SPATIAL MAPPING OF SEXUAL NETWORK LOCATIONS AND UTILIZATION OF HIV/STI PREVENTIVE SERVICES AMONG LONG-DISTANCE TRUCK DRIVERS USING THE NORTHERN CORRIDOR HIGHWAY, KENYA

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Spatial Mapping of Sexual Network Locations and Utilization of HIV/STI Preventive Services among Long-distance Truck Drivers Using the Northern Corridor Highway, Kenya

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University.

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DEDICATION

I dedicate this work to my beloved mother, Josephine Mueni, for her exemplary role in supporting and encouraging me throughout my academic journey. I also dedicate this work to my wife and children for their practical and emotional support, which they offered generously during my study time.

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ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
ART	Antiretroviral Therapy
EMOD	Epidemiological Modeling Software
FSWs	Female Sex Workers
HIV	Human Immunodeficiency Virus
IOM	International Organization of Migration
KMCC	Knowledge Management and Communications Capacity
LDTDs	Long-Distance Truck Drivers
MSMs	Men who have Sex with Men
NASCOP	National AIDS and STIs Control Programme
NCTTCA	Northern Corridor Transit and Transport Coordination Authority
SSA	Sub-Saharan Africa
STIs	Sexually Transmitted Infections
UNAIDS	Joint United Nations Programme on HIV/AIDS
WHO	World Health Organization

DEFINITION OF TERMS

Sexual networks	The sexual relationship links that an individual forms with his/her sexual partners; defined by the number of sexual partners, the newness of the sexual partners (casual or regular), centrality (presence of a high-risk sexual partner like one who is infected with HIV or STIs in a sexual network), and core groups (most-at-risk groups).
Casual sexual partner	A new sexual partner whom an individual is meeting for the first time, with no previous sexual ties, and does not intend to sustain the sexual partnership to the future.
Regular sexual partner	A sexual partner whom an individual is not meeting for the first time, has had previous sexual ties or has been in frequent sexual interactions over time.
Hotspot	An area of a higher concentration of events (sexual network locations for this study) compared to the random distribution of events in other regions.
Sexual interaction	A situation in which two or more individuals make penetrative sexual contact through genitalia, oral or anal.
Sexual act	Sexual contact by penetration of the male genitalia to the female genitalia, or anus, contact through mouth and genitalia, contact through finger and genitalia of two different people.

ABSTRACT

Globally, long-distance truck drivers (LDTDs) are highly vulnerable to risky sexual networks while on transit. Moreover, the LDTDs have limited access to HIV and sexually transmitted infection (HIV&STI) preventive services. In Kenya, along the Northern Corridor highway, little is known about the distribution of the sexual network locations used by the LDTDs, making it hard to provide spatially targeted HIV/STI preventive interventions. The general objective was to determine the spatial distribution of sexual network locations and utilization levels of HIV/STI preventive services among LDTDs using the Northern Corridor highway in Kenya. A cross-sectional study was conducted among 296 LDTDs who made a stopover at Mlolongo weighbridge in Machakos. The LDTDs listed their history of sexual interactions and highway stopovers used over the week preceding data collection, together with their patterns of utilization of HIV/STI preventive services while on transit. Shapefiles were created and overlaid over the map of Kenya using the R statistical software to create maps of sexual network locations. Descriptive statistics yielded; socio-demographic & socioeconomic characteristics, frequency of sexual interactions, and utilization levels of HIV/STI preventive services among study participants. A composite outcome variable on utilization of HIV/STI preventive services was derived from; condom use, history of HIV testing, frequency of HIV testing, antiretroviral therapy (ART) use, and STI treatment. Ordered logistic regression and binomial logistic regression were used to determine the factors associated with the frequency of sexual interactions and the utilization of HIV/STI preventive services. The mean age of study participants was 38.4 years, ranging from 24-57 years. Generally, clusters of sexual network hotspots among the LDTDs were restricted to the outskirts of major cities along the Northern Corridor highway (Nairobi, Mombasa and Nakuru) and the Kenya-Uganda international border. The majority of the respondents, 231 (78.0%) had good utilization of HIV/STI preventive services, while the rest, 65 (22%), had limited utilization. The number of weeks spent on a transit journey, that is, one week (OR=1.89, 95% CI: 1.02, 3.53; P=0.045), two weeks and above (OR=4.16, 95% CI: 2.25, 7.81; P<0.001), as well as age (OR=0.91, 95% CI: 0.88, 0.95; P<0.001), use of alcohol (OR=10.9, 95% CI: 5.33, 22.9; P<0.001) and Khat (OR=7.05, 95% CI: 3.46, 14.75; P<0.001), were independently associated with a high frequency of sexual interactions among LDTDs involved in the study. Only the history of STIs (OR=8.4, 95% CI: 4.5, 16.7; P<0.001) among the LDTDs was independently associated with the utilization of HIV/STI preventive services. In conclusion, the distribution of sexual network hotspots is generally restricted to the Kenya/Uganda border, and proximally to major urban areas along the Northern Corridor highway. Despite 78% in good utilization of HIV/STI preventive services, uptake of the subsequent HIV testing services among the LDTDs is still low at 4.9%. More HIV/STI preventive interventions should be focused on the young LDTDs, those who spent above one week on transit, and those who use alcohol and khat due to their high frequency of sexual interactions. Further research is recommended to determine the factors influencing the uptake of subsequent HIV testing services among the LDTDs, to scale up the low uptake of 4.9% identified in this study.

CHAPTER ONE

INTRODUCTION

1.1 Background

The Long-distance truck drivers (LDTDs) are central to the challenges faced in the fight against Human Immunodeficiency Virus (HIV) and sexually transmitted infections (HIV/STIs) in large part due to risky sexual networks arising from the nature of their mobile career (Apostolopoulos et al., 2010; Makhakhe et al., 2017). The sexual networks of the LDTDs result from several factors, including but not limited to multiple sexual partners, concurrent sexual interactions, and risky sexual behaviours (Apostolopoulos et al., 2010). Consequently, the risky sexual networks aggravate the transmission of HIV and other STIs like Chlamydia, Syphilis and Gonorrhea, among the LDTDs and their sexual partners (Makhakhe et al., 2017). Moreover, the risk of HIV and STI infection outcomes among the LDTDs is partly attributable to sub-optimal access and underutilization of HIV/STI preventive services (Lalla-Edward et al., 2017).

Geographic Information System (GIS) techniques have proven indispensable for the visualization of health-related data in solving various health problems (Boyda et al., 2019). Indeed, spatial data has previously guided spatially targeted interventions like condom distribution, HIV testing, and STI treatment (Dobra et al., 2017; Bershteyn et al., 2018). However, in most developing countries, the spatial dimension of HIV/STI control remains inadequately exploited (Muleia et al., 2020). As a result, under exploitation of geospatial techniques has led to a lack of prioritization in the distribution and allocation of limited HIV/STI preventive resources (Boyda et al., 2019).

Globally, the most-at-risk population groups, who include LDTDs, accounted for 54% and 62% of all new HIV infections in the year 2018 and 2019, respectively (United Nations Programme on HIV/AIDS (UNAIDS), 2019; UNAIDS, 2020). Female Sex Workers (FSWs) are the highest among the most-at-risk population groups on major

highways and the most vulnerable to HIV/STI infections (UNAIDS, 2019). Along the major highways, LDTDs account for the highest number of FSWs' clients (Ferguson & Morris, 2007). Therefore, LDTDs have continually stood out as a critical bridge of HIV/STI infection between the sex workers and the general population in many parts of the world (Sawal et al., 2016).

Sub-Saharan Africa (SSA) suffers the highest burden of HIV globally (UNAIDS, 2019). The most at-risk population groups and their sexual partners in this region accounted for 69% of new HIV infections in West and Central Africa and 28% in Eastern and South African regions in 2019 (UNAIDS, 2020). Suboptimal access to HIV/STI preventive services along the highways in this region has also been associated with the high risk of HIV/STIs infection among LDTDs (Makhakhe et al., 2017).

In Kenya, the Northern Corridor highway is known for sexual networks majorly from FSWs and LDTDs. While spatial mapping has been utilized to depict population size estimates and transactional sex among FSWs, limited evidence is available on the spatial distribution of sexual network locations used by the LDTDs (Ferguson & Morris, 2007; Odek et al., 2014). Further, key challenges like long hours on transit and the inability to access healthcare services during normal working hours, are known to negatively shape the utilization of HIV/STI interventions among the LDTDs on the Northern Corridor highway (Kelvin et al., 2019; Gachohi et al., 2020).

1.2 Statement of the Problem

While the mapping of transactional sex revealed 5600 FSWs on the 39 key hotspots on the Kenyan Northern Corridor highway (Ferguson & Morris, 2007), the distribution of sexual network locations used by the LDTDs is not well understood. Previous research has laid much emphasis on the FSWs while excluding the LDTDs who constitute a majority of the risky sexual networks on the Northern Corridor highway (Ferguson & Morris, 2007; Odek et al., 2014). Consequently, it becomes difficult for healthcare

stakeholders to provide spatially targeted HIV/STI preventive services among LDTDs, hence poor allocation and distribution of key resources like condoms, HIV testing kits, and STI drugs (Cuadros et al., 2017; Bershteyn et al., 2018; Dobra et al., 2018).

The poor distribution of health resources has led to the underutilization of HIV/STI preventive services among the LDTDs. The result has been an HIV prevalence of 26% and 17.8% recorded previously among the LDTDs which is high, compared to the general population in Kenya (Rakwar et al., 1999; Strauss et al., 2018). The high HIV prevalence among the LDTDs may negatively affect their general health well-being, hence sub-optimal economic productivity in the Long-distance trucking industry and Kenya.

1.3 Justification of the study

This study targeted LDTDs, whose spatial role in transmitting HIV and STIs is not well characterized in developing countries. Mapping the sexual network locations used by the LDTDs identified hotspots that need spatially-targeted HIV/STI preventive services. Spatially-targeted interventions can guide planning, decision making, monitoring and evaluation, and policy formulation for HIV/STIs prevention programs (Cuadros et al., 2013; Tanser et al., 2018).

By understanding the spatial distribution of sexual network locations, the LDTDs and their sexual partners will be made aware of high-risk highway stopovers (sexual network hotspots), which may positively influence their sexual behaviour towards a lesser risk of HIV/STIs exposure. The study findings will aid policymakers in revising or improving existing policies to enhance the availability of more HIV/STI preventive services. Improved policies will also aid LDTDs and their sexual partners towards lesser risky sexual behaviours and improved access to HIV/STI preventive services.

This study will inform the Ministry of Health and HIV programming stakeholders on LDTDs' healthcare needs that need priority and improved interventions. Improved health care interventions will help to combat the transmission of new HIV/STIs among LDTDs,

their sexual partners, and the general population. Therefore, reduced rates of HIV/STI infections will improve the general human health well-being, hence more economic productivity in the Long-distance trucking industry in Kenya and East Africa.

1.4 Objectives

1.4.1 General Objective

The general objective was to determine the spatial distribution of sexual network locations and utilization of HIV/STI preventive services among Long-distance truck drivers using the Northern Corridor highway.

1.4.2 Specific Objectives

The specific objectives were:

1. To establish the spatial distribution of sexual network locations used by Long-distance truck drivers along the Northern Corridor highway.
2. To determine the frequency of sexual interactions among Long-distance truck drivers using the Northern Corridor highway.
3. To determine the levels of utilization of HIV/STI preventive services among the Long-distance truck drivers using the Northern Corridor highway.
4. To determine the factors associated with the frequency of sexual interactions among Long-distance truck drivers using the Northern Corridor highway.
5. To determine the factors associated with the utilization of HIV/STI preventive services among the Long-distance truck drivers using the Northern Corridor highway.

1.5 Research Questions

The research questions were:

1. What is the spatial distribution of sexual locations used by Long-distance truck drivers along the Northern Corridor highway?
2. What is the frequency of sexual interactions among Long-distance truck drivers using the Northern Corridor highway and associated individual factors?
3. What are the levels of utilization of HIV/STI preventive services among the Long-distance truck drivers using the Northern Corridor highway?
4. What are the risk factors associated with the frequency of sexual interactions among Long-distance truck drivers using the Northern Corridor highway?
5. What are the factors associated with the utilization of HIV/STI preventive services among the Long-distance truck drivers using the Northern Corridor highway?

1.6 Conceptual Framework

Different variables derived from the literature review were used to design a conceptual framework, which illustrates how independent and intermediate variables are linked to the outcome of the study, Figure 1.1.

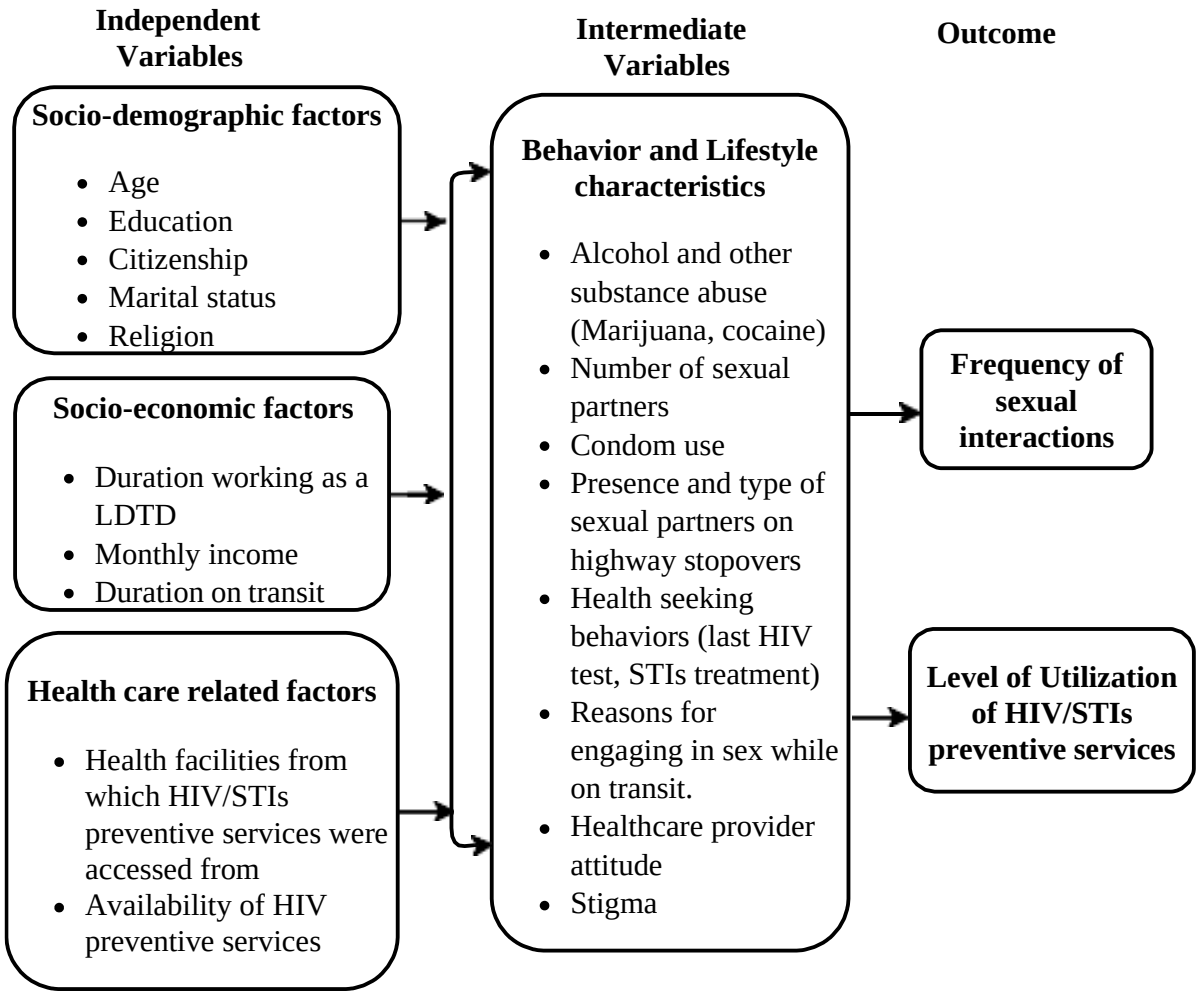

Figure 1. 1: Conceptual framework on the associative linkage between independent and dependent variables. Source, Author.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this section, existing literature was reviewed from; global, regional, and local perspectives. The use of spatial techniques in understanding the distribution of sexual networks and HIV/STIs control, the frequency of sexual interactions, and utilization of HIV/STI preventive services and associated factors were highlighted and critiqued to identify gaps in knowledge and synthesize key findings from past studies. This approach enabled the formulation of suitable strategies, materials, and methods that would inform the study's scope.

2.2 Structure and components of sexual networks

Sexual networks are the relationship links that an individual forms with his or her sexual partners. Different partners involved in concurrent sexual partnerships facilitate the interconnectedness of different sexual networks. As a result, the interconnection of the different sexual networks leads to a sustained transmission of HIV and other STIs within those sexual networks. The number of sexual partners, the randomness of the sexual partners (casual and regular), core groups (the most-at-risk like female sex workers), and the presence of sexual partners with certain high-risk traits like infection with STIs or HIV are the key concepts of a sexual network (Wohlfeiler & Potterat, 2003; Schmid & Kretzschmar, 2012). Therefore, understanding the dynamics embedded in a sexual network like their places of convergence (locations) and the type of the sexual partners can inform certain interventions like partner notification, condom distribution, HIV testing, and STI treatment.

Doherty et al. (2005), in their study on determinants of sexual networks, in San Francisco, U.S.A, highlighted Egocentric and Socio-metric approaches used in sexual network

analysis. The egocentric analysis approach relies on information only drawn from a primary index partner about the other sexual partners within his/her sexual network (Doherty et al., 2005). Unlike the Egocentric, the Socio-metric approach relies on data derived from all sexual partners within a given sexual network. Sexual networks are the sexual linkages and network-related behaviours of an individual or the entire network group (Doherty et al., 2005). Notable key components of a sexual network are the type of sexual partners (casual or regular), frequency of sexual interactions, condom use, drug and substance use, and duration of the sexual partnership. The distribution of the aforementioned sexual network components is determined by; political, economic, social, and cultural factors (Doherty et al., 2005). The sexual network density is the overall actual ties among the members of a given sexual network. Denser sexual networks denote high contact rates among people, hence a higher opportunity for transmission of HIV and STIs. For this study, an egocentric approach was employed among LDTDs to define their sexual networks' nature and how they were distributed along the Northern Corridor highway.

In the U.S, Apostolopoulos et al. (2015), found an association between LDTDs' sexual networks and the risk topography of HIV/STIs. The sexual networks involving the LDTDs were characterized by substance abuse, with cocaine as the most used drug (Apostolopoulos et al., 2015). Findings from this study highlight how certain sexual networks may have risky behaviours likely to aggravate HIV/STIs among members of the same networks.

Gesink et al. (2018), using integrative mixed methods, interviewed 31 MSMs in Toronto, Canada, letting them map their sexual networks for the preceding three months. Their findings identified six distinct sexual networks (hosters, house callers, privates, rovers, travellers, and geo-flexibles) with different characteristics. Their findings revealed that (hosters and rovers) had contracted either syphilis or HIV at some point. Their findings further showed that an HIV and Gonorrhea infection was highest among (geo-flexibles, hosters, and rovers). In their conclusion, they denote that HIV/STI preventive services should be prioritized in groups and regions with high transmission levels. This study notes

that understanding the sexual network topology in which LDTDs and their sexual partners are immersed can aid in focused interventions that will eventually save scarce health resources.

In Malawi, Palk and Blower (2018), revealed geographic variations in the distribution of sexual networks. The study explains that the distribution patterns of sexual behaviours may predict the intensity of HIV across different regions. Further, the same study highlights the role of mobile populations (who include LDTDs) in spreading diseases, and especially HIV/STIs, to different regions. A different study revealed how individual sexual behaviours could create a chain of transmission from high-risk groups to low-risk groups (Awad et al., 2012). Findings from the two studies shed light on the link between certain components of sexual networks (sexual behaviours) and how such sexual behaviours can predict the severity of HIV/STIs across different geographical locations.

Awad et al. (2012) found that HIV prevalence was consistent in certain risk groups with common sexual networks. Findings from this study highlight how sexual networks may contribute to the spread of HIV/STIs, especially when the network involves risky behaviours like poor condom use or substance abuse. As indicated from the above findings, the need to identify sexual networks and the components embedded therein (condom use trends) cannot be overemphasized.

In Uganda, Kuhanen (2010), in their study of sexual networking and the emergence of AIDS, identified dense sexual networks characterized by risky sexual behaviours like poor condom use and drug abuse within the growing urban town of Rakai. They further noted that changing the economic levels of the town and changing sexual culture were linked to the rapid spread of HIV/AIDS. This study highlights how economic changes may influence the development of sexual networks and the spread of HIV and other STIs.

Ferguson and Morris (2007) observed an interplay in certain components of a sexual network like sexual partners (casual and regular) and condom use in Kenya. The study

shows that condom use was 79% among LDTDs having sexual interactions with casual sex workers compared to 69% among regular sexual partners. Findings from this study may inform the specific sub-categories of a sexual network that need more targeted interventions in the control of HIV/STIs (for this case, LDTDs interacting with regular sexual partners with low rates of condom use).

2.3 Geospatial approaches in HIV/STIs control

Geospatial techniques have been widely used in displaying the spatial distribution of HIV/STIs and related risk factors in Africa and other parts of the world. Visualization of areas where HIV preventive services can be found has also been enabled using geospatial approaches. Additionally, HIV prevalence, mortality, and incidence rates in different regions both locally and internationally have been made possible by using maps generated with geospatial techniques (Boyda et al., 2019). Therefore, the information generated through geospatial techniques can guide spatially targeted interventions like condom distribution and HIV testing (Zulu et al., 2014; Cuadros et al., 2017; Bershteyn et al., 2018; Dobra et al., 2017).

According to a study done in the US, the variability of risky sexual traits among LDTDs may be influenced by a given geographical location's social and economic activities (Apostolopoulos et al., 2015). Apostolopoulos et al. (2015) continue to argue that locations (stopovers) close to urban areas that exhibit a high volume of social and economic activities are likely to have intensive sexual interactions characterized by risky sexual behaviours. Distance to major urban areas in Malawi was an explaining factor for high HIV prevalence, closely linked to sexual interactions involving risky behaviours (Zulu et al., 2014). Other studies have also had similar outcomes (Cuadros et al., 2017; Palk & Blower, 2018). Findings from this study indicate how the spatial variability in the distribution of sexual traits among LDTDs may also point to the regions with a high prevalence of HIV/STIs. Clustering different highway locations (stopovers) according to

the intensity of risky sexual traits exhibited may aid in tailored HIV/STI preventive services for the LDTDs.

Contrary to the outcome of the two studies mentioned above, a study in Malawi found that risky behaviours and HIV prevalence were high in rural settings (Coburn et al., 2017). This outcome was attributed to the mobility of individuals from regions of high HIV prevalence to lesser risky regions. Findings from this study highlight the role of mobility in the diffusion of HIV/STIs, from regions of high prevalence to regions of low prevalence.

In Malawi, a study found that the geographic distribution of sexual behaviours may predict the severity of HIV across different regions (Palk & Blower, 2018). Another study revealed an association between socioeconomic, migration, sexual behaviour dynamics, and high HIV prevalence in different regions of sub-Saharan Africa (Bulstra et al., 2020). The two studies highlighted here show how risky sexual behaviours (poor condom use, drug and substance abuse) exhibited in different geographic regions may predict the spread of HIV/STIs transmission while guiding on possible mitigation measures.

International border points have been shown to create an enabling environment for LDTDs to engage in sexual interactions with casual and regular sexual partners. For instance, in Tanzania, it was found that delays at the international border towns contributed to alcohol drinking and risky sexual behaviours among LDTDs (Kohli et al., 2017). When LDTDs overstay at the international border points waiting for clearance, they find an opportunity to interact with more casual sexual partners while at the same time building new opportunities for newer regular sexual partners (Michalopoulos et al., (2016). Findings from the two studies show how certain unique factors associated with certain geographical regions (overstaying at international border points) can create an enabling environment for risky sexual behaviours, encouraging the spread of HIV/STIs at international levels.

In Sub-Saharan Africa, Cuadros et al. (2013) used demographic health survey data from 20 Sub-Saharan countries to compare spatial clusters with high and low HIV infections using the Kulldorff spatial scan test. Their findings established that about 14% of the Sub-Saharan population lived in intensive HIV epidemics. In comparison, 16% lived in low HIV prevalence regions where behavioural and biological protective factors may have slowed transmission. Their findings further showed 38 clusters with high HIV prevalence and 45 clusters with low HIV prevalence. These findings reveal priority geographic regions that need spatially targeted HIV interventions.

In Kwa-Zulu Natal, South Africa, Tanser et al. (2018) conducted a population-based cohort study of 17,984 HIV-negative individuals aged between 15 to 54 years. All participants were geo-located to their homestead of residence. A two-dimensional Gaussian kernel of 3 kilometres radius was employed to produce robust estimates of HIV incidence across different geographical regions. Their findings identified three large irregularly-shaped clusters with an HIV relative risk of 1.6, 1.7, and 2.3 in two peri-urban communities near the main highway. They further revealed that the rate of new HIV infection in the three regions was 70% compared to other regions. This study identifies a corridor of HIV transmission associated with urbanization and proximity to a major highway.

In East Africa, the main road network of the Northern Corridor highway runs from Mombasa Sea Port through Kenya and Uganda to Kigali in Rwanda, Bujumbura in Burundi, to Kisangani in the Democratic Republic of Congo (Northern Corridor Transit and Transport Coordination Authority (NCTTCA), 2019). The highway is characterized by road stopovers, which have diverse most at-risk groups like Female Sex Workers and LDTDs (International Organisation of Migration (IOM), 2011). A map of the Northern Corridor highway showing major towns, minor towns, and country boundaries has been provided, (Appendix I) (NCTTCA, 2019).

In Kenya, Odek et al. (2014), using a geographic approach system, interviewed 11,609 secondary key informants and 6,360 FSWs. In their findings, they identified 10,670 places 'hotspots' where the FSWs converged for sex work. These findings imply that HIV/STIs prevention should be channelled to these hotspots where the FSWs converge. However, the study focused only on FSWs, excluding other key population groups like MSMs; it may not give a clear and complete picture of sex workers' population patterns in Kenya.

Another study on the size estimation of key population groups in Nairobi Kenya revealed that there were 11 042 MSMs, 29 494 FSWs, and 6 107 injecting drug users in the city (Okal et al., 2013). These findings highlight the opportunity for policy formulation and targeted interventions when the size estimates of the key population groups are known. Since the study did not target LDTDs among the key population groups, their population estimates are not known, hence difficult in planning for targeted interventions.

Most of the studies reviewed in this section did not focus more on Long-distance truck drivers. Though the studies highlighted several key aspects like sexual network determinants, sexual network density, distribution, and HIV/STI transmission, much about the same is unknown among Long-distance truck drivers. Using the Egocentric social network analysis approach, we will use LDTDs in our study to inform us about their sexual networks. This approach will identify their sexual network density, their determinants, and how they are distributed across the Northern Corridor highway.

2.4 Sexual interactions among the Long-distance truck drivers

Long-distance truck drivers are faced with a wide range of occupational-related challenges, which make them vulnerable to HIV/STIs while on transit (KMCC, 2014; Makhakhe et al., 2017). The vulnerability of LDTDs to HIV/STI infections is attributed to; separation from regular sexual partners, traversing regions with high HIV prevalence, unsafe sexual networks, and concurrent sexual interactions with sex workers (Apostolopoulos et al., 2011; Makhakhe et al., 2017). Sexual interactions characterized

by risky sexual behaviours like drug and substance use and poor condom use have been widely revealed in previous studies (Apostolopoulos et al., 2010; Apostolopoulos et al., 2011).

Studies in Bangladesh and South Africa indicated that LDTDs had more sexual interactions with casual sexual partners than regular sexual partners (Gibney et al., 2003; Makhakhe et al., 2017). Another study done in Mozambique revealed that 34.7% of the 322 participants in the study had more than three casual sexual partners (Botao et al., 2016). As opposed to the study findings in Bangladesh, Mozambique, and South Africa, a study in Nigeria found that slightly more than half (52%) of the LDTDs had more sexual interactions with regular sexual partners compared to casual sexual partners. These findings imply that preferences of sexual partners among LDTDs may vary from one region to the other or maybe across different highway stopovers. Understanding partner choice and the influencing factors may assist in packaging the HIV/STIs preventive services and knowing who to target with the same interventions.

Risky sexual behaviours among LDTDs may vary across different sexual partnerships. For instance, studies in Nigeria, South Africa, and Mozambique, showed that condom use was high among sexual interactions involving LDTDs and their casual sex partners, as opposed to regular sexual partners (Sunmola, 2005; Makhakhe et al., 2017; Botao et al., 2016). In Kenya, Ferguson and Morris, (2007) found a 90% rate of condom use among sexual interactions with casual partners, and 69% condom use among regular sexual partners. Contrary to the findings above here, a study in Togo, found low rates of condom use among LDTDs and casual sexual partners (Yaya et al., 2016). The studies highlighted here point to the need to identify which sexual partnerships have low condom use, to guide focused HIV/STIs preventive interventions.

Studies have also gone further to identify reasons for the lack of condom use during sexual interactions among LDTDs. In India, study participants listed their reasons for not using condoms during sexual interactions as follows; non-availability of the condoms, feeling

unease during sexual intercourse, and lack of perceived risk of HIV/STIs (Singh & Joshi, 2012). Studies done in India and Mexico indicated that lack of perceived risk of HIV/STI infection during sexual interactions with regular sexual partners was the main reason for not using condoms (Pandey et al., 2008; Ulibarri et al., 2012). In Nigeria, Lawal and Olley (2017), in their cross-sectional survey of 154 LDTDs, identified that perceived vulnerability to HIV/STIs had a significant negative association with risky sexual behaviours like poor condom use. In Zambia, condom use with regular sexual partners was said to bring suspicion and mistrust between LDTDs and their regular sexual partners (Michalopoulos et al., 2016).

Further, evidence shows that sexual interactions between LDTDs and their sexual partners are characterized by drug and substance use. A study in India found that excessive alcohol during or before sexual intercourse can impair decision-making, hence a potential influence on risky sexual behaviour like poor condom use (Steward et al., 2017). In Brazil, a study by Malta et al. (2006) found that two-thirds of the long-distance truck drivers involved in their study used alcohol weekly, especially during sexual intercourse.

A study done in Mozambique revealed that 34.7% of the 322 participants involved in the study had more than three casual sexual partners (Botao et al., 2016). Of the 322 interviewed, 23.3% had sexual intercourse on their last trip. These findings reveal high levels of sexual interactions that are likely to fuel more HIV/STI infections among the LDTDs and their partners if HIV/STIs preventive measures like proper condom use are not observed.

Ferguson and Morris (2007), made an interesting revelation in their study of mapping transactional sex on the Kenyan Northern Corridor highway. From the 39 key hotspots identified in their study, LDTDs accounted for the FSWs' highest number of sexual clients. The FSWs interviewed were revealed to have had an estimated 13.6 sexual partners, and 54.2 sex acts in a month. However, the investigators disclosed that little was known about

the sexual networks of the FSWs and LDTDs involved in the study, hence an opportunity for further research.

2.5 Factors associated with frequency of sexual interactions

In India, Singh & Joshi (2012) observed that LDTDs who spent 15 days and above on transit were more likely to engage in sexual interactions with casual sexual partners compared to those who spent a shorter duration. Equally, in South Africa, Delany-Moretlwe et al. (2014) found that LDTDs who spent 4 weeks on a transit journey were more likely to engage in sexual interactions and were 1.5 times more likely to have HIV infection. Additionally, In India, another study found that spending 10 days and above among LDTDs increased their chances of engaging in paid sexual intercourse (Pandey et al., 2008). In contrast, another study done in India found no significant association between time spent on a transit journey and the frequency of sexual interactions among LDTDs (Maarefvand et al., 2016). The implication that we draw from these studies is that the longer the duration spent on a transit journey, the higher the risk of engaging in risky sexual behaviours, which aggravates the risk of contracting HIV/STIs among LDTDs.

In India, Singh and Joshi (2012), found that level of income and marital statuses were significantly associated with the frequency of sexual interactions. Singh and Joshi (2012) continue to argue that unmarried LDTDs were more likely to engage in HIV risky behaviours compared to their married counterparts. In South Africa, Delany-Moretlwe et al. (2014) identified that unmarried LDTDs were more likely to engage in frequent unsafe sex compared to married LDTDs. Furthermore, Pandey et al. (2012) discovered that unmarried LDTDs were more likely to engage in sexual interactions and more likely to be infected with HIV. In contrast, another study found that marital status did not significantly associate with the frequency of sexual interactions (Maarefvand et al., 2016). In Togo, a study found that education and duration as a LDTD were significantly associated with condom use in sexual interactions (Yaya et al., 2016).

Drug and substance abuse has been associated with risky sexual behaviours among LDTDs. For instance, in India, a study found that LDTDs who used alcohol during or before sexual interactions were more likely to engage in sexual interactions compared to those who did not (Singh et al., 2012). Elsewhere in New Mexico, a study revealed that the exchange of injectable illicit drugs like cocaine played a significant role in the frequency of sexual interactions between the LDTDs and their sexual partners (McCree et al., 2010). Five drivers interviewed in a focused group discussion revealed that due to heroin addiction, they offered free sex to rich white women along the highways in the exchange for drugs. Contrary to the findings highlighted above here, a study done in Nigeria found no significant association between substance use and the frequency of sexual interactions (Sunmola et al., 2005). These studies reveal the role of drugs in fueling the frequency of sexual interactions among LDTDs and their sexual partners.

In Sub-Saharan Africa, existing studies indicate that LDTDs experience sexual interactions similar to those witnessed in other parts of the world. In South Africa, Makhakhe et al. (2017) identified that sex work on the highways was characterized by competitiveness and sometimes violence among FSWs over LDTDs. They reported that some FSWs were willing to have sex without condoms to win on LDTDs. They also reported various sexual preferences from LDTDs like anal, oral, and vaginal sex. The study further identified some FSWs using oil-based lubricants for anal sex with LDTDs, unlike the recommended water-based lubricants. Other FSWs were reported to have based their decisions on condom use on the physical appearance of their LDTD clients. We conclude that careless sexual interactions fueled by competition among sex workers may lead to high HIV/STIs infection rates among the LDTDs and their sexual partners.

In Nigeria, Lawal and Olley (2017), in their cross-sectional survey of 154 LDTDs, identified that perceived vulnerability to HIV/STIs had a significant negative association with risky sexual interactions. LDTDs who perceived themselves as vulnerable to HIV/STIs infection were less likely to engage in careless and unplanned sex with sex workers compared to those who did not. From this study, it is essential to note that an

individual's perception of vulnerability to HIV/STIs is likely to positively change his sexual behaviours and reduce careless sexual interactions.

In East Africa, Tanzania, Cox et al. (2014) studied determinants of concurrent sexual partnerships. Their findings found that unmet expectations within a sexual relationship, comparison of a sexual partnership with others, diminishing rewards in a sexual relationship, financial and material dissatisfaction influenced the duration and frequency of sexual relationships. It is significant to note from these findings that besides the sexual interactions, other unrelated factors influence the sustainability of the sexual relationship.

In Kenya, Romo et al. (2019) did a study on depression and its effect on sexual risk behaviours among 284 Long-distance truck drivers. Their findings identified that depressive mental disorder was significantly associated with a high number of condom-less sexual partners. 27.3% of the participants interviewed reported having more than three sexual partners. It was further revealed that 53.5% of the drivers interviewed reported having abused alcohol.

2.6 Utilization of HIV/STI preventive services

In New Mexico, a qualitative study on sexual and drug use behaviours revealed some factors that acted as barriers to access and utilization of HIV/STI preventive services (McCree et al., 2010). Respondents disclosed that lack of health insurance cover, mistrust, lack of confidentiality to health care providers, and inability to keep hospital appointment dates had posed key challenges towards meeting their health care needs. In Zambia, a study found that LDTDs worked on tight schedules, with very little time to rest, to beat deadlines of delivering goods to the destination points within the required time frame (Michalopoulos et al., 2016). Most of the truck drivers interviewed further revealed that since they only got time to rest on weekends, most of the facilities offering health care services were closed. These studies demonstrate the key barriers that could hinder access to health care services for LDTDs not only in Mexico and Zambia but also in other regions.

Addressing such challenges may ease access to the services and reduce new HIV/STI infections.

Apostolopoulos et al. (2011) identified below average utilization levels of condoms among LDTDs who sought sex from gay partners in the USA. The respondents revealed that the stigma of being seen with condoms by their fellow truckers, who would associate it with engaging in casual sex with FSWs, also hindered their consistency in its use. This study demonstrates the role stigma can play in the utilization of HIV/STI services among LDTDs.

Ishtiaq et al. (2017), in their findings on STIs infection among LDTDs, found that (40%) of those who were interviewed had experienced symptoms of infection in Southern Punjab, Pakistan. They further highlighted that these LDTDs had poor knowledge of condom use, and most of them engaged in unprotected sexual intercourse. Most of those who had STI infections did not report having sought timely diagnosis and treatment before. They attributed this to a lack of adequate health care facilities along the highways. Other LDTDs reported that they had faced difficulties accessing HIV anti-retroviral treatment drugs due to a negative attitude of the health care providers, who acted reluctant and unconcerned with their confidentiality. From this study, we note delayed diagnosis and treatment of LDTDs who had contracted STIs. Delayed treatment of STIs can lead to a worse prognosis of the disease and high chances of infecting the sexual partners. We also note that healthcare provider attitudes can negatively affect healthcare-seeking behaviours of LDTDs, especially when confidentiality is not taken seriously.

In Sub-Saharan Africa, a study in Maputo, Mozambique, revealed that a third of the LDTDs had never been tested for HIV. In contrast, 75% of those interviewed had not received free condoms, lubricants, and HIV/STI preventive information in the last 12 months (Botao et al., 2016). Of those interviewed, 76.5% reported having not used condoms in their last sexual act. A study done in Kenya by Ferguson and Morris (2007) found that 79% of bars and other entertainment joints provided free condoms for LDTDs.

From the studies highlighted here, we note that LDTDs are faced with inadequate access to condoms. Consequently, the shortage of condoms may aggravate the risk of HIV/STI infection among LDTDs.

Lalla-edward et al. (2016), in their meta-analysis study on the availability of healthcare programs targeted for LDTDs in 30 Sub-Saharan Africa countries, found that all the programs had a primary focus on HIV/STIs prevention. Only three programs extended their services to cover other primary health care needs among the LDTDs. It was identified that the presence of these programs had a significant role in the reduction of risky sexual behaviours, knowledge, and attitudes on HIV/STIs among the LDTDs. It was noted that external donors funded most of these programs, with only three being funded by trucking companies. Due to limited information and studies on the availability of HIV/STIs preventive services for LDTDs in SSA, much about the same remained unknown. We draw from these findings that knowledge about the availability of HIV/STI preventive services would improve its access.

Lalla-edward et al. (2017) identified that the most accessed services by LDTDs in South Africa were primary health care 62%, followed by HIV preventive, treatment and care services 32%, and STIs/TB/Malaria preventive and treatment services 6%. These findings were computed from a total of 16,888 visits accessed by 13,252 LDTDs within two years. This study highlights the priority of health care needs, which are specific to the LDTDs. Given that the most accessed services were primary health care needs, it would point out the missed opportunities in provider-initiated testing and counselling.

A study done in Kwa-Zulu Natal, South Africa, demonstrated that 53% of the LDTDs interviewed had no access to free condoms (Ramjee, & Gouws, 2002). Their findings further revealed a high HIV prevalence of 56% among the LDTDs interviewed. However, we cannot ascertain whether the high HIV prevalence was solely due to inadequate access to free condoms or other factors.

In Mozambique, Botao et al. (2016) discovered that 65.8% of the LDTDs had been tested for HIV. Likewise, in another study in Togo, Yaya et al. (2016) found that 47.4% of a similar population had been tested for HIV before. In Nigeria, Atilola et al. (2010) identified low utilization levels of HIV testing (36.4%) among Long-distance truck drivers. Nonetheless, another study done in Kenya on the LDTDs revealed that 73.1% of them had not been tested for HIV in the past year, whereas the mean frequency of HIV testing for those tested within that year was 5.9 months (Kelvin et al., 2019). The understanding that we draw from these studies is that HIV testing among LDTDs is still dismal. Therefore, improvement is needed to achieve the recommended frequency of 3 months of HIV testing among the most at-risk populations, which include the LDTDs.

In East Africa, Tanzania, a study on the effects of peer education and condom use by Laukamm-Josten et al. (2000) revealed that self-reported condom use increased by 50-74% among LDTDs. The increased condom use resulted from the intervention of peer education on condom use among truck drivers. We note how focused interventions can positively impact HIV/STI preventive measures among Long-distance truck drivers from these study findings.

According to Kelvin et al. (2019), providing a comprehensive package of primary health care and HIV/STIs preventive services may improve the utilization of HIV/STIs services among the LDTDs in Kenya. This understanding implies that tailored services that address both communicable and non-communicable services may improve the uptake of the health care services among the LDTDs.

A study by Strauss et al. (2018) on preferences for HIV testing among truck drivers in Kenya concluded that offering oral HIV testing at the wellness centres along the highways may improve the uptake of HIV testing among the LDTDs. The improved uptake was associated with the non-invasive nature of the test kits which do not inflict pain on the users. The understanding that we draw from this outcome is that packaging the HIV/STIs preventive services that suit the preferences of LDTDs may lead to improved uptake of

the services. Since those who never accessed the wellness clinics were left out during the interview, these findings may be inconclusive.

In Kenya, Kelvin et al. (2019) identified that informing the LDTDs on the availability of HIV testing through mobile phone texts increased uptake of the service. This outcome shows the importance of conveying information on the availability of the services to the LDTDs. Since some of the LDTDs may have been illiterate, they may have missed the services because they would not understand the information sent to them through the mobile phone texts.

George et al. (2018) argue that however much a service may be available if the service costs are unaffordable to the LDTDs, uptake may be very minimal among LDTDs in Kenya. This study highlights the importance of managing the costs of HIV/STI preventive services to meet the economic capabilities of the LDTDs. The more affordable service is to the LDTDs, the more they will access it, hence early detection of diseases like HIV, linkage to care, and timely viral suppression reducing rates of the new transmission.

2.7 Factors associated with utilization of HIV/STI preventive services

A study done in Spain revealed that a history of STIs was associated with the utilization of HIV/STI preventive services (Fernandez-Balbuena et al., 2016). Recent guidelines recommend integrating STI and HIV services for cost-effective use of resources and maximizing the opportunity to identify new cases of HIV infection from those who present with STI symptoms (UNAIDS,2020). This is because STIs share a common mode of transmission with HIV while at the same time increasing the risk of HIV infection (Katz et al., 2016). Thus, the chances are that those infected with STIs may also have been exposed to HIV. Therefore, offering HIV testing to those who present with STIs may help optimize other HIV preventive services like HIV testing, condom access, pre-exposure prophylaxis (PreP), and post-exposure prophylaxis (PEP). In contrast, another study done in the U.S did not find any significant association between the history of STIs and

utilization of HIV preventive services. The implication that we draw from the studies highlighted here is that LDTDs who present with STIs should also benefit from other HIV preventive services.

In Zambia, age was significantly associated with the utilization of HIV/STI preventive services (Mutale et al., 2018). Long-distance truck drivers aged 40 years and above were more likely to have used HIV preventive services than their younger counterparts. From these findings, we note how different age groups may have varied needs regarding the utilization of HIV/STI preventive services. Different age sets of LDTDs may need different approaches in the packaging of the HIV/STI services. Much attention will be needed to the age set of LDTDs who have poor utilization levels of HIV/STI preventive services. The study also highlights an opportunity for health care providers to target younger LDTDs with comprehensive HIV/STI preventive services.

Marital status has been shown to affect the uptake of HIV testing services among LDTDs (Mutela et al., 2018). Having two or more wives was associated with low uptake of HIV testing services compared to having one wife (Mutela et al., 2018). Mutela et al. (2018) explained that multiple sexual partners might increase exposure to HIV, hence the reluctance in the uptake of HIV testing due to fear that one could be infected. This study highlights the need to target LDTDs who report multiple sexual partners with more HIV/STI preventive services. Therefore, to optimize utilization levels of HIV/STI preventive services among the LDTDs, those who report multiple sexual partners should be comprehensively targeted with more services.

In Nigeria, Ijeoma et al. (2018) found that a high level of education was associated with good utilization of HIV/STI preventive services. Education enlightens us on the benefit of utilizing health services whenever the need arises. Therefore, it is expected that the LDTDs who have higher education levels will have a higher uptake of the HIV/STI preventive services compared to those who don’t. Consequently, the LDTDs with low

education levels will need extensive sensitization and health messages on the importance of optimizing the utilization of HIV/STI services.

Lack of perceived risk of HIV infection and type of sexual partner was identified as the key reasons for the choice of condom use among LDTDs interviewed at Mombasa port from different East African Countries (Bwayo et al., 1991). Long-distance truck drivers reported that they would opt not to use protection during sexual intercourse in some instances. The choice not to use protection happened when the sexual partner did not identify as a female sex worker or did not perceive any risk of contracting HIV from the partner. When an individual does not perceive any risk of HIV infection, the chances are that he or she will engage in risky sexual behaviours. Risky sexual behaviours would, in turn, elevate the risk of HIV and STIs among individuals and their sexual partners. Additionally, where there is no perceived risk, utilization of HIV/STI preventive services is also likely to be abandoned. This study highlights the need to sensitize LDTDs on the potential of contracting HIV and STIs from their sexual partners whenever the protection from risky sexual behaviours is overlooked.

Anticipated stigma and self-esteem were significantly associated with a history of HIV testing among a group of LDTDs interviewed in a study done in Kenya (Romo et al., 2019). These findings imply that LDTDs may delay in accessing HIV/STI preventive services due to the fear and anxiety that may result from stigma. Delayed access to HIV/STI preventive services will eventually lead to a poor prognosis of disease, creating an opportunity for more HIV and STI infections within the sexual networks and the general population.

In summary, studies reviewed in this section reveal certain factors linked to strained utilization of health care services among LDTDs in different regions of the world. Important factors include; physical access and poor quality of services, lack of health insurance among LDTDs, lack of perceived risk of HIV infection, frequent stock-outs of commodities like condoms and STI treatment drugs, unaffordable health care services,

stigma, bad health care provider attitude, and inadequate health facilities along the highways among others. Therefore, this study will seek to determine the spatial distribution of sexual network locations and also establish the frequency of sexual interactions, utilization levels of HIV/STI preventive services, and their associated factors among LDTDs to close the gaps that we have identified. Indeed, the distribution of the sexual networks may inform on hotspots that would need intensified HIV/STI preventive services among the LDTDs.

CHAPTER THREE

MATERIALS AND METHODS

3.1 Study Site

This study was carried out at Mlolongo Township in Machakos County. Mlolongo is one of the significant stopovers for LDTDs along the Northern Corridor highway (NCTTCA, 2019). The town has diversified stopover roles. Besides taking the weight of the trucks, the town is a key destination for commercial sex work and offers restful accommodation services (Ferguson & Morris, 2007). Additionally, the town is also a residential hub for many workers from Nairobi, witnessing a high volume of entertainment activities during weekends hence a convenient stopover by LDTDs (Ferguson & Morris, 2007). Therefore, this was a suitable site for our study given that almost all LDTDs have to make a stopover in this location.

3.2 Research Design

A Cross-Sectional, participatory study was carried out on LDTDs recruited into the survey to list the locations (in the form of towns) used as stopovers while on transit along the Northern Corridor highway during the week preceding the study. Geocoding of these locations was done using the Google earth tool. From this list, information on sexual encounters while in each of these locations was sought. The locational data was mapped using GIS techniques to generate a map visualizing regional sexual network patterns defined by LDTDs and their sexual partners. Other information collected was individual characteristics of LDTDs and their sex partners and sexual encounter information relevant to HIV/STIs transmission.

3.3 Study Variables

3.3.1 Dependent variables – by objective

The dependent variables by goals are;

Objective 2: Frequency of sexual interactions.

Objective 3: Levels of the utilization of HIV/STIs preventive services.

Objective 4: Frequency of sexual interactions.

Objective 5: Levels of the utilization of HIV/STIs preventive services.

3.3.2 Independent variables -by objective

The independent variables by goals are;

Objective 2: Frequency of sexual interactions among Long-distance truck drivers.

- Socio-demographic characteristics include; age, education, marital status, religion, and citizenship.
- Socio-economic characteristics include; monthly income, duration of employment, and the number of days spent on a transit journey.
- Others; predominant drug use.

Objective 3: Utilization levels of HIV/STI services among Long-distance truck drivers.

- Socio-demographic characteristics include; age, education, marital status, religion, and citizenship.
- Socio-economic characteristics include; monthly income, duration of employment, and the number of days spent on a transit journey.

Objective 4: Factors associated with the frequency of sexual interactions among Long-distance truck drivers.

- Socio-demographic characteristics are; age, education, marital status, religion, and citizenship.
- Socio-economic characteristics are; monthly income, duration in employment, and the number of days spent on a transit journey.

Objective 5: Factors associated with utilization levels of HIV/STIs among Long-distance truck drivers.

- Socio-demographic characteristics are; age, education, marital status, religion, and citizenship.
- Socio-economic characteristics are; monthly income, duration of employment, and the number of days spent on a transit journey.

3.4 Study Population

The study population was the LDTDs who used the northern corridor highway and made a stopover in Mlolongo town. The target population was the LDTDs operating along the Northern Corridor highway.

3.4.1 Inclusion Criteria

The LDTDs were eligible for our survey if they were; of the male gender, present at the stopover and willing to participate, able to write or speak English and Swahili, having been involved in the transit of goods or services along the Northern Corridor highway in the previous week and not previously interviewed in the same survey.

3.4.2 Exclusion Criteria

The LDTDs who were previously interviewed in the survey were excluded, to avoid the bias that would occur with interviewing them more than once. This is because responses focused on the history of sexual interactions in the week preceding the day of data collection. Thus, interviewing a LDTD more than once would mean double reporting.

3.5 Sample Size Determination

The Cochran Formula (Cochran, 1977) was used to calculate the sample size. This formula is used in calculating ideal sample sizes in situations where the study population is large, given a desired level of precision, desired confidence level, and the estimated proportion of the attribute present in the population (Ajay & Micah, 2014). Since the population of the LDTDs using the Northern Corridor highway is more than ten thousand, we used this formula in calculating the sample size (IOM, 2011).

$$\boldsymbol{n_0 = \frac{z^2\, p\, q}{e^2}}$$

Where:

- n_0 is the sample size.
- e is the desired level of precision (The margin of error), 0.05.
- p is the estimated proportion of the population that has the attribute in question. Since no known documented prevalence rates of sexual interactions and levels of utilization of HIV/STIs services, the HIV prevalence of LDTDs 26% (0.26) was used as the proxy attribute present among the long-distance truck drivers operating along the Northern Corridor highway (Bwayo et al., 1991; Bwayo et al., 1994; Mbugua et al., 1995; Strauss et al., 2018).
- q Is (1 - p), which is (1-0.26) =0.74

- Z is the number that represents the standard deviations above or below the mean population; a score derived from a z-test which is 1.96 at the desired 95% confidence level. Therefore, a sample size of 296 was derived as follows;

$$\boldsymbol{n_0 = \frac{1.96^2 \times 0.26 \times 0.74}{0.05^2} = 2.956 \times 100 = 296}$$

3.6 Sampling Technique

A systematic sampling method was adopted. Since the data collection exercise involved three enumerators, it was estimated that each of them would interview at least seven LDTDs daily. Therefore, approximately twenty-one LDTDs were interviewed each day, hence the daily sampling size. It was established that an estimated 450 LDTDs went through each of the two weigh-bridge sections during the preliminary visit to the Mlolongo weighbridge.

The *k*th term (sampling interval) was calculated by dividing the daily number of LDTDs (450) who went through each of the two weighbridge sections by the daily sampling size of twenty-one. From the calculation, a sampling interval of 21 was arrived at as shown in the below equation.

$$\boldsymbol{kth} = \frac{N}{n} = \frac{450\ (daily\ estimate\ of\ LDTDs)}{21\ (daily\ sampling\ size)} = 21$$

The first participant was randomly selected from within the first sampling interval by using the lottery technique, which is a simple random method. The rest of the participants to be interviewed were selected by adding the sampling interval value to the random figure derived from the initial lottery technique until a sample size of 296 was attained. If the k^{th} participant did not meet the inclusion criteria or wasn't willing to participate, they were replaced with the next one.

3.7 Data collection tools

An interviewer-administered questionnaire (English and Swahili versions) was implemented as a tool for data collection, (Appendix IV & V). The study adopted this tool from a World Health Organisation (WHO) generic tool designated for conducting HIV and STIs research (World Health Organisation, 2013). Guidelines in previous studies on questionnaire development were also consulted (Choi & Pak, 2005; Oppenheim, 2000).

3.8 Pre-testing

The study commenced with a pre-testing of data collection tools at the neighbouring Makutano town in Machakos County. The town is used as a stopover for rest and commercial sex but on a significantly lower scale relative to our study site along the Northern Corridor highway. In this exercise, we recruited 30 participants considering the sample size recommended for a study to achieve a power of 80% (Perneger et al., 2014).

3.8.1 Validity

To ensure accuracy in the data collection exercise, questionnaires and the consent form were reviewed for any missing pages before being submitted to the data enumerators for the data collection exercise. All questionnaires were identified with unique serial numbers to avoid double entering into the data set. After data entry, data were double-checked, cleaned, and later analyzed using scientific techniques.

3.8.2 Reliability

Reliability aims at ensuring consistency in tools used for data collection. Throughout the pre-test exercise, the flow and wording of questions and responses were observed. The aim was to establish whether there were any difficulties in giving the responses among the LDTDs. This exercise made it possible to replace the sensitive terms used in the questionnaire like “penetrative sex,” with sexual interaction, which may have affected the

respondents' willingness to participate in the exercise to completion. Preparation of the data collection tools was done in line with all the study objectives to capture all required information. Data enumerators were taken through the contents of the questionnaire, the consent form (Appendix II), and how to approach respondents before the data collection exercise. Reliability was also maintained through the monitoring and assistance of data enumerators during pre-test and data collection exercises.

3.9 Data Collection

The LDTDs were initially approached at a wayside parking towards the exit of the weighbridge for a detailed introduction to the study. Those who expressed willingness to participate in the study were further taken through an informed consent, which they formally signed before the onset of the interview. Given the sensitive nature of some of the questions in our questionnaire, most of the LDTDs understandably requested to be interviewed inside the truck driver's cabin, safeguarding privacy during the interview process.

Three enumerators were trained on the procedures of data collection. The enumerators were also trained to maintain the confidentiality and privacy of the participants. During the data collection exercise, the enumerators signed a confidentiality form as required by the ethical protocol, (Appendix III).

Locational data, history, frequencies of sexual interactions, history, and trends of the utilization of HIV/STI preventive services among the LDTDs were collected from the LDTDs who met the eligibility criteria.

Since the data collection exercise occurred during the COVID-19 crisis, LDTDs who agreed to be interviewed were offered a facemask and sanitized with an alcohol hand sanitiser before the start of the interview, while at the same time observing social distance as required by the Ministry of Health. Providing the LDTDs with a facemask enhanced

their confidence and willingness to participate in the interview because they felt protected from any risks of infection with the COVID-19.

3.10 Data Management and Analysis

A database was designed in MS Excel®, and data from the questionnaires were entered, followed by data cleaning and exportation to the R statistical software, (R Core Team, 2018) for analysis.

Descriptive statistics were generated regarding the socio-demographic and socio-economic characteristics, frequency of sexual interactions, history of HIV and STIs, and levels of utilization of HIV/STI preventive services. Locational data was generated cumulatively for a given stopover as given by the LDTDs during the interview. Geographical coordinates were extracted using the Google-earth-pro tool. Shapefiles were created and overlaid over the map of Kenya using the R statistical software (R Core Team, 2018), to generate sexual network location maps along the Northern Corridor highway.

The number of sexual acts reported by the respondents was used to generate an ordered outcome variable, in the order of; no sexual acts (zero), one to three sexual acts, and four to six sexual acts. The Association between the predictor variables and the outcome variables (frequency of sexual interactions) were analyzed using ordinal logistic regression (R Core Team, 2018).

A composite outcome variable on utilization of HIV/STIs preventive services was derived from; condom use, history of HIV testing, frequency of HIV testing, antiretroviral therapy (ART) use, and follow-up for the HIV positive and STI treatment. On their own, the individual variables could not give a conclusive level of the utilization of HIV/STI preventive services among the LDTDs, hence the need for the composite variable (Song et al., 2013). The selection of the original variables used to create the composite variable was based on the relevance of the variable in the utilization of HIV/STI preventive services as guided in previous research (Song et al., 2013).

Responses from the investigated variables, including condom use, history of HIV testing, frequency of HIV testing, ART use, and follow-up for the HIV positive and STI treatment, were assigned a score of either 1 or 0 depending on the question`s dimension. Following summing up for each participant, we computed a weighted score ranging between 0 and 1 by dividing the summed responses by the number of eligible variables. The scores were arbitrarily multiplied by 8 to generate endpoint scores ranging from one to eight for each participant to help create a dichotomized outcome variable for utilization levels: limited utilization (1 to 4) and good utilization (5 to 8). The numerator (total scores of all eligible responses) was derived as follows; Condom use (1,0) + History of HIV testing (1,0) + Frequency of HIV testing within the last three months (1,0) or Within 3-6 months ago (0.5) or tested in more than six months ago + ART. use (1) + STI treatment (1,0). The denominator was the number of eligible questions. The weighted mean was then multiplied by a constant (8) to place the scores in the range of between one and eight, as shown in the equation:

$$\text{Composite score} = \frac{Total\ scores\ of\ all\ eligible\ responses}{Number\ of\ eligible\ questions} \times 8$$

The Association between the independent variables and the outcome variable (level of utilization of HIV/STIs preventive services) was determined using binomial logistic regression analysis in R statistical software (R Core Team, 2018).

3.11 Ethical Considerations

Ethical approval was sought from the Ethical Review Board of the University of Eastern Africa Baraton, UEAB/REC/10/02/2020, (Appendix VI). Permit and license to carry out the study was provided by the National Commission for Science, Technology and Innovation, NACOSTI/P/20/4107, (Appendix VII). Authorization to collect data was granted by the board of postgraduate studies, Jomo Kenyatta University of Agriculture

and Technology, JKU/2/11/HSH/314-1277/2018, (Appendix VIII). Written informed consent was sought from the study participants before the start of the interview. To ensure confidentiality, the anonymity of LDTDs was maintained through out data collection exercise, analysis and archiving. After data entry, the questionnaires were destroyed by burning.

CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter summarizes findings on sexual networks and the utilization of HIV prevention services among LDTDs using the Northern Corridor highway, Kenya, conducted in July and August of 2020. The chapter details sexual network locations used by the LDTDs in the form of maps, descriptive statistics of the frequency of sexual interactions, and utilization levels of the HIV prevention services among the LDTDs. Factors associated with the frequency of sexual interactions and the utilization of HIV preventive services are presented towards the end.

4.2 Socio-demographic characteristics of the study participants

A total of 296 long-distance truck drivers participated in the study, hence a response rate of 100%. The mean age of the respondents was 38.4 years, a median of 39.0 years, with the youngest being 24 years and the oldest 57 years. The highest proportion, 126 (42.6%), of the LDTDs were aged between 35 to 44 years. The majority 233 (78.7%) of the LDTDs involved in the study were of Kenyan Citizenship, while the least 6 (2.0%) were from South Sudan. In terms of education, the majority 195 (65.9%) of the participants had attained Secondary school education, with only 6 (2.0%) having attended college. Most 238 (80.4%), of the LDTDs, disclosed that they were married, while a minority (1.4%) in this category reporting to have been divorced. In terms of religion, the majority, 231 (78.0%) of the LDTDs, were Christians, while the rest were Muslims (Table 4.1).

Table 4.1: Socio-demographic characteristics of LDTDs along the Northern Corridor highway, Kenya, 2020

Variable	Frequency (n=296)	Proportion (%)	95% CI of Proportion
Age			
18-24	3	1.0	0.3, 3.2
25-34	98	33.1	27.8, 38.4
35-44	126	42.6	36.9, 48.4
45-54	65	22.0	17.5, 27.2
55-64	4	1.4	0.4, 3.7
Citizenship			
Kenya	233	78.7	73.5, 83.2
Uganda	36	12.2	8.8, 16.6
Tanzania	13	4.4	2.5, 7.6
Rwanda	8	2.7	1.3, 5.5
South Sudan	6	2.0	0.8, 4.6
Education			
Primary	72	24.3	19.6, 29.7
Secondary	195	65.9	60.1, 71.2
Vocational	23	7.8	5.1, 11.6
College	6	2.0	0.8, 4.6
Marital Status			
Single	31	10.5	7.3, 14.7
Married	238	80.4	75.3, 84.7
Divorced	4	1.4	0.4, 3.7
Cohabiting	23	7.8	5.1, 11.6
Religion			
Christian	231	78.0	72.8, 82.5
Muslim	65	22.0	17.5, 27.2

4.3 Socio-economic characteristics of the study participants

Approximately 146 (49.3%) of the LDTDs had worked for more than ten years as long-distance truck drivers, with only 5 (1.7%) having worked for less than one year. In terms of weeks spent on a single transit journey, 116 (39.2%) of the LDTDs spend less than one week, with only 6 (2.0%) spending three weeks. The majority, 285 (96.3%), of the LDTDs earned a monthly salary of less than 50,000 Kenya shillings, while the rest earned 50,000 Kenya shillings and above (Table 4.2).

Table 4.2: Socio-economic characteristics of LDTDs along the Northern Corridor highway, Kenya, 2020

Variable	Frequency (n=296)	Proportion (%)	95% CI of Proportion
Years working as a truck driver			
Less than one year	5	1.7	0.6, 4.1
One to three years	45	15.2	11.4, 19.9
Four to five years	34	11.5	8.2, 15.8
Six to ten years	66	22.3	17.8, 27.6
Above ten years	146	49.3	43.5, 55.2
Weeks away on a transit journey			
Less than seven days	116	39.2	33.6, 45.0
One week	91	30.7	25.6, 36.4
Two weeks	83	28.0	23.1, 33.6
Three weeks	6	2.0	0.8, 4.6
Income level			
<500 USDs (<50000K.Shs)	285	96.3	93.3, 98.0
≥500 USDs (≥50000K.Shs)	11	3.7	2.0, 6.7

4.4 Distribution of sexual network locations used by Long-distance truck drivers

4.4.1 Distribution of stopover locations along the Northern Corridor highway

The LDTDs reported a total of 42 highway stopovers along the Northern Corridor highway. The highway stopovers extend along the Northern Corridor highway from the Kenyan Coastal City of Mombasa to the Kenya/Uganda border points. (Figure 4.1).

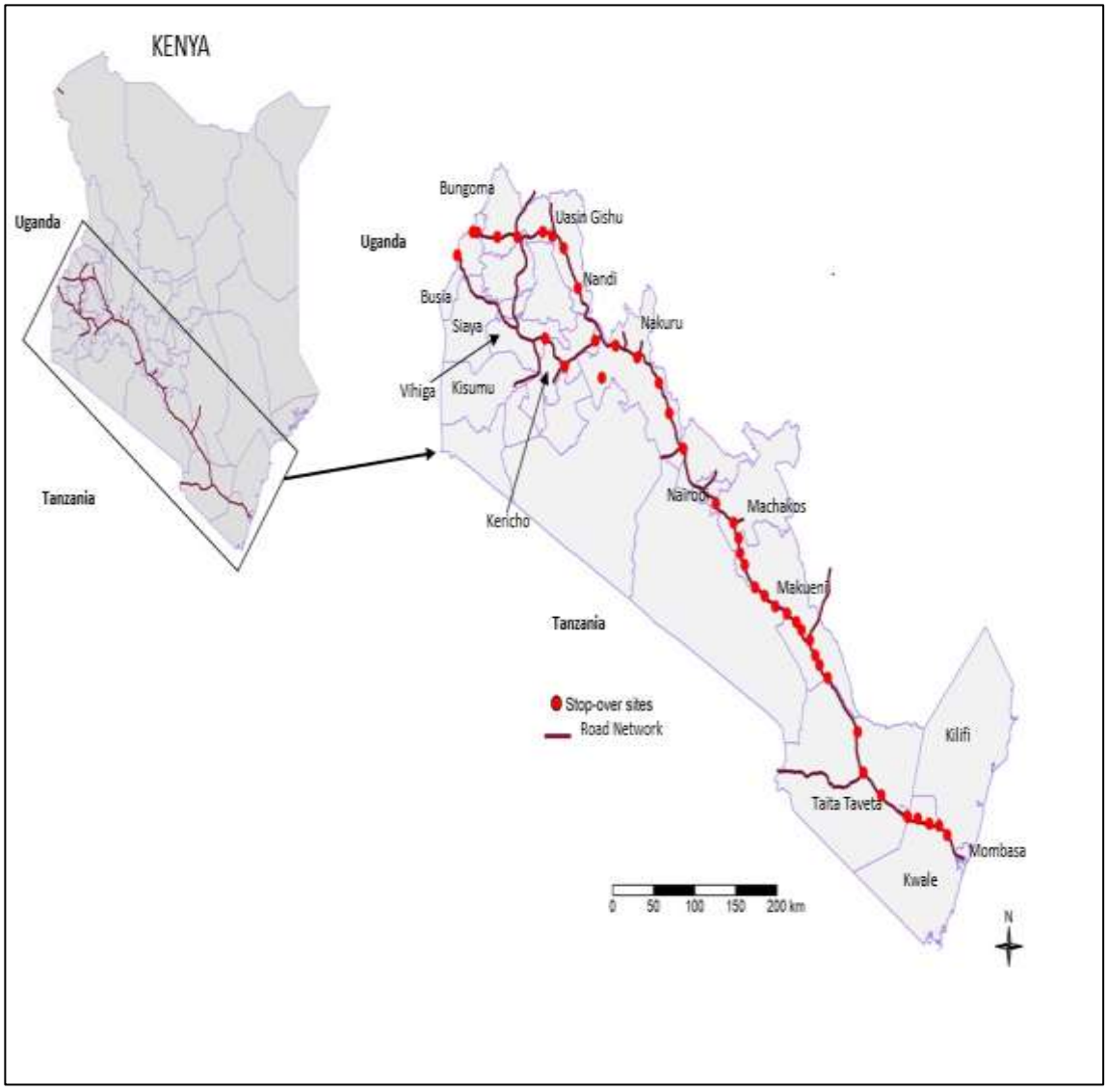

Figure 4. 1: Map showing reported stopovers along the Northern Corridor highway

4.4.2 Cumulative number of days spent by study participants per stopover

In this category, a cluster of hotspots was defined as a group of hotspots (>58 cumulative person-days) situated proximally to each other on the highway. Four clusters of hotspots were identified as follows; Coastal cluster in Kilifi and Taita Taveta, one cluster in Machakos (Nairobi Metropolitan) and the Kenya/Uganda border cluster (Figure 4.2).

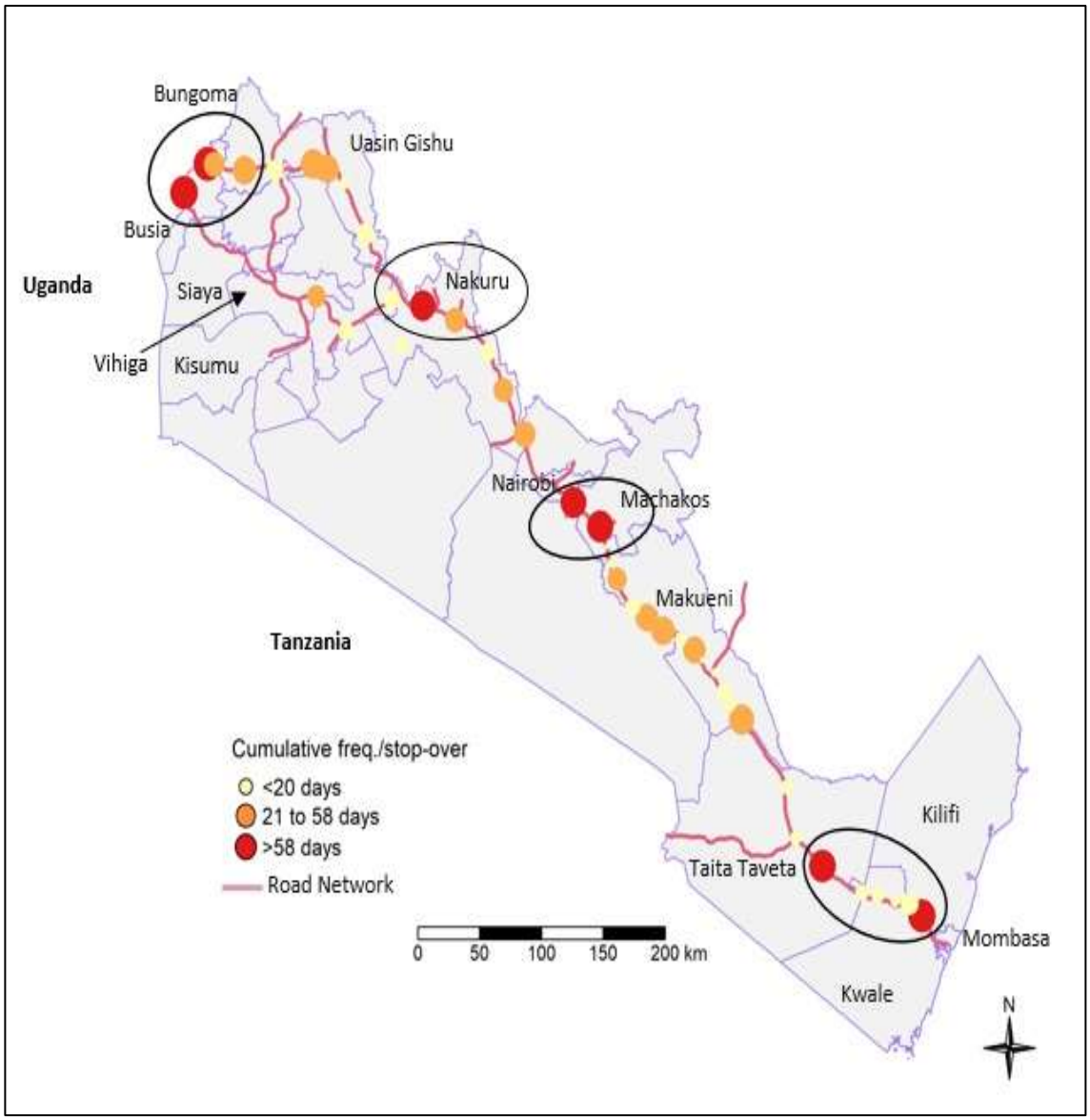

Figure 4. 2: Map showing the cumulative number of person-days spent per stopover

4.4.3 Number of sexual interactions per stopover

Here, a cluster of hotspots was defined as hotspots (13 or more sexual interactions) situated proximally to each other on the highway. Three clusters of hotspots were identified as follows; the Coastal cluster in Kilifi, Machakos (Nairobi Metropolitan), and the Kenya/Uganda border cluster in Bungoma and Busia. (Figure 4.3).

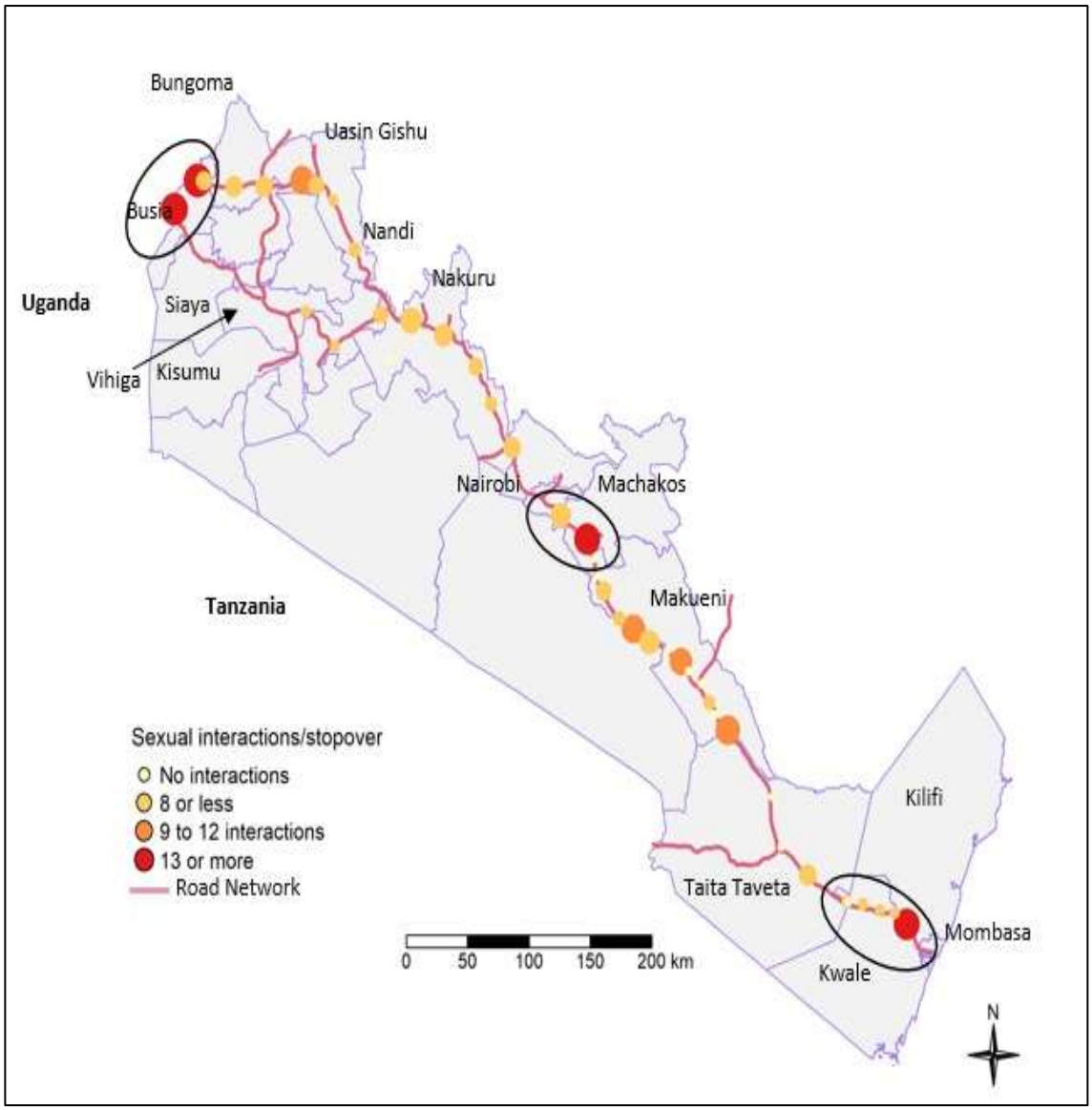

Figure 4. 3: Map showing the number of sexual interactions per stopover

4.4.4 Average number of sexual interactions per stopover

In this category, clusters of hotspots were defined as hotspots (13 and above-average number of sexual interactions) situated proximally to each other on the highway. Two clusters of hotspots were identified in the following regions; the Coastal cluster in Kilifi and Taita Taveta and the other in Kericho. (Figure 4.4).

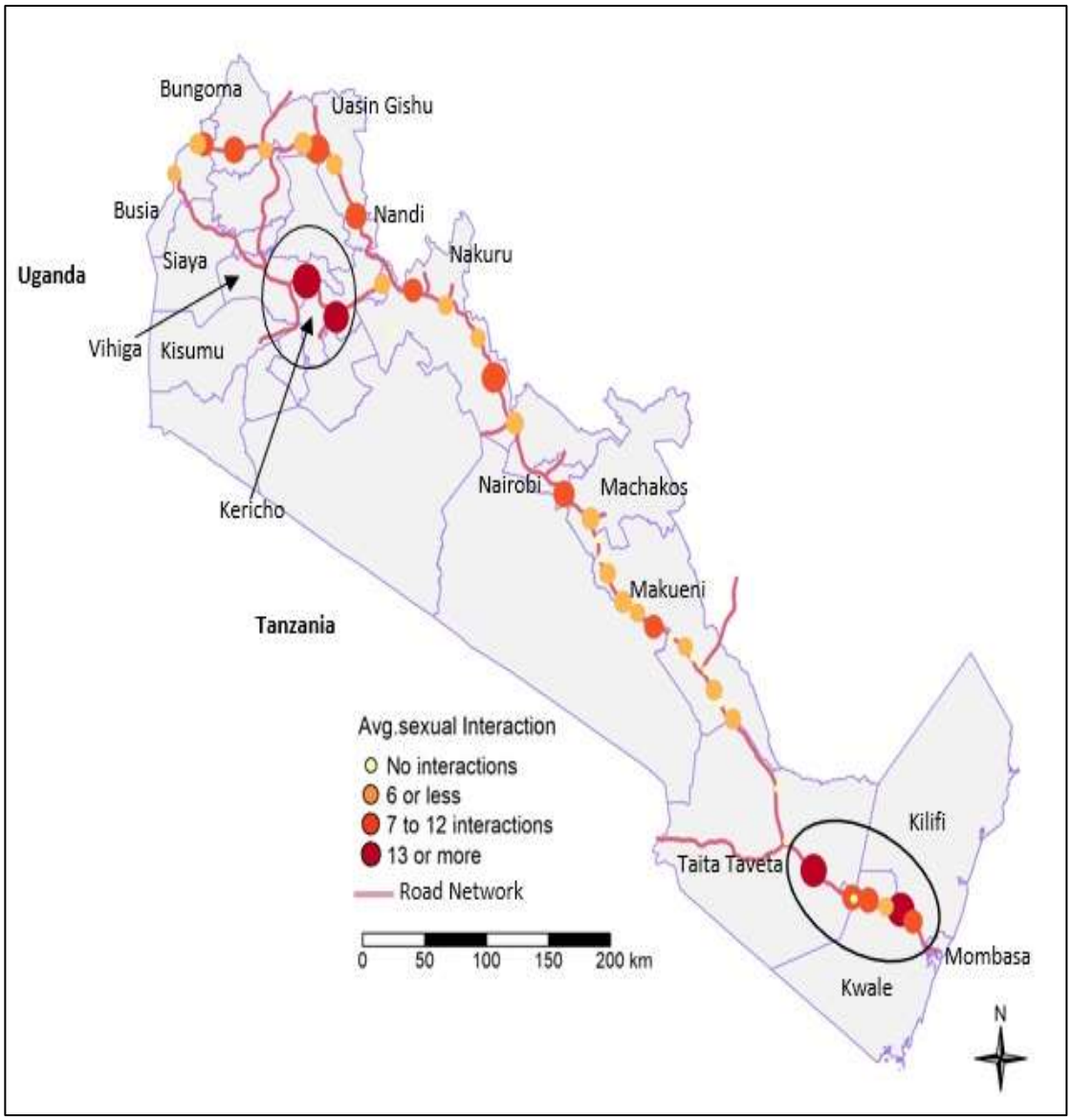

Figure 4. 4: Map showing the average number of sexual interactions per stopover

4.4.5 Casual and regular sexual partners per stopover

Clusters of hotspots for casual and regular sexual partners were defined by hotspots (11 or more casual partners, and 3 or more regular partners respectively) situated proximally to each other. There was only one cluster of hotspots for casual sexual partners on the Kenya/Uganda international border. Six clusters of hotspots for regular sexual partners were identified in the following regions; the Coastal cluster in Kilifi, others in Makueni, Machakos (Nairobi Metropolitan), Nakuru, Uasin Gishu, and the Kenya/Uganda cluster. (Figure 4.5).

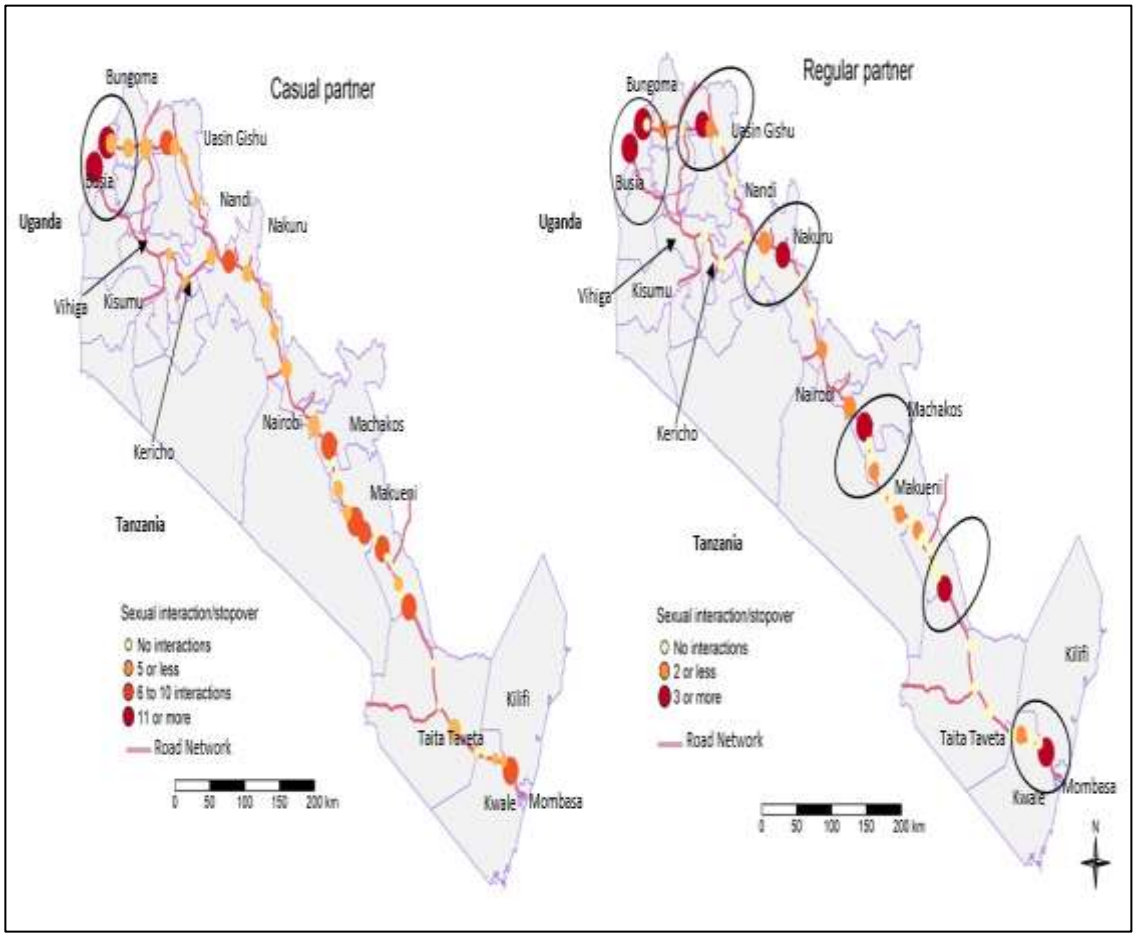

Figure 4. 5: Map showing the number of casual & regular sexual partners interacted with per stopover

4.4.6 Average number of sexual acts per sexual interaction, per stopover

Here, clusters of hotspots were identified as hotspots (more than two sexual acts) situated proximally to each other. Five clusters of hotspots were situated in the following regions; Machakos (Nairobi Metropolitan), Makueni, Nakuru cluster, Uasin Gishu, and the last one in Nandi. (Figure 4.6).

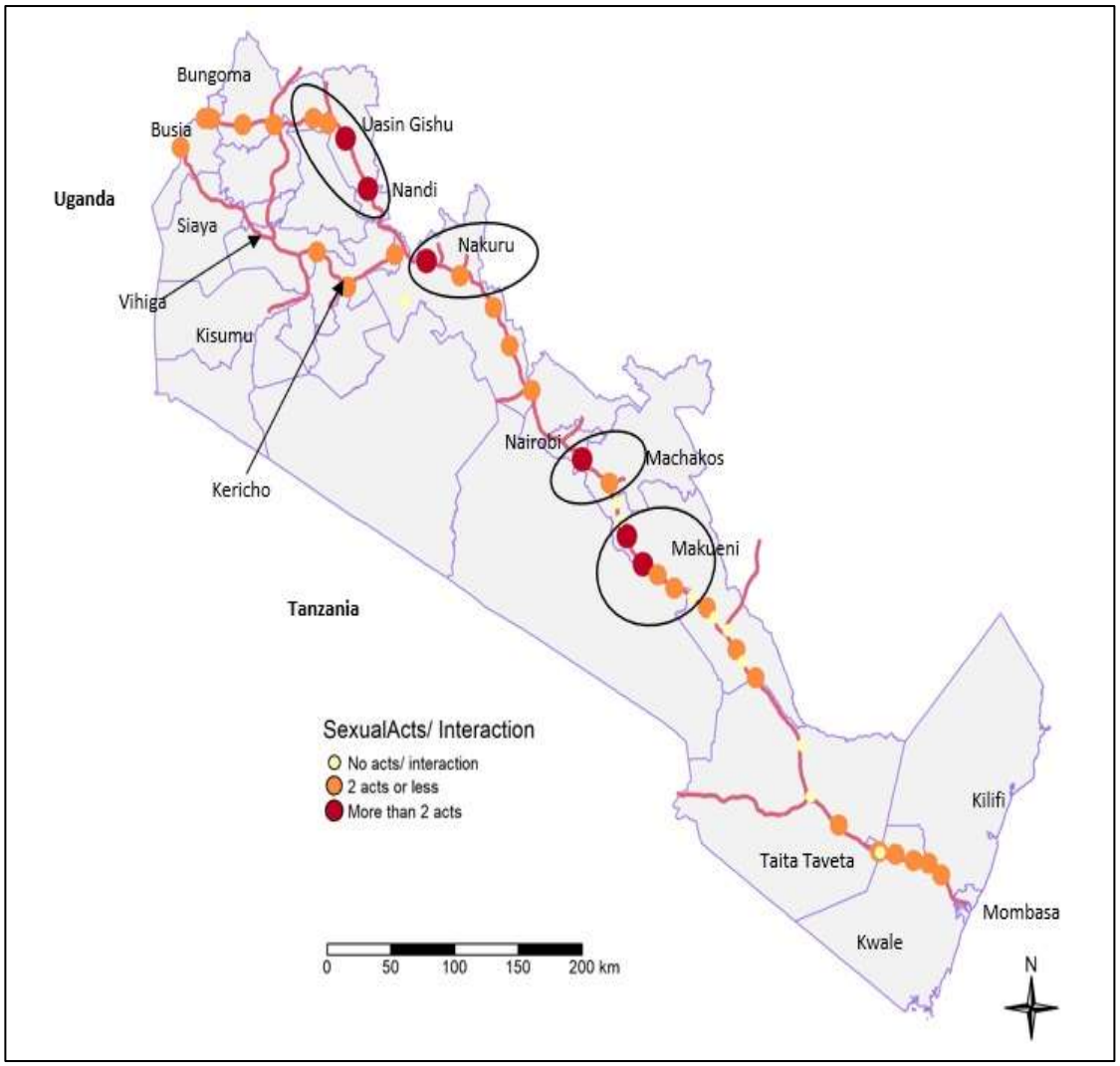

Figure 4. 6: Map showing the average number of sexual acts per sexual interaction, per stopover

4.5 Frequency of sexual interactions among study participants

4.5.1 History of Sexual Interaction

At least, 141 (47.6%) of the LDTDs had sexual interactions with either casual or regular sexual partners on the week preceding our study while on transit, while the rest did not have sexual interactions at all (Figure 4.7).

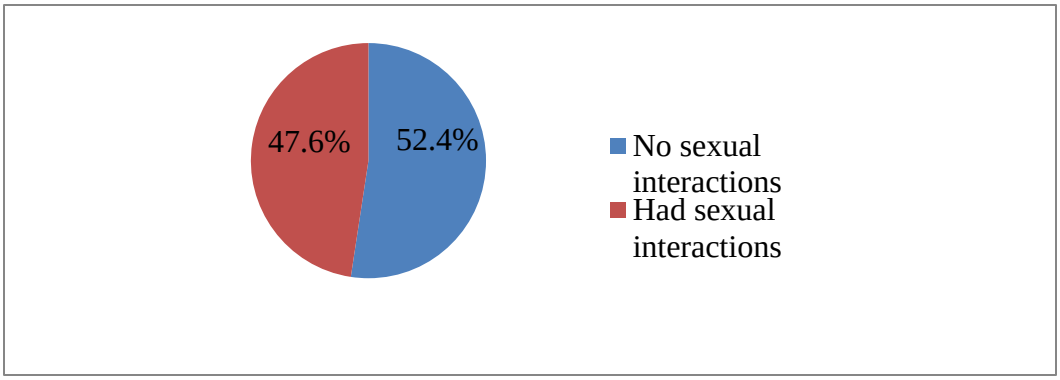

Figure 4. 7: History of sexual interactions

4.5.2 Sexual interaction with casual and regular partners

Of the total 141 LDTDs who reported sexual interactions over the week preceding the study, 105 (74.5%) and 36 (25.5%) of them had sexual interactions with casual and regular sexual partners, respectively. A total of 213 casual and regular sexual partners had been involved in sexual interactions with the LDTDs. Out of the 213 sexual partners, 176 (82.6%) were casual partners, while the rest were regular sexual partners (Table 4.3). A total of 428 sexual acts ranging from one to six sexual acts per sexual interaction and a median of 3 were reported among the LDTDs and their sexual partners.

Table 4.3: Sexual interactions with casual and regular partners

Variable	Frequency (*n*)	Proportion (%)	95% CI of Proportion
Total Number of truck drivers who reported sexual interaction	**n=141**		
Had sexual interaction with casual partners	105	74.5	63.3, 81.6
Had sexual interaction with regular partners	36	25.5	18.7, 36.7
Sexual partners interacted with	**n=213**		
Casual sexual partners	176	82.6	76.7, 87.3
Regular sexual partners	37	17.4	12.7, 23.3

4.5.3 Reasons for sexual interactions while on transit

Of the 141 respondents who reported sexual interaction, the majority, 85 (60.3%), disclosed that their main reason was the urge to meet sexual needs while on transit, with the minority 3 (2.1%) citing the presence of sex workers on the highway stopovers as the factor fueling their sexual interactions (Figure 4.8).

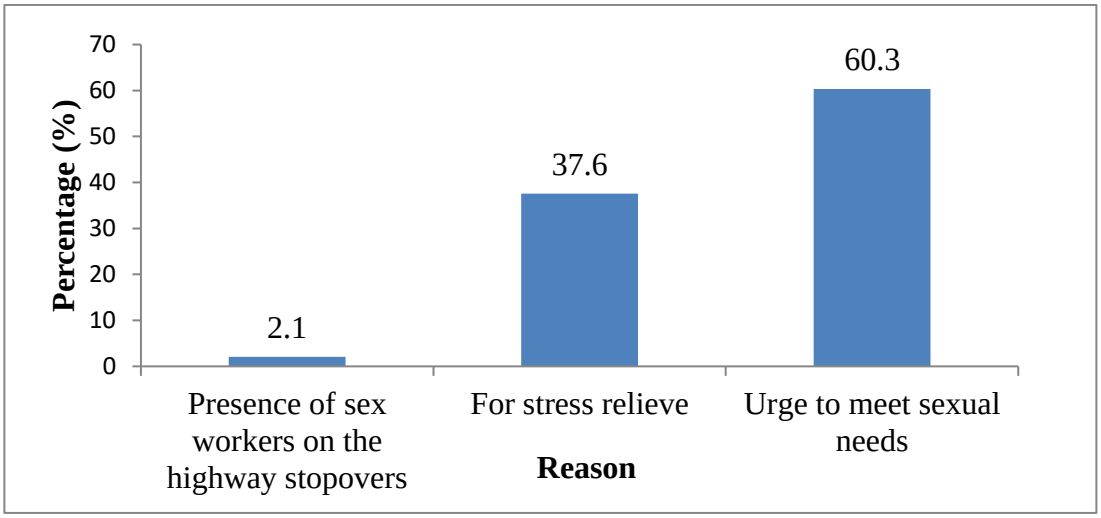

Figure 4. 8: Reasons for sexual interactions while on transit

4.5.4 Drug and Substance use

Among the 141 LDTDs who had sexual interactions, 44(31.2%) of them had taken alcohol, with the rest reporting use of Marijuana and Khat as the predominant substances during or before sexual interactions (Figure 4.9).

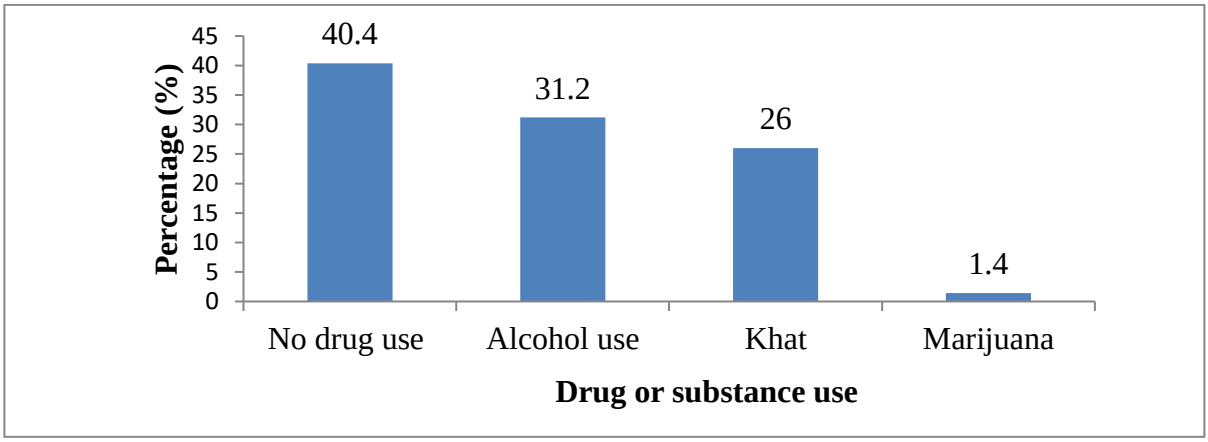

Figure 4. 9: Drug and substance use during or prior to sexual interaction

4.6 Levels of the utilization of HIV prevention services among study participants

4.6.1 Condom use

Of the 141 LDTDs who reported sexual interactions, 119 (84.4%) of them used condoms, while the rest did not. Condom use was low among LDTDs who had sexual interaction with regular partners. Slightly below half, 17 (47.2%) of the 36 LDTDs who had sexual interaction with regular partners used condoms while the rest did not. Study participants who had sexual interactions with casual sex partners had the highest rates of condom use, with 102 (97.1%) of them reporting condom use. When asked their reasons for not using condoms, most 18 (81.8%) said they didn't perceive any risks of infection with STIs or HIV during sexual interactions (Table 4.4).

The study participants were asked about their source of condoms while on transit, regardless of their sexual interaction in the week preceding our study. The bigger proportion, 125 (42.2%), mentioned that they accessed them from bars or other entertainment joints along with the highway stopovers. The majority of the study participants, 215 (72.6%), reported that they had never lacked condoms in a time of need (Table 4.4).

Table 4.4: Condom use among LDTDs along the Northern Corridor highway, Kenya, 2020

Variable	Frequency (*n*)	Proportion (%)	95% CI of Proportion
Condom use among truck drivers	**n=141**		
Yes	119	84.4	77.1, 89.8
No	22	15.6	10.2, 22.9
Condom use among truck drivers who had sexual interaction with regular partners	**n=36**		
Yes	17	47.2	30.8, 64.3
No	19	52.8	35.7, 69.2
Condom use among truck drivers who had sexual interaction with casual partners	**n=105**		
Yes	102	97.1	91.3, 99.2
No	3	2.9	0.7, 8.7
Reasons given for lack of condom use among those who didn't use	**n=22**		
No perceived risk of infection	18	81.8	59.0, 94.0
Need to have maximized pleasure from unprotected sexual intercourse	4	22.2	7.4, 48.1
Source of condoms	**n=296**		
From bars or other entertainment joints	125	42.2	36.6, 48.1
Never in need of them at all	27	9.1	6.2, 13.1
Purchase from a privately owned facility (pharmacies, or chemists)	29	9.8	6.8, 13.9
Public health facility	62	21.0	16.5, 26.1
Non-governmental health facility	53	17.9	13.8, 22.9
Ever lacked condoms in a time of need	**n=296**		
Yes	81	27.4	22.4, 32.9
No	215	72.6	67.1, 77.6

4.6.2 HIV testing trends

The majority (n=287, 97%) of the LDTDs who were interviewed reported having been tested for HIV at some point since the start of their career as LDTDs. At the time of conducting this study, only 4.9% of the LDTDs had been tested for HIV within the last three months. Out of the 287 LDTDs reporting HIV testing, only 4.5% had utilized both finger prick and oral HIV testing. The majority of the LDTDs (97.9%) reported a negative HIV outcome from their last HIV test (Table 4.5).

Table 4.5: HIV testing trends among LDTDs along the Northern Corridor highway, Kenya, 2020

Variable	Frequency (*n*)	Proportion (%)	95% CI of Proportion
History of HIV testing	**n=296**		
Yes	287	97	94.1, 98.5
No	9	3	1.5, 5.9
Duration after last HIV test	**n=287**		
Three months ago	14	4.9	2.8, 8.2
Four to Six months ago	100	34.8	29.4, 40.7
Above Six months ago	173	60.3	54.3, 65.9
Type of HIV test	**n=287**		
Finger Prick	274	95.5	92.2, 95.5
Finger prick and Oral	13	4.5	2.5, 7.8
HIV test outcome	**n=287**		
Negative	281	97.9	95.3, 99.1
Positive	6	2.1	0.9, 4.7

4.6.3 Challenges in access to HIV testing services

Of the 287 LDTDs who reported HIV testing before, 45.3% of them reported time delays as their main challenge in accessing HIV testing services, while the minority (7%) cited negative attitude from health care providers (Figure 4.10).

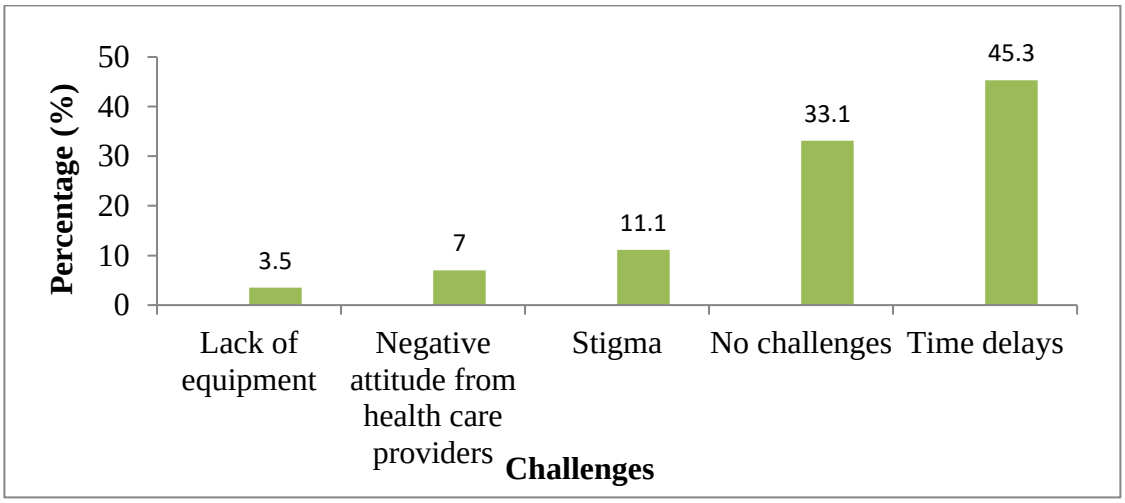

Figure 4. 10: Challenges faced while accessing HIV testing services

4.6.4 Facilities from which HIV testing was accessed from

Non-governmental health facilities were highly sought for HIV testing services, followed by public health facilities, then private health facilities, at 154 (53.7%), 87 (30.3%), and 46 (16%), respectively, as reported by the respondents (Figure 4.11).

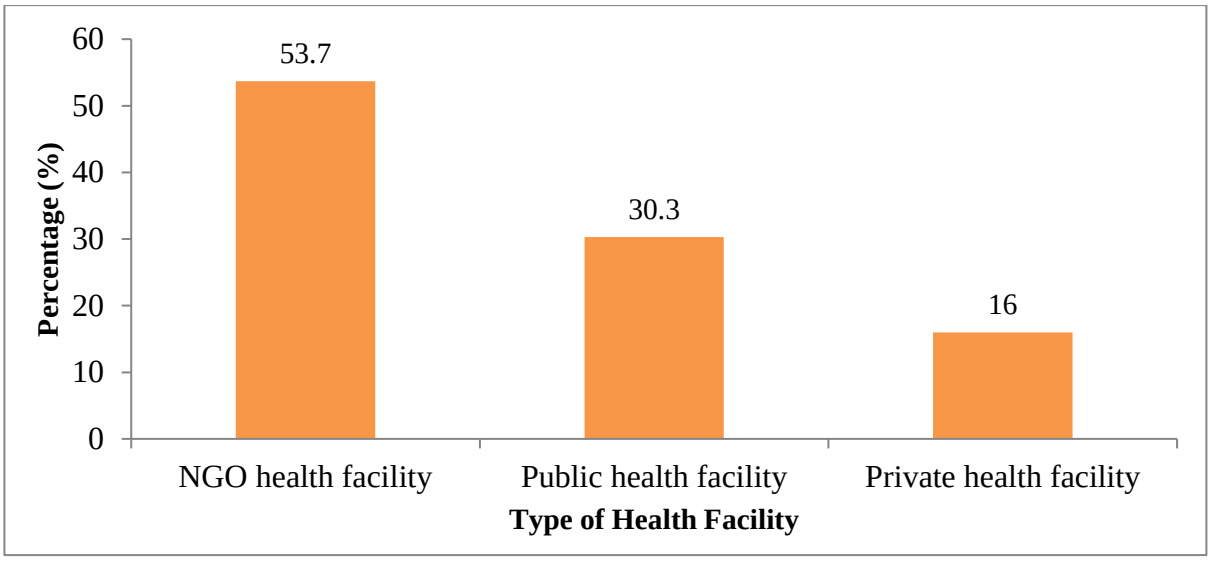

Figure 4. 11: Type of facility from which HIV testing was accessed

4.6.5 Antiretroviral therapy use and follow up on care

All the six LDTDs who reported to have tested HIV positive before had been started on antiretroviral therapy (ART) therapy and are already on follow-up and care in different health facilities. When asked about the challenges they faced while accessing their ART therapy, three participants reported no challenges at all, two reported having missed one of their scheduled follow-up and ART refill appointments due to delays at the international border points. One LDTD reported having missed one of his follow-up and ART refill appointments at some point when he tested positive for COVID-19 and was isolated for 21 days.

4.6.6 Sexually transmitted infections among study participants

A majority (59.1%) of the LDTDs disclosed infections with an STI since their career onset. Of those who reported having ever contracted an STI, majority (98.9%) sought treatment while the rest did not. Of those who reported that they had sought treatment, 96.0% reported doing so within seven days (Table 4.6).

Table 4.6: STI infections and treatment among LDTDs along the Northern Corridor highway, Kenya, 2020

Variable	Frequency (n)	Proportion (%)	95% CI of Proportion
History of STI infection	**n**=296		
Yes	175	59.1	53.3, 64.7
No	121	40.9	35.3, 46.7
Sought for STI treatment	**n=175**		
Yes	173	98.9	95.5, 99.8
No	2	1.1	0.2, 4.5
Sought for STI treatment after how long	**n=173**		
Within 7 days	166	96.0	91.5, 98.2
After a period exceeding 7 days	7	4	1.8, 8.5

4.6.7 Health facilities from which STI treatment was sought from

Approximately, half (48.6%) of the LDTDs sought STI treatment from non-governmental health-based facilities (Figure 4.12).

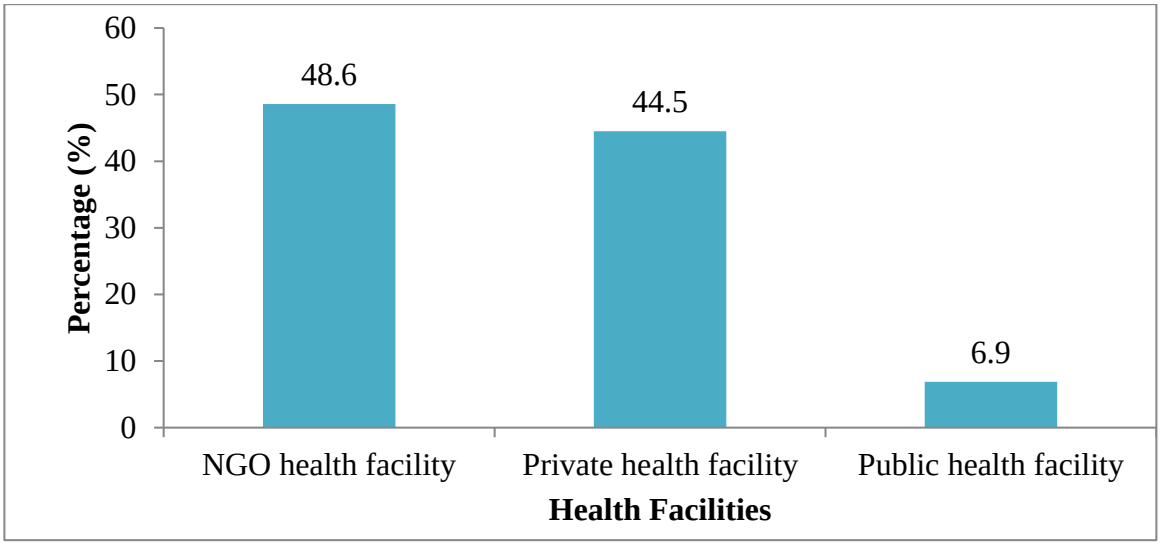

Figure 4. 12: Health facilities sought for STI treatment

4.6.8 Challenges in access to STI treatment services

Figure 4.13 illustrates the respondents' challenges while seeking STI treatment while on transit along the Northern Corridor highway, Kenya.

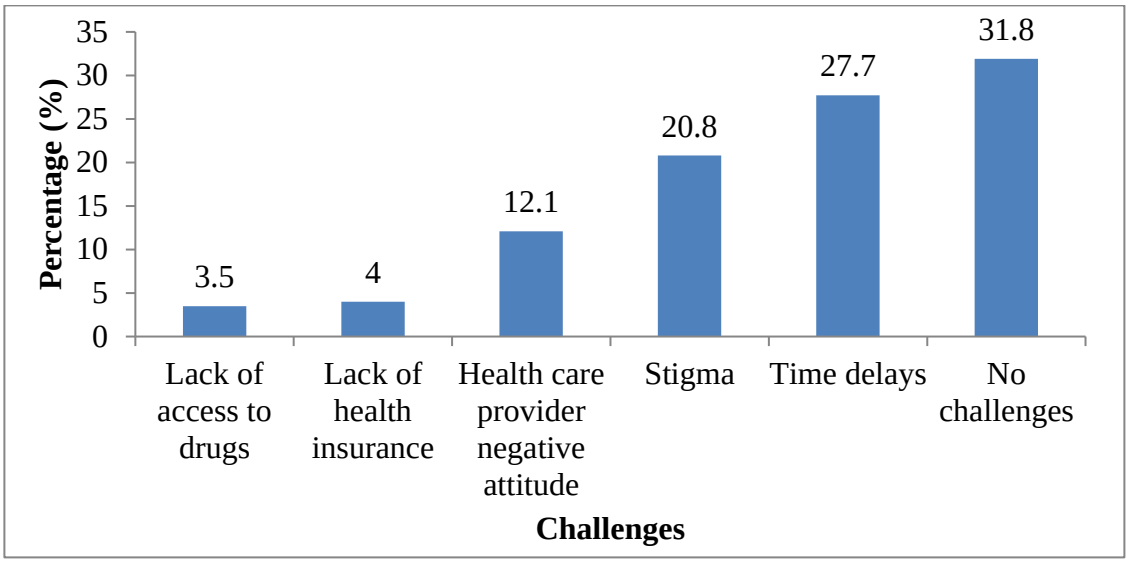

Figure 4. 13: Challenges faced while seeking STI treatment

4.6.9 Utilization levels of HIV/STI preventive services

From the composite variable we generated, most of LDTDs (78.0%) were classed to have good utilization of HIV/STIs preventive services (5-8), while the rest (22%) had limited utilization (1-4) (Figure 4.14).

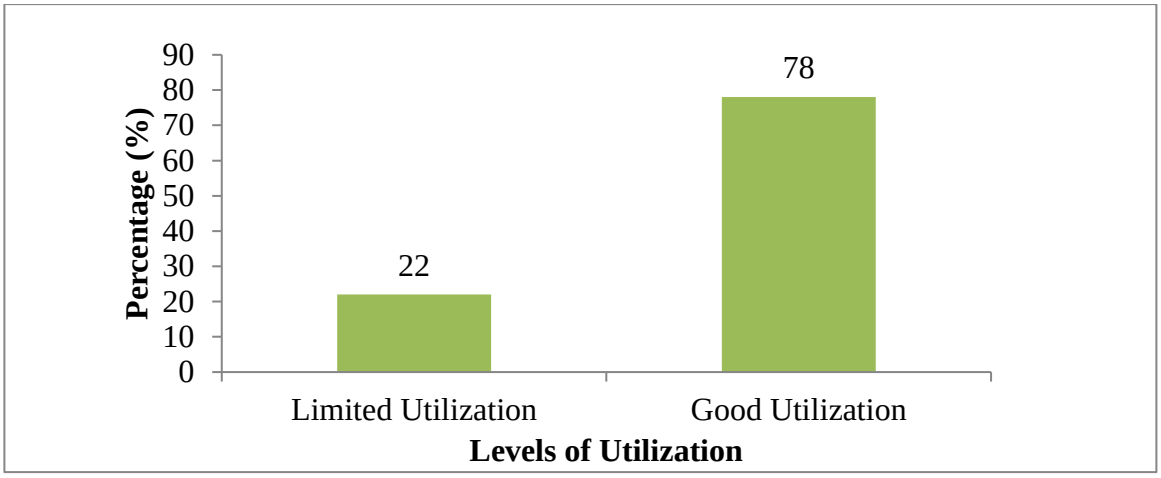

Figure 4. 14: Levels of the utilization of HIV/STI preventive services

4.7 Factors associated with frequency of sexual interactions

A univariable analysis using the ordered logistic regression was performed to determine the factors associated with the frequency of sexual interactions among LDTDs. The Proportional odds ratio (OR) was used to estimate the strength of association between the independent and dependent variables. The level of significance was set at $P<0.05$, but the variables with a p-value less than 0.1 ($P<0.1$) at the univariable ordered logistic regression level would enter the multivariable ordered logistic regression level of analyses.

4.7.1 Univariable ordered logistic regression for factors associated with frequency of sexual interactions

The following variables depicted significance at univariable analyses: age, religion, education, marital status, years working, weeks spent on a transit journey, income level, and predominant drug use (Table 4.7).

Table 4.7: Univariable ordered logistic regression model of factors associated with frequency of sexual interactions among LDTDs, along the Northern Corridor highway, Kenya, 2020

Variable	Levels	*β*	95% CI of *β*	OR	95% CI of OR	P-Values
Age		-0.11	-0.14, -0.08	0.90	0.87, 0.93	**<0.001**
Religion	Christian	*Ref*		*Ref.*		
	Muslim	-0.86	-1.44, -0.30	0.42	0.24,0.74	**0.003**
Citizenship	Kenyan	*Ref*		Ref.		
	Non- Kenyans	-0.04	-0.59,0.51	0.97	0.56,1.66	0.899
Education	Primary	*Ref*		*Ref.*		
	Secondary	0.56	0.03, 1.11	1.75	1.03,3.03	**0.004**
	Vocational and collage	0.75	-0.07, 1.56	2.11	0.94,4.76	**0.007**
Marital status	Single or divorced	*Ref.*		*Ref.*		
	Married	-1.14	-1.80, -0.48	0.32	0.17, 0.62	**<0.001**
	Cohabiting	0.29	-0.70, 1.29	1.34	0.50,3.63	**<0.001**
Years working	≤3 years	*Ref.*		*Ref.*		
	4 to 10 years	-0.57	-1.22, 0.07	0.56	0.30,1.07	**<0.001**
	>10 years	-1.73	-2.37, -1.09	0.18	0.09,0.34	**<0.001**
Weeks on transit	<1week	*Ref.*		*Ref.*		
	1week	0.68	0.12,1.23	1.96	1.13,3.44	**0.002**
	≥2 week	1.44	0.90,1.99	4.23	2.46,7.38	**<0.001**
Income	Low income	*Ref.*		*Ref.*		
	Middle lower income	-2.29	-5.20, -0.62	0.10	0.01, 0.54	**0.003**
Drug/substance use	No drug	Ref				
	Alcohol	2.8	2.11,3.52	16.4	8.27, 33.8	**<0.001**
	Khat	2.46	1.78,3.17	11.7	5.91, 23.8	**<0.001**
	Marijuana	1.95	-0.44,4.35	7.0	0.65, 77.6	**0.010**

4.7.2 Multivariable ordered logistic regression for factors associated with frequency of sexual interactions

A multivariable ordered logistic regression was performed after controlling for confounding in all variables that were significant for frequency of sexual interaction at P<0.1. The number of weeks spent on a transit journey and predominant drug use were independently associated with the frequency of sexual interactions among long-distance truck drivers involved in our study (Table 4.8). For every one-year increase in age, the odds of reporting 4-6 or 1-3 sexual acts compared to no sexual acts decreases by 9%. For drivers who spent one week on a transit journey, the odds of having at least one sexual act (combining 1-3, and 4-6 sexual acts) versus zero sexual acts was 1.89 times that of drivers who spent less than one week, holding constant all other factors. For drivers who spent at least two weeks on a transit journey, the odds of having at least one sexual act (combining1-3, and 4-6 sexual acts) versus zero sexual acts was 4.16 times that of drivers who spent less than one week on a transit journey, holding constant all other factors. For drivers predominantly using alcohol, the odds of having at least one sexual act (combining 1-3 and 4-6 sexual acts) was 10.9 times that of drivers who used no drug, holding constant all other factors. For drivers predominantly using khat, the odds of having at least one sexual act (combining 1-3 and 4-6 sexual acts) was 7.05 times that of drivers who used no drug, holding constant all other factors. For drivers predominantly using Marijuana, the odds of having at least one sexual act (combining 1-3 and 4-6 sexual acts) was 3.14 times that of LDTDs who used no drug but not statistically significant (Table 4.8).

Table 4.8: Multivariable ordered logistic regression model of factors associated with frequency of sexual interactions among LDTDs, along the Northern Corridor highway, Kenya, 2020

Levels	Levels	*β*	95% CI of *β*	OR	95% CI of OR	P-values
Age		-0.09	-0.13, -0.05	0.91	0.88, 0.95	**<0.001**
Weeks on transit	< 1 week	*Ref.*		*Ref.*		
	1 week	0.64	0.02,1.26	1.89	1.02, 3.53	**0.045**
	Above 2 weeks	1.43	0.81,2.06	4.16	2.25, 7.81	**<0.001**
Drug/substance use	No drug	*Ref.*		*Ref.*		
	Alcohol	2.39	1.67,3.13	10.9	5.33, 22.9	**<0.001**
	Khat	1.95	1.24,2.69	7.05	3.46, 14.75	**<0.001**
	Marijuana	1.15	-1.31,3.61	3.14	0.27, 37.11	0.349

4.8 Factors associated with utilization of HIV/STI preventive services

A univariable analysis using the binomial logistic regression was performed to determine the factors associated with the utilization of HIV/STIs preventive services among the LDTDs. We used the odds ratio to estimate the strength of association between the independent and dependent variables. The level of significance was set at $p<0.05$. Only the variables with $P<0.1$ at univariable binomial logistic regression level, entered the multivariable binomial logistic regression level of analyses.

4.8.1 Univariable binomial logistic regression model of factors associated with utilization of HIV/STI preventive services among LDTDS

The association between the utilization of HIV/STI preventive services with the History of STIs and with stigma was statistically significant at univariable analyses (Table 4.9).

4.8.2 Multivariable binomial logistic regression model for factors associated with utilization of HIV/STI prevention services among LDTDs.

A multivariable binomial logistic regression was performed to control for confounding on the significant factors identified at the univariate step. Only the history of STIs among the LDTDs was independently associated with the utilization of HIV/STIs preventive services among LDTDs involved in the study (OR 8.4; 95% CI; 4.5,16.7; $P<0.001$). The LDTDs who reported a history of STIs were 8.4 times more likely to have utilized the HIV/STIs preventive services compared to those who did not have a history of an STI (Table 4.10).

Table 4.9: Univariable binomial logistic regression model of factors associated with utilization of HIV/STI preventive services among LDTDs, along the Northern Corridor highway, Kenya, 2020

Variable	Levels	*β*	95% CI of *β*	OR	95% CI of OR	P-value
Age		0.01	-0.02,0.05	1.02	0.98,1.05	0.423
Citizenship	Kenyan	*Ref.*	-	*Ref.*	-	-
	Non-Kenyans	0.22	-0.48,0.92	1.25	0.64,2.61	0.53
Marital status	Married	*Ref.*	-	*Ref.*	-	-
	Single	-0.26	-1.08,0.56	0.77	0.35, 1.83	0.529
	Cohabiting	-0.28	-1.26, 0.69	0.75	0.30, 2.18	0.572
Religion	Christian	*Ref.*	-	*Ref.*	-	-
	Muslim	0.15	-0.53,0.83	1.16	0.60, 2.37	0.666
Education	Primary	*Ref.*	-	*Ref.*	-	-
	Secondary	0.30	-0.32, 0.92	1.35	0.71, 2.50	0.352
	College	0.54	-0.55, 1.64	1.72	0.61,5.67	0.332
Duration working as LDTD	<3 year	*Ref.*	-	*Ref.*	-	-
	4 -10 years	0.44	-0.35,1.23	1.56	0.70, 3.41	0.272
	>10 years	0.37	-0.37, 1.10	1.44	0.68, 2.97	0.328
Monthly income	Low income	*Ref.*	-	*Ref.*	-	-
	Middle, lower income	-0.30	-1.66,1.06	0.74	0.21, 3.46	0.665
Time away on transit	<1week	*Ref.*	-	*Ref.*	-	-
	1week	0.462	-0.21, 1.13	1.59	0.82, 3.15	0.175
	>2 weeks	0.435	-0.23, 1.10	1.54	0.80,3.07	0.203
Drug/substance use	No drugs	*Ref.*	-	*Ref.*	-	-
	Alcohol	1.125	0.15, 2.10	3.07	1.26, 9.26	0.024
	Khat, marijuana	17.637	-2003.71, 2038.99	<0.00	<0.00,0.00	0.986
History of STI	Yes	2.13	1.47, 2.78	8.38	4.46,16.65	**<0.001**
	No	*Ref.*	-	*Ref.*	-	-

Attitude of H/care providers towards LDTD	Yes	0.83	-0.41, 2.06	2.29	0.76, 9.86	0.19
	No	*Ref.*	-	*Ref.*	-	-
Stigma	Yes	1.69	0.49, 2.89	5.42	1.90,22.85	**0.006**
	No	*Ref.*	-	*Ref.*	-	-
Time delays on transit	Yes	0.06	-0.49 ,0.62	1.06	0.61 ,1.86	0.828
	No	*Ref.*	-	*Ref.*	-	-

Table 4.10: Multivariable binomial logistic regression model of factors associated with utilization of HIV/STI prevention services among LDTDs, along the Northern Corridor highway, Kenya, 2020

Variable	**Levels**	**β**	**95% CI of *β***	**OR**	**95% CI of OR**	**P-value**
History of STI	Yes	2.1	1.5, 2.8	8.4	4.5,16.7	**<0.001**
	No	Ref		Ref		
Stigma	Yes	1.0	-0.3,2.3	2.8	0.8, 4.1	0.1173
	No	Ref		Ref		

CHAPTER FIVE

DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a discussion based on the findings of the study as provided in chapter four. It is organized into sections that reflect each of the study's objectives. The last section of the chapter highlights the study limitations, conclusion, and recommendations for practice and further research.

5.2 Discussion

5.2.1 Distribution of the sexual network locations used by the Long-distance truck drivers

The study sought to determine how the sexual networks among the LDTDs are spatially distributed along the Northern Corridor highway in Kenya. The findings revealed a significant variation in the spatial distribution of key components of the sexual networks among LDTDs, including the type of sexual partners, sexual interactions, number of sexual acts, and preferred highway stopovers. The variation in the distribution of sexual networks highlights the need for spatially targeted measures focusing on safe sexual interactions that could curb HIV/STI transmission among the LDTDs and their sexual partners. Spatially targeted interventions can enhance the allocation and distribution of resources such as; condoms and other services tailored for LDTDs such as HIV testing and STI treatment (Zulu et al., 2014; Cuadros et al., 2017). In addition, more HIV testing services, STI screening, and treatment need to be conducted in the high-risk stopovers. The LDTDs and their sexual partners should also exercise safer sexual behaviours while in the hotspot stopovers to minimize their chances of contracting HIV and STIs.

The variability in the spatial distribution of sexual networks among the LDTDs is consistent with previous research on the spatial distribution of sexual interactions and behaviours in different populations (Coburn et al., 2017; Gesink et al., 2018; Palk & Blower, 2018; Bulstra et al., 2020). A study done in Malawi revealed that the geographic distribution of sexual risk behaviours would predict HIV prevalence in different regions (Palk & Blower 2018). In addition, Awad et al. (2012) revealed that individual sexual behaviours could result in a chain of HIV/STI transmission from high-risk groups to lower-risk groups.

The study revealed 42 highway stopovers distributed along the 900 km long Northern Corridor highway, comparable to a study by Ferguson and Morris (2007), which established 39 highway stopovers on the same highway. Literature indicates that highway stopovers among LDTDs naturally arise in response to the need for food and other refreshments, vehicle maintenance such as tire change for their freight trucks, accommodation, and soliciting for commercial and transactional sex (Gysels et al., 2001). Interestingly, none of the 42 highway stopovers was reported in Mombasa, Nairobi, or Kisumu cities, similar to the previous study done on the highway (Ferguson and Morris, 2007). The fact that major cities are the major destination points for most import goods transported from Mombasa's port city disincentives LDTDs from using them as stopovers.

The hotspots with the highest cumulative number of person-days spent by LDTDs in a specific stopover were approximately 30km proximal to major cities and towns such as Nairobi, Nakuru, Eldoret, and Kenya/Uganda international border points. The choice of highway stopovers among LDTDs could be influenced by the availability of sex workers, security, and accommodation facilities, all available in the outskirts of these towns and cities (Ferguson and Morris, 2007). Furthermore, the long period of days spent by LDTDs, waiting for COVID-19 clearance at the Kenya/Uganda international border towns may explain the hotspot clusters at those points (Gachohi et al., 2020). These findings imply that the longer the time spent on a single stopover, the greater the likelihood of sexual interactions. Therefore, stakeholders involved in HIV programming may find an

opportunity to offer more awareness on safe sexual behaviours to the LDTDs who spent longer durations in a given stopover.

One of the four hotspots in which the highest number of sexual interactions were reported (≥13 sexual interactions per stopover) is located on the outskirts of Nairobi city. Given the close link between risky sexual behaviours and the risk of HIV infection, the findings may explain the high prevalence of HIV reported in peri-urban and densely populated regions of Kenya cities that are home to many settled FSWs that avoid the high costly urban life (Cuadros et al., 2017; Palk & Blower, 2018). To corroborate our hypothesis, distance to major urban areas in Malawi predicted high HIV prevalence (Zulu et al., 2014).

Notably, two other hotspots in which the highest number of sexual interactions were reported (≥13 sexual interactions per stopover) are located at the Kenya/Uganda international border towns. The findings are consistent with studies carried out in Zambia and Tanzania, showing that delays at the international border points might create an enabling environment for sexual interactions among LDTDs and their sexual partners (Michalopoulos et al., 2016; Kohli et al., 2017). Additionally, a study in Bangladesh found that many LDTDs engaged in sexual interactions with regular and casual sexual partners at the international border points (Gibney et al., 2003).

In contrast to the highest number of sexual interactions being reported in the periurban and densely populated outskirts of cities, four hotspots characterized by average sexual interactions per stopover were located away from the densely populated and major urban towns. The distribution of the average number of sexual acts per sexual interaction per stopover also follows a pattern in which the hotspots are located away from the densely populated and major urban regions. The mobility of LDTDs may lead to the distribution of HIV and associated risk behaviours from regions of high to low prevalence (Coburn et al., 2017).

The distribution of hotspots of casual sexual partners was restricted to the Kenya-Uganda border points. According to studies done in Zambia and Tanzania, when LDTDs overstay at the international border points waiting for clearance, they find an opportunity to interact with more casual sexual partners while at the same time building new opportunities for newer regular sexual partners (Michalopoulos et al., 2016; Kohli et al., 2017). Research shows that LDTDs could spend as long as ten days at the Kenya-Uganda border points waiting for COVID-19 test results at the early stages of the COVID-19 pandemic (Gachohi et al., 2020). Delays at the Kenya-Uganda border points meant more time for the LDTDs to establish casual sexual partnerships, contributing to casual partners' hotspots at those points. The distribution of hotspots of regular sexual partners was widely spread across the Northern Corridor highway. The regularity of travel among the LDTDs along the highway could mean the regularity of sexual partners, hence the hotspots of regular sexual partners. Conclusively, the proximity of stopovers to major urban areas and international border points as well as the mobility of LDTDs, are the key factors that determine the distribution of sexual networks along the Northern Corridor highway.

5.2.2 Frequency of sexual interactions

The study assessed the frequencies of sexual interactions and associated factors among the LDTDs who operate along the Northern Corridor highway segment in Kenya. Slightly below half (47.6%) of the LDTDs had been involved in sexual interactions. Of the LDTDs who reported sexual interactions, 74.5% had sexual interactions with female sexual partners who were meeting for the first time (casual sexual partners). The rest (25.5%) had sexual interactions with sexual partners they had met before (regular sexual partner). The findings imply that the LDTDs engage casual sexual partners more than regular sexual partners for commercial sex while on transit. As a result, the exposure rates to HIV and STIs are likely to be high among the LDTDs engaging casual sexual partners. Understanding the most engaged group of sexual partners by the LDTDs can inform healthcare stakeholders on priority groups to target with HIV and STI interventions. This approach is not only cost-effective but also saves time and scarce healthcare resources.

The study findings are consistent with studies done in South Africa and Bangladesh, which found that casual sex workers are the most engaged by LDTDs along the major highways (Gibney et al., 2003; Makhakhe et al., 2017). Contrary to our findings, a study done in Nigeria (Sunmola, 2005) revealed that 52% of the LDTDs had more sexual interactions with regular sexual partners than casual sexual partners.

A total of 428 sexual acts were reported from the sexual interactions between the study participants and their female sexual partners. The number of sexual acts may inform healthcare stakeholders involved in HIV programming on the number of condoms needed among the LDTDs and their sexual partners for effective control of HIV and STIs. The study found a lower weekly average of 3 sexual acts among the study participants with their sexual partners compared to Ferguson and Morris, (2007), who found a weekly average of 13.6 sexual acts from dairies of FSWs who interacted with LDTDs. The disparity in the results could be explained by the different methods used to collect the data. Whereas this study used self-reporting, Ferguson & Morris, (2007) used sex workers' dairies to extract their information on the number of weekly sexual acts.

Regarding drug and substance use during sexual interaction, 31.2% of the LDTDs who reported sexual interactions had taken alcohol as the predominant substance. For effective control of HIV and STIs to be achieved, alcohol use among the LDTDs and their sexual partners should be regulated. Therefore, the transport agencies in the government, healthcare stakeholders, and employers in the trucking industry should work in collaboration to ensure that substance use among the LDTDs is controlled. In India, excessive alcohol use during or before sexual intercourse was found to impair decision-making, potentially influencing risky sexual behaviour like poor condom use (Steward et al., 2017). Other studies have identified alcohol use is likely to influence risky sexual behaviours among the LDTDs during sexual interactions (Botão et al., 2016; Maarefvand et al., 2016; Malta et al., 2006; Sunmola, 2005).

5.2.3 Levels of the utilization of HIV/STI preventive services

This study assessed the utilization levels of HIV/STI preventive services and associated factors among the LDTDs. Analyses classed most of the respondents (n=231, 78.0%) as having good utilization, while the rest (22%) had limited utilization. An STI history was strongly associated (OR >8) with the utilization of HIV/STI preventive services.

The study findings reveal that despite the high number of LDTDs undergoing HIV testing (97%), the uptake of the subsequent tests (as recommended after every three months) is still low (4.9%). In such circumstances, the identification of new HIV cases among the LDTDs could be difficult. As a result, a late HIV diagnosis misses the early initiation to antiretroviral therapy and continues to bridge the infection to other sexual partners. Nevertheless, there is an opportunity to improve the uptake of the subsequent HIV tests to meet the recommended frequency of 3 monthly testing for the most at-risk populations, including LDTDs. The 97% of LDTDs previously tested for HIV in this study are comparable to 91.8% reported in 2018 in Kenya, suggesting recent improvements in national HIV testing among the LDTDs (Romo et al., 2018). Studies in Mozambique and Togo reported lower proportions (65.8% and 47.7% respectively) of HIV testing among the LDTDs, perhaps reflecting lesser national HIV testing (Botão et al., 2016; Yaya et al., 2016).

Of the LDTDs previously tested on HIV, 95.5% had only received the provider-administered finger prick test. In contrast, only 4.5% of the LDTDs had ever utilized oral HIV tests. This outcome indicates that the oral HIV testing uptake is unacceptably low among the LDTDs, despite strong recommendations from UNAIDS (UNAIDS, 2020). Research shows that availing the oral HIV test kits to the LDTDs may improve their uptake of HIV testing (Kelvin et al., 2019). Indeed, the reason for their recommendation is the non-invasive nature enabling ease of use without healthcare provider involvement (Kelvin et al., 2019). Therefore, the reasons for the low (4.9%) uptake of the oral HIV tests need to be investigated.

On the challenges faced while seeking HIV testing before, close to half of the study participants 130 (45.3%) reported time delays as their key challenge, 32 (11.1%) reported self-stigma, whereas 20 (7%) stated negative attitude from health providers as their main challenge. Our findings demonstrate the need for stakeholders involved in providing HIV prevention services to be flexible and extend the time they offer HIV/STIs preventive services to the LDTDs. Creating a flexible working schedule would allow the LDTDs to access the HIV/STI services at odd hours when they stop to rest. The findings also suggest the need for psychological therapy among LDTDs to reduce self-stigma. Self-stigma among the LDTDs can limit their ability to exploit the available HIV preventive services fully. Health care providers also need to be sensitized on the unique health care needs faced by the LDTDs, to reduce the negative attitude towards them. Our findings concur with a study by Kohli et al. (2017), which found that time delays among LDTDs in Tanzania limited their ability to keep clinic appointments for HIV prevention services. Romo et al. (2018) found that self-stigma in HIV testing could negatively affect the uptake of the service among LDTDs, which is consistent with our study findings on LDTDs citing self-stigma as a key challenge in their access to HIV prevention services.

Slightly above half (59.1%) of the LDTDs reported contracting an STI during their career, suggesting minimal condom use during their sexual interactions. However, it was notable that almost all (98.9%) of the LDTDs who contracted the STIs sought treatment. Prompt STI treatment provides a strong prognosis of recovery and reduces the chances of HIV transmission between sexual partners. Contrary to our findings, a previous study on the same population conducted a decade earlier found smaller proportions of 15% of LDTDs reporting an STI history, perhaps reflecting a change of practices with time (Ferguson & Morris, 2007).

Most of the LDTDs (78.0%) reported good utilization of the HIV/STI preventive services (scores of 5-8), while the rest (22%) had limited utilization (scores of 1-4). The proportion of LDTDs (22%) who had limited utilization highlights the need for enhanced interventions. These interventions need to be tailored to meet the unique healthcare needs

of the LDTDs. Policy guidelines on HIV programming (HIV testing, care, and treatment) recommend integrating STI and HIV preventive services like; HIV testing and counselling and condom distribution to the vulnerable groups (Katz et al., 2016). Integrating the STI and HIV preventive services can improve the overall utilization of HIV preventive services while being cost-effective (Katz et al., 2016). The outcome in utilizing HIV/STI preventive services supports the guidelines for integrating HIV and STI services. Contrary to our findings on 78% of LDTDs reporting good utilization of HIV preventive services, a study in South Africa found that only 30% of the study participants had good utilization (Lalla-Edward et al., 2017).

Of the LDTDs who reported sexual interactions with casual sexual partners, 97.1% of them used condoms. For the LDTDs who had sexual interactions with regular sexual partners, only 47.2% of them used condoms. From these findings, it is evident that the exposure risk to HIV and STIs is high among the LDTDs engaging regular sexual partners implying that intense HIV/STI control efforts need to include this segment, previously neglected relative to those engaging in casual sex. Consistent with our findings, previous studies in Nigeria, South Africa, and Mozambique have identified low rates of condom use in sexual interactions between LDTDs and regular sexual partners as opposed to higher rates among casual partners (Botão et al., 2016; Makhakhe et al., 2017; Sunmola, 2005).

5.2.4 Factors associated with frequency of sexual interactions

The study established that only age, number of days spend on transit, and drug and substance abuse were significantly associated with a higher frequency of sexual interactions among the LDTDs. Regarding age, the study established that for every increase in age by one year among the LDTDs, the odds of reporting 1-3 or 4-6 sexual acts decreased by 9% compared to zero sexual acts (OR=0.91). The study findings demonstrate that sexual activity decreases with an increase in age among the LDTDs while on transit. Consequently, the younger LDTDs are at a higher risk of exposure to HIV/STIs

compared to their older counterparts due to their higher likelihood of engaging in sexual interactions. Thus, the younger and newly employed LDTDs should be targeted with more HIV/STI preventive services than their older counterparts. Employers in the Long-distance trucking industry should partner with healthcare stakeholders to sensitize newly employed and young LDTDs on the risk of HIV/STI infections that lurks in risky sexual interactions while on transit. The findings concur with those of Pandey et al. (2008), which found that LDTDs aged 25-34 years in India were more likely to engage in sexual interactions as compared to their older counterparts.

The study established that spending one week (OR=1.89) and two weeks (OR =4.16) on a transit journey were risk factors for a higher frequency of sexual interactions among the LDTDs. These findings demonstrate that the longer the time LDTDs spend on a transit journey, the higher their chances of engaging sexual partners to meet their sexual needs. This outcome highlights the need for employers in the Long-distance trucking industry to offer assistants to the LDTDs who spent longer durations on transit. For instance, a LDTD driving from Mombasa to Kisumu can be assisted by another one waiting from Nairobi. This would shorten the time spent on the transit journey lowering the LDTDs' exposure to risky sexual interaction. Our findings are consistent with a study done in India, which found that LDTDs who spent 15 days and above were more likely to engage in sexual interactions with casual sexual partners compared to those who spent a shorter duration (Singh & Joshi, 2012).

Similarly, a study done in South Africa found that LDTDs who spent four weeks on a transit journey were more likely to engage in sexual interactions and 1.5 times more likely to have HIV infection (Delany-Moretlwe et al., 2014). Additionally, In India, another study found that spending ten days and above among LDTDs increased their chances of engaging in paid sexual intercourse (Pandey et al., 2008). Contrary to our findings, another study done in India found no significant association between time spent on a transit journey and the frequency of sexual interactions among LDTDs (Maarefvand et al., 2016).

Use of alcohol (OR=10.9) and Khat (OR=7.05) emerged as risk factors for higher frequencies of sexual interactions among the LDTDs and their sexual partners. These findings indicate that the LDTDs who engage in substance use, specifically alcohol and Khat, before or during sexual interactions are more likely to report a higher frequency of sexual interactions than those who do not. The more the frequency of sexual interactions under the influence of drugs and substances, the higher the exposure risk to HIV and STIs. Therefore, the LDTDs should drink alcohol responsibly while on transit, and where possible, avoid sexual engagements while drunk. Our findings are consistent with a study done in India that found that LDTDs who used alcohol during or before sexual interactions were more likely to engage in sexual interactions than those who did not (Singh & Joshi, 2012). In contrast, a study done in Nigeria found no significant association between substance use and the frequency of sexual interactions (Sunmola, 2005).

5.2.5 Factors associated with utilization of HIV/STI preventive services

Only the history of STIs among the LDTDs was significantly and strongly associated with the utilization of HIV/STI preventive services (OR = 8.4). These findings imply that the LDTDs who contracted STIs and sought treatment in various health facilities also benefited from other HIV/STI preventive services such as accessing condoms and HIV testing. The findings also suggest that the health care providers who attend the LDTDs should also create awareness of preventing future STIs among them. Recent guidelines recommend that patients who present with STIs obtain HIV testing to avoid missed opportunities for identifying new HIV cases (UNAIDS, 2020) since STIs elevate the risk of HIV infection. The chances are that the LDTDs presenting with STI symptoms may also have been exposed to HIV attributable to a similar transmission mode (Katz et al., 2016). While these findings are consistent with those of other studies done in Zambia and Brazil reporting a significant association between STI and utilisation of HIV/STI preventive services (Fernández-Balbuena et al., 2016; Mutale et al., 2018), a study in the USA reported no significant association between the history of STIs and the uptake of HIV preventive services (Bradley et al., 2012). Our findings further suggest that in

enhancing the utilization of HIV/STIs preventive services, LDTDs should be encouraged to bring along their sexual partners for STI/HIV health care services whenever they have an STI. The ultimate goal would be to maximize the utilisation of HIV/STI preventive services among the most at-risk populations and the general population, thus reducing new HIV and STI infections.

5.2.6 Linking the spatial distribution of sexual network locations with the utilization of HIV/STI preventive services among the LDTDs

As suggested by Palk and Blower (2018), the geographic distribution of sexual risk behaviours could predict the intensity of HIV and STIs prevalence in different regions. This indicates that the hotspots of sexual networks identified in this study may equally suggest stopovers that have significant HIV and STI transmission levels among the LDTDs and their sexual partners. Therefore, intensified HIV testing services, STI screening, and treatment are needed in the hotspots identified in this study.

The distinct sexual network hotspots revealed from this study may suggest stopovers that need specific and spatially targeted HIV/STI preventive interventions. Sexual network hotspots characterized by high cumulative stopovers of LDTDs would be appropriate for condom distribution, HIV testing, STI treatment, and behavioural change messages on safe sexual practices. Hotspots defined by the number of sexual interactions and sexual acts would be suitable for condom and sexual lubricant distribution, and behavioural change messages on proper condom use. Lastly, the hotspots that were characterized by the number of casual and regular sexual partners would be appropriate for sexual partner referral and contact tracing, partner HIV testing, sexual partner STI treatment, condom distribution and behavioural change messages on sexual partner reduction. Indeed, these targeted interventions would not only be cost-effective on scarce health resources but also likely to improve the 22% of limited utilization of HIV/STI preventive services identified in the study.

5.3 Study Limitations

Since this study was cross-sectional, it is not possible to draw causal inferences from the findings. Therefore, the study findings are suitable for generating hypotheses on the frequency of sexual interactions and utilization of HIV/STI preventive services among LDTDs. The study relied on self-reporting from the study participants, hence likely to have recall bias in the responses given. To mitigate the effect of recall bias, the study participants were asked about their sexual interactions on the week preceding the day of the survey. Given the discomfort that may arise from the questions touching on sexual interactions, responses given by the study participants were likely to have a social-desirability bias, where respondents over-report the good behaviour and under-report the bad behaviour. To mitigate the potential of social-desirability bias in the study, the participants were assured of confidentiality and the benefits the study had in improving their health, well-being, and productivity in the trucking industry. Lastly, the responses given by the study participants may have been affected in one way or another by the timing of data collection during the COVID-19 pandemic. Mobile workers, including LDTDs, may have been going through psychological difficulties due to fear of infection with COVID-19. To ensure that the study participants were comfortable and not in fear of being infected with COVID-19 from the interactions during face-to-face interviews, they were offered facemasks while keeping social distance as recommended by the Ministry of Health Kenya.

Lastly, the use of an interviewer-administered questionnaire may have introduced interviewer bias. The ideal questionnaire recommended in situations of sensitive information (sexual interactions) is the self-administered questionnaire. However, due to the mobile nature of the LDTDs, most of them may not have returned the filled questionnaires, hence a low response rate in the study. The data enumerators were trained on the protocol of handling sensitive responses in the questionnaires so as not to shun the LDTDs from giving honest responses.

5.4 Conclusion

The distribution of sexual network hotspots is generally restricted to the Kenya/Uganda border, and proximally to major urban areas. The hotspots may suggest stopovers with significant transmission levels of HIV/STIs, which calls for enhanced spatially targeted interventions among the LDTDs and their sexual partners. Thus, there is a need for spatially targeted measures that ensure safe sexual interactions that curb HIV/STIs spread among the LDTDs and their sexual partners.

The frequency of sexual interactions is higher among the LDTDs who interact with casual sexual partners than regular sexual partners. Equally, the exposure risk to HIV and STIs is likely to be high among the LDTDs who engage casual sex workers due to their high frequency of sexual interactions. As result, more HIV/STI preventive interventions should be focused on the LDTDs who engage the casual sexual partners. Understanding the frequency patterns of sexual interactions, like the average number of sexual acts and types of sexual partners frequently engaged, may assist in packaging essential sexual-behavioural change messages to the LDTDs and their sexual partners. Further, relevant biomedical services like HIV testing and STI treatment may be guided by understanding the patterns embedded in the frequency of sexual interactions among the LDTDs.

Despite the majority (78%) of the study participants reporting good utilization of HIV/STI preventive services, uptake of the subsequent HIV testing services among the LDTDs is still low. The low rate of 4.9% on the recommended three months frequency of HIV testing highlights the need for enhanced HIV/STI preventive services among the LDTDs. These services should be packaged in a manner that suits the unique needs of the LDTDs.

Young age, spending above one week on a transit journey, and using alcohol and Khat are risk factors for a high frequency of sexual interactions among the LDTDs. Consequently, the risk of HIV/STIs is likely to be high among the LDTDs who exhibit the characteristics above, hence the need for heightened HIV/STIs prevention interventions among them.

The history of an STI among the LDTDs is a predictor of the utilization of HIV/STI preventive services. Therefore, a current or recent history of an STI among the LDTDs should prompt a healthcare provider to offer them other HIV preventive services. Eventually, this would improve the uptake of HIV/STI preventive services among the LDTDs, hence reducing the transmission rate of HIV and STIs.

5.5 Recommendations

5.5.1 Recommendations for practice

The Ministry of Health, private health facilities, non-governmental health organizations and healthcare providers involved in providing HIV/STIs prevention interventions for LDTDs and other most at-risk populations should;

1. Enhance the availability of HIV/STI preventive services (HIV testing, STI treatment, condom distribution, and behavioural change messages) at the sexual network hotspots identified in this study (stopovers situated at the international border points and the metropolitan regions of major Cities in Kenya).
2. Focus HIV/STI preventive services to the LDTDs reporting sexual interactions with casual sexual partners due to the high frequencies of sexual interactions, increasing their exposure risk to HIV and STIs.
3. Enhance HIV testing among the LDTDs to meet the recommended frequency of three months of testing for the most at-risk populations, improving the 22% of limited utilization of HIV/STI preventive services identified in this study.
4. Target the following categories of LDTDs who are at a high risk of HIV/STIs; those who are younger, those who spent more than one week on a single transit journey, and those who report the use of alcohol and Khat during or before sexual interactions.
5. Create and enhance awareness of preventing future STIs among the LDTDs and sensitise them on the need to seek other HIV preventive services whenever they experience signs and symptoms of an STI.

5.5.2 Further Research

1. Further research is recommended to determine the spatial distribution of health facilities (public, non-governmental, and private health facilities) and the availability of HIV/STIs preventive services in those facilities along the Northern

Corridor highway. A study of this kind will enable stakeholders involved in HIV/STI programming to identify gaps and priority regions that may need improvement in allocating and distributing health resources.

2. A study is also recommended to determine how the accessibility of healthcare services (distance, cost, availability of the health services, and health insurance) influences the uptake of HIV/STIs preventive services among the LDTDs operating along the Northern Corridor highway.
3. There is also a need for a study to determine the factors influencing the uptake of subsequent HIV testing services among the LDTDs to enhance the low uptake of 4.9% identified in this study.

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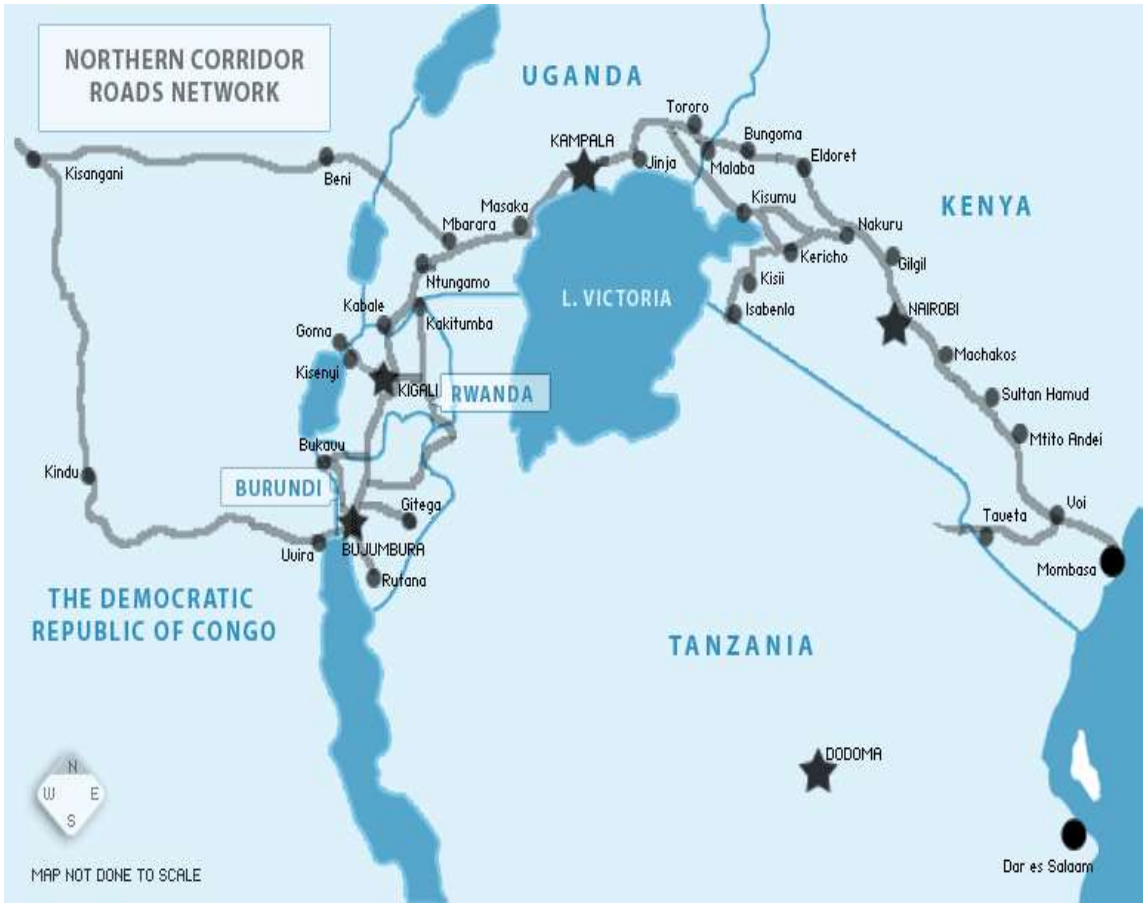
APPENDICES

Appendix I: Map of the Northern Corridor Highway (NCTTCA, 2019)



Appendix II: Consent Form

Information about the study

Hello, I am (Name) working on a research project for a Master's Degree in International Health from Jomo Kenyatta University of Agriculture and Technology. We are conducting a study on; **Spatial mapping of sexual network locations and utilization of HIV/STI preventive services among long-distance truck drivers using the Northern Corridor highway.** By listening to people who may have had some experience with long-distance truck driving, we hope to learn about their experiences on sexual networks and encounters, individual factors that influence sexual interactions, and the availability and utilization of HIV/STIs preventive services along the north corridor highway.

You have been selected to represent truck drivers in this area (from the Northern Corridor highway), and we would very much like to hear about your opinions and experiences. Before we get started, I would like to explain to you how the interview works.

Informed Consent

Your participation in the interview and every aspect of the study is entirely voluntary.

If some questions are difficult or make you uncomfortable, we can skip them. You may also ask me to clarify any questions if you do not understand them. You may also decide to stop the interview at any time.

All of the information that you provide for the study will be kept entirely confidential. We record your responses, but the questionnaire will not have your name on it, and your answers to our questions are identified serially only by a number, never by name.

If you have questions or concerns after we are finished, you may contact (Provide phone number).

Although there are no direct benefits to you from participating in this interview, we hope that the interview will help in understanding the distribution patterns of sexual network locations used by long-distance truck drivers. The study findings will inform on targeted interventions to reduce new HIV/STIs infections and aid in the achievement of the UNAIDS targets. The interview will take about 20 minutes.

Do you have any questions about the interview? Are you willing to participate in our study?

Consent Form

We have a form that must be read to you before we begin, to confirm that we have explained the study to you and that you have agreed to participate.

We ask you to sign the form, but we do not keep the form attached to the questionnaire, so your name will not be linked to the information we write about you, and no one except the people responsible for the study will have access to this information.

The form just repeats what I have told you about the study, but I have to read it to you.

I understand that I have been asked by (Name of Interviewer) to participate in a research project designed to investigate people's experiences and perspectives regarding HIV testing, counselling, and treatment.

I understand that during this study, I will be asked questions about my sexual experiences while on transit through the northern corridor highway and that my responses will be recorded in a questionnaire form. My participation in the study will be kept confidential, and my identity will be available only to those performing or supervising the research. I understand that I would never be identified by name in any publications resulting from this study.

I am aware that there may be some questions asked during the interview, which may make me uncomfortable. I realize that I do not have to answer any question that I do not want to answer. I understand that I am free to withdraw my consent and discontinue participation in this research project at any time, without affecting my future career in long distance driving.

I realize that I will not benefit directly from this project. However, with my participation, I hope to help investigators and healthcare providers improve on HIV/STI targeted interventions along the northern corridor highway.

Certificate

I have read this consent form or have had it explained to me to my satisfaction the information relating to this study. I understand what my participation will involve and agree to take part in this interview under the terms of this agreement. I have had the opportunity to ask questions about it, and my questions have been answered to my satisfaction.

I consent voluntarily to participate in this study, and I understand that I have the right to withdraw at any time, without it in any way affecting my future career or access to health care services.

Participant signature…….

Interviewer Signature……

Appendix III: Confidentiality Form for Data Enumerators

I (Name)……. here-by commit to keeping confidential and private, information collected from the Study participants as provided by the National Ethics Committee on Human Research and the training on ethics offered to me before the commencement of this study. I will not coerce participants and that I will ensure their participation is voluntary, having taken them through an informed consent before interrogation.

Signature…….

Appendix IV: Questionnaire (English Version)

Thank you for agreeing to participate in this study, which seeks your opinions and thoughts on sexual networks and the utilization of HIV/STI Preventive services along the Northern Corridor highway. The survey will take approximately 7-10 minutes. Please note that participation is voluntary, and your contribution is confidential.

Date of interview DD/MM/YYY____/_____/_____.

Interview ID number in the form of 001, 002, 003…….

SECTION A

Socio-demographic and Economic Characteristics

QA.1.How old are you in years……..?

QA.2 What is your Citizenship?

☐Kenya

☐Tanzania

☐Uganda

☐Rwanda

☐Burundi

☐D.R.C

☐South Sudan.

☐Other, specify…….

☐Declined to answer

QA.3 What was the last level of schooling that you attended?

☐No formal education.

☐Primary education

☐Secondary education

☐Vocational training

☐College

☐University

☐Declined to answer

QA.4 What is your marital status?

☐Single, never married

☐Married

☐Divorced.

☐Widowed

☐Cohabiting

☐Declined to answer

QA.5 What is your religion?

☐ Christian.

☐ Muslim

☐ Hindu

☐Other specify…….

☐Declined to answer

QA.6 For how many years have you worked as a Long-distance truck driver?

☐ Less than a year

☐ 1-3 years.

☐ 4-5 Years.

☐ 6-10 years.

☐ Above ten years

☐Other specify…….

☐ Declined to answer

QA.7 Would you share with us the number of days or weeks spent on transit before going home?

☐Less than 7 days

☐1 week

☐2 weeks

☐3weeks

☐4 weeks and above

☐Other specify……..

☐Declined to answer

QA.8 What is your monthly income?

☐ 0-499 USDs (0-49 999 KShs)

☐ 500-999 USDs (50 000Kshs-99 999 Kshs)

☐ 1000-1999 USDs (100 000Kshs-199 999 Kshs)

☐ >2000 USDs (200 000 Kshs)

☐Declined to answer

Section B; Sexual Networks and Frequency of Sexual Encounters

Date.	**Name the town you made a stopover for rest, in the following days?**	**Did you have a sexual interaction while on this stopover? (Yes/No)**	**If Yes, what was the nature of the interaction(Casual sexual partner)**	**Sexual interaction with Regular Sexual Partner.**	**Number of sex acts during that day**	**Geographical coordinates**
Yesterday	e.g Mtito Andei(Kenya).	☐Yes ☐No	☐Yes ☐No	☐Yes ☐No		
2 days ago		☐Yes ☐No	☐Yes ☐No	☐Yes ☐No		
3 days ago		☐Yes ☐No	☐Yes ☐No	☐Yes ☐No		
4 days ago		☐Yes ☐No	☐Yes ☐No	☐Yes ☐No		
5 days ago		☐Yes ☐No	☐Yes ☐No	☐Yes ☐No		
6 days ago		☐Yes ☐No	☐Yes ☐No	☐Yes ☐No		
7 days ago		☐Yes ☐No	☐Yes ☐No	☐Yes ☐No		

Section C

Factors Related to Frequency of Sexual Interactions.

The next set of questions is about your sexual history and characteristics related to it. By sex, we mean vaginal, oral, or anal sexual intercourse. Please remember that your answers are strictly confidential.

QC.1 During the time you had penetrative sex (anal or vaginal), did you use condoms?

☐Yes

☐No

☐Declined to answer

QC.2 If **NO to QC.1 above,** would you share to us your reason for not using condoms?

☐Lack of perceived risk of HIV/STIs infection from the partner

☐Did not have the condoms

☐Need to have maximized pleasure with unprotected sexual intercourse

☐Declined to answer

☐Other specify……..

QC.3 What would you say were your reasons for sexual engagement while on transit?

☐ As a way of relieving stress related to nature of trucking work

☐ Urge to meet sexual needs due to prolonged separation from wife or regular sexual partner

☐Availability of cheap commercial sex along the highway stopovers

☐Peer influence from fellow truck drivers

☐Declined to answer

☐Other specify……..

QC.4 When you were having sex, had you used any of these substances before or during sex?

☐ Alcohol

☐ Marijuana

☐ Khat (*Miraa*)

☐ Cocaine

☐ Other specify……..

☐ Declined to answer

QC. 5 Where do you mostly get your condoms from while on transit?

☐Public Health facility (Governmental)

☐Non-Governmental facility (NGO, FBO or a CBO)

☐Private health facility (Chemists, Clinics or Hospitals)

☐From bars and lodgings

QC.6 Have you ever lacked condoms in a time when you needed them?

☐Yes

☐No

☐Declined to answer

QC.7 What is your main challenge towards access of condoms while on transit?

☐Stockouts from the Public Health Facilities

☐Stockouts from the Non-Governmental facility (NGO, FBO or a CBO)

☐Unable to afford them from Private facilities (Clinics, or Chemists)

☐Stock out from bars or lodgings

☐Declined to answer

Section D

Utilization of HIV/STIs services and Related Factors

The next set of questions is about the utilization of HIV/STDs health care services. Please remember that your answers are strictly confidential.

QD.1 Have you ever been tested on HIV?

☐Yes.

☐No.

☐ Declined to answer

QD. 2 If **YES to QD.1 above**, what type of HIV test was it?

☐Finger prick

☐Oral test

☐Both

☐ Declined to answer

QD.3 If your **answer to QD.1 is YES**, would you tell us when you were lastly tested?

☐ 3 months ago

☐ 4-6 months ago.

☐ Above 6 months ago.

☐ Declined to answer

QD.4 Would you share with us the outcome of your last HIV test? (If **NEGATIVE, skip to QD.8)**

☐ Negative.

☐ Positive

☐ Declined to answer

QD.5 If **POSITIVE to QD.4 above**, were you started on medication from a clinic or any health facility?

☐ Yes

☐ No

☐ Declined to answer

QD.6 If your answer is **YES to QD.5 above (started on medication**), are you on care and follow up till today?

☐Yes

☐No

☐Declined to answer

QD. 7 If your answer to **QD6 is NO**, would you share with us why?

☐ Lack of access to care and treatment

☐ Unwilling to take follow up services

☐ Difficulties related to nature of trucking Job

☐ Declined to answer

☐Other specify……..

QD.8 Can you recall the type of facility from which you accessed your last HIV testing?

☐ Public Health Facility (Governmental)

☐ Non-Governmental Facility (NGO, FBO or CBO)

☐ Private health facility (Chemists, Clinics or Hospitals)

☐Do not know.

QD.9 What has been your main challenge while seeking for HIV preventive services?

☐ Lack of the required equipment or drugs from health facilities (ART drugs, Test Kits)

☐ Lack of a health care provider from the health facility

☐ Time delays

☐ Negative attitude from the service providers

☐ Declined to answer

☐Other specify……

QD.10 Have you ever had a sexually transmitted infection (Burning sensation during urination or penile discharge associated with unprotected sexual intercourse).

☐Yes

☐No

☐ Declined to answer

QD.11 If YES **to QD.10 above**, did you seek for treatment?

☐Yes

☐No

☐Declined to answer

QD.12 If **YES to QD.11 above**, from which of these facilities did you seek treatment from?

☐ Public Health facility (Governmental)

☐ Non-Governmental facility (NGO, FBO or a CBO)

☐ Private health facility (Chemists, Clinics or Hospitals)

☐ Declined to answer

QD.13 After how long did you seek for the STI treatment

☐1-7 days

☐1-2Week

☐More than two weeks

☐ Declined to answer

QD.14 What is your main challenge while accessing STI treatment while on transit?

☐Lack of access to the drugs and health care facilities

☐Lack of funds for the health care service

☐Lack of Health insurance cover

☐Negative attitude from the health service providers

☐Declined to answer

☐Other specify……..

This brings us to the conclusion of our interview. Thank you for participating.

Appendix V: Swahili Questionnaire (Dodoso la Maswali ya Kiswahili)

Asante kwa kukubali kushiriki katika utafiti huu ambao unatafuta maoni yako kwenye mitandao ya ngono na utumiaji wa huduma za Kinga za Ukimwi kwenye Barabara kuu ya Koroni ya Kaskazini. Utafiti utachukua takriban dakika 7-10. Tafadhali kumbuka kuwa ushiriki ni wa hiari, na mchango wako ni wa siri.

Tarehe ya mahojiano DD/MM/YYYY _____/_____/_____.Nambari ya mahojiano...01,

SEHEMU A

QA.1. Je, Una miaka mingapi…….?

QA.2 Je, Uraia wako ni wa nchi gani?

☐Kenya

☐Uganda

☐Tanzania

☐Rwanda

☐Burundi

☐D.R.C

☐South Sudan.

☐ Nyingine, taja……

☐ Sina jibu

QA.3 Kiwango gani cha mwisho cha masomo ambacho ulihudhuria?

☐ Hakuna elimu rasmi

☐ Elimu ya msingi

☐ Elimu ya sekondari

☐Chuo anuwai

☐ Elimu ya Juu

☐ Sina jibu

QA.4 Je, hali yako ya ndoa ni ipi kati ya hizi?

☐Kabwela

☐Nimeoa

☐Tuliachana na mpenzi

☐ Mjane

☐ Naishi na mpenzi hasiye wa kudumu

☐ Sina jibu

QA.5 Je, Dini yako ni gani?

☐ Mkristo

☐ Mwislamu

☐ Mhindu

☐ Nyingine, taja …….

☐ Sina jibu

QA.6 Ni kwa muda gani umefanya kazi kama derefa wa Malori ya masafa Marefu?

☐ Chini ya mwaka moja

☐ Miaka 1-3

☐ Miaka 4-5.

☐ Miaka 6-10

☐ Zaidi ya Miaka 10

☐ Nyingine, taja …….

☐ Sina jibu

QA.7 Ni muda gani huwa unatumia kabla umerudi nyumbani kunako familia ama mpenzi wako?

☐ Chini ya suku saba

☐ Wiki moja

☐ Wiki mbili

☐ Wiki tatu

☐ Wiki nne na zaidi

☐ Nyingine, taja ……

☐ Sina jibu

QA.8 Je mapato yako ya kila mwezi yako kiwango gani kati ya hizi?

☐ 0-499Dola za Makerekani (0- 49 999KShs)

- ☐ 500-999 Dola za Marekani (50 000Kshs-99 999Kshs)
- ☐ 1000-1999 Dola za Marekani (100 000Kshs-199 999Kshs)
- ☐ >2 000Dola za Marekani(200 000Kshs)
- ☐ Sina jibu

SEHEMU YA B;Kushiriki Ngono

Tarehe	**Jina la mji uliokuwa, kwenye siku zifuataz o?**	**Je, Ulikuwa na mwingilia no wa kingono katika mji huu? (Ndio/La)**	**kama jibu lako ni Ndio, je alikua mpenzi wa aina gani(mpenzi hasiye wa kudumu)**	**Kushirki kimapenz i na mpenzi wa kudumu**	**Idadi ya watu ulioingili ana kingono nao ilikuwa nini?**	**Kurat ibu za kijiog rafia**
Jana		❍Ndio ❍la	❍Ndio ❍la	❍Ndio ❍la		
Juzi		❍Ndio ❍La	❍Ndio ❍La	❍Ndio ❍La		
Mtondo		❍Ndio ❍La	❍Ndio ❍La	❍Ndio ❍La		
Mtondog oo		❍Ndio ❍La	❍Ndio ❍La	❍Ndio ❍La		
Siku tano zilizopita		❍Ndio ❍La	❍Ndio ❍La	❍Ndio ❍La		
Siku sita zilizopita		❍Ndio ❍La	❍Ndio ❍La	❍Ndio ❍La		
Siku saba zilizopita		❍Ndio ❍La	❍Ndio ❍La	❍Ndio ❍La		

SEHEMU YA C

Sababu zinazohusiana na Kushiriki kwa Ngono

Seti inayofuata ya maswali ni juu ya historia yako ya kushiriki ngono na sifa zinazohusiana nayo. Tafadhali kumbuka kuwa majibu yako ni ya siri kabisa.

QC.1 Kama jibu lako ni kuwa ulishiriki haina hizo za ngono zilizotajwa, je ulitumia kinga?

☐Ndio

☐ La

☐ Sina jibu

QC.2 Ikiwa jibu lako la swali QC.1 ni La, unaweza tueleza ni kwa sababu gani?

☐ Sikujiona katika hatari ya kuambukizwa virusi ama magonjwa ya zinaa

☐ Sikua na Kondomu wakati huo

☐Hamu ya kutaka kutosheka zaidi na mapenzi bila kinga

☐Msukumo kutoka kwa madereva wenzangu

☐ Sina jibu

☐Nyingine, taja……

QC.3 Je ni gani unaweza sema ndio sababu kuu ya kushirki ngono wakati uko safarini?

☐Kupunguza uchofu wa safari

☐hamu ya kutaka kukinai mahitaji ya kimapenzi

☐Kuwepo kwa wauza ngono

☐Sina jibu

☐Nyingine taja……

QC.4 Je, wakati wa kushirki ngono ulikua umetumia yoyote kati ya haya madawa ya kulevya?

☐ Pombe

☐ Marijuana/Bangi

☐Miraa

☐ Nyingine, taja…….

☐ Sina Jibu

QC. 5 Je, huwa unapata mipira ya kujikinga virusi kutoka wapi?

☐ Kituo cha serikari

☐ Kituo cha shirkia lisilo la Kiserikali

☐ Kituo cha Serikali na Kisicho cha Kiserikali

☐Kutoka kwa vyumba vya burudani

☐ Kunua kutoka kwa maduka ya madawa

☐Sina Jibu

QC.6 Je, umewai kosa Kondomu wakati ulipoihitaji?

☐Ndio

☐La

☐Sina Jibu

QC.7 Je ni changamoto gani kuu unayokumbana nayo wakati unatafuta mipira ya kondomu?

☐Kuisha kwa kondomu kwa vituo vya Afya

☐Kuisha kwake kutoka kwa vituo vya afya vya mashirika yasiyo ya kiserikali.

☐Kuisha kwa kondomu kutoka kwa vyumba vya burdani

☐Ukosefu wa pesa za kununua kutoka kwa maduka ya madawa

☐Nyingine taja…….

SEHEMU YA D

Kitengo cha utumizi wa huduma za kuzuia maambukizi ya Virusi vya Ukimwi na Magonjwa Mengine ya Zinaa

Hiki Kitengo kinahusisha mjadala wa jinsi unavyotumia huduma za kuzuia Virusi vya Ukimwi na Maginjwa mengine ya Zinaa

QD.1 Je, umewai kupimwa virusi vya ukimwi?

☐Ndio

☐La

☐Sina Jibu

QD. 2 Kama jibu lako la swali QD1 ni Ndio, je kilikua kipimo kipi?

☐Cha kudungwa kwa kidole na sindano

☐Kipimo cha mdomo

☐Zote mbili

☐ Sina Jibu

QD.3 Kama jibu lako la QD.1 ni Ndio, je unaweza tueleza ni lini ulipimwa mara ya mwisho?

☐ Miezi tatu iliyopita

☐Miezi nne hadi sita iliyopita

☐ Zaidi ya miezi sita iliyopita

☐ Sina jibu

QD.4 Je, Unaweza tueleza matokeo ya kipimo chako cha Virusi vya Ukimwi? (Kama La vuka hadi swali namba nane)

☐ Sikupatikana na Virusi Ukimwi

☐ Nilipatikana na Virusi vya Ukimwi

☐ Sina Jibu

QD.5 Kama jibu lako la swali QD.4 kua ulipatikana na Virusi, je, ulianzishiwa madawa ya kupunguza makali ya Virusi?

☐ Ndio

☐La

☐ Sina Jibu

QD.6 Je, unaendelea kutumia madawa na kuenda Kliniki?

☐ Ndio

☐La

QD. 7 Kama Jibu lako la QD.6 ni La, unaweza tueleza sababu?

☐ Ungumu wa kupata madawa

☐ Sababu za Kibinafsi

☐ Hali ngumu ya Kikazi

☐ Sina Jibu

☐Nyingine taja……

QD.8 Je, Unaweza kumbuka kituo cha Afya ulikopimwa Viruis vya Ukimwi?

☐ Kituo cha serikari

☐ Kituo cha shirkia lisilo la Kiserikali

☐ Kituo cha Afya Kisicho cha Kiserikali

☐Siwezi Kumbuka

QD.9 Je, ni nini imekua changamoto kubwa wakati unapotafuta huduma zinazohusiana na ukingaji wa Virusi na magonjwa ya zinaa?

☐ Kukosa vifaa vya kupima virusi

☐ Ukosefu wa wahudumu wa Afya

☐ Kucheleweshwa

☐ Ukosefu wa hari zuri ya huduma kutoka kwa wahudumu wa Afya

☐ Sina Jibu

☐Nyingine taja…….

QD.10 Je, umewai abukizwa ugonjwa wowote wa zinaa?

☐Ndio

☐La

☐ Sina Jibu

QD.11 Kama Ndio kwa swali QD.10, je uliweza kupata matibabu?

☐Ndio

☐La

☐Sina jibu

QD.12 Kama Jibu lako la swali QD.11 ni Ndio, je ulipata huduma ya matibabu kutoka kwa hizi vituo?

☐ Kituo cha serikari

☐ Kituo cha shirkia lisilo la Kiserikali

☐ Kituo cha Serikali na Kisicho cha Kiserikali

☐Siwezi Kumbuka

QD 13 Je ilikua ni baada ya muda gani uliendea huduma ya Afya kutoka wakati ulipohisi umeabukizwa ugonjwa wa zinaa?

☐Siku moja hadi saba

☐ Wiki moja hadi wiki mbili

☐Zaidi ya Wiki mbili

☐Sina jibu…….

QD.14 Je, ni nini imekua changamoto kubwa wakati unatafuta tiba ya magonjwa ya zinaa??

☐ Ukosefu wa madawa na vifaa vya huduma ya Afya

☐ Kukosa pesa a kugharamia huduma za afya

☐Kutazamwa visvyo na wahudumu wa afya

☐ Nilikosa kadi ya bima ya Afya

☐Sina jibu

☐Ingine eleza……..

Hii inatuleta kwenye hitimisho la mahojiano yetu. Asante kwa kushiriki.

Appendix VI: Ethical Approval

OFFICE OF THE DIRECTOR OF GRADUATE STUDIES AND RESEARCH
UNIVERSITY OF EASTERN AFRICA, BARATON
P.O. BOX 2500-30100, Eldoret, Kenya, East Africa

B1017022020 February 17, 2020

TO: Cyrus Mutie Paul
Department of Environmental Health and Disease Control
Jomo Kenyatta University of Agriculture and Technology

Dear Cyrus,

RE: Spatial Mapping Of Sexual Network Locations And Utilization of HIV/AIDS Preventive Services Among Long-Distance-Truck-Drivers Using The Northern Corridor Highway, Kenya

This is to inform you that the Research Ethics Committee (REC) of the University of Eastern Africa Baraton has reviewed and approved your above research proposal. Your application approval number is UEAB/REC/10/02/2020. The approval period is 17th February, 2020 – 16th February, 2021.

This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by the Research Ethics Committee (REC) of the University of Eastern Africa Baraton.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to the Research Ethics Committee (REC) of the University of Eastern Africa Baraton within 72 hours of notification.
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to the Research Ethics Committee (REC) of the University of Eastern Africa Baraton within 72 hours.
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to the Research Ethics Committee (REC) of the University of Eastern Africa Baraton.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and also obtain other clearances needed.

Sincerely yours,

Jackie K. Obey

17 FEB 2020

Prof. Jackie K. Obey, PhD
Chairperson, Research Ethics Committee

Appendix VII: Research License by NACOSTI

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **806718**

Date of Issue: **18/March/2020**

RESEARCH LICENSE

This is to Certify that Mr.. CYRUS MUTIE of Jomo Kenyatta University of Agriculture and Technology, has been licensed to conduct research in Machakos on the topic: Spatial Mapping of Sexual Network Locations and Utilization of HIV/STDs Preventive Services among Long-Distance-Truck-Drivers using the Northern Corridor Highway, Kenya for the period ending : 18/March/2021.

License No: **NACOSTI/P/20/4107**

806718

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

Appendix VIII: Study Authorization/Clearance from BPS JKUAT

JOMO KENYATTA UNIVERSITY
OF
AGRICULTURE AND TECHNOLOGY

DIRECTOR, BOARD OF POSTGRADUATE STUDIES

P.O. BOX 62000-00200, NAIROBI, KENYA. TEL: 254-067-52711/52181-4. MOBILE: 0708-602225
FAX: (067)52164. Email: director@bps.jkuat.ac.ke

REF JKU/2/11/HSH314-1277/2018 8TH OCTOBER, 2020

CYRUS MUTIE PAUL
C/o SOPH
JKUAT

Dear Mr. Mutie,

RE: APPROVAL OF MSc. RESEARCH PROPOSAL AND SUPERVISORS

Kindly note that your MSc. research proposal entitled: **"Spatial mapping of sexual network locations and utilization of HIV/STDs preventive services among long distance – truck drivers using the northern corridor highway, Kenya."** has been approved. The following are your approved supervisors:-

1. Dr. John Gichohi - JKUAT
2. Dr. Susan Mambo - JKUAT
3. Dr. Salome Wanyoike - MoALF

DIRECTOR, BOARD OF POSTGRADUATE STUDIES
01 MAR 2021

PROF. LOSENGE TUROOP
DIRECTOR, BOARD OF POSTGRADUATE STUDIES

Copy to: Dean, SOPH

/pk

Appendix IX: Publications

Research | Volume 40, Article 194, 01 Dec 2021

| 10.11604/pamj.2021.40.194.31122

Frequency of sexual interactions and associated factors among long-distance truck drivers operating along the Northern Corridor Highway, Kenya

Cyrus Mutie[1,&], Salome Kairu-Wanyoike[2], Susan Mambo[1], Reagan Ngoge[1], John Gachohi[1,3]

[1]School of Public Health, Jomo Kenyatta University of Agriculture and Technology, Juja, Kenya,

[2]Meat Training Institute, Ministry of Agriculture, Livestock, Fisheries and Cooperatives, Athi River, Kenya,

[3]Washington State University, Global Health, Nairobi, Kenya

[&]Corresponding author

Cyrus Mutie, School of Public Health, Jomo Kenyatta University of Agriculture and Technology, Juja, Kenya

Received: *08 Aug 2021* - ***Accepted:*** *25 Nov 2021* - ***Published:*** *01 Dec 2021*

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Available online at: https://www.panafrican-med-journal.com/content/article/40/194/full

Keywords: Casual sexual partners, regular sexual partners, human immunodeficiency virus (HIV), risky sexual behavior, sexually transmitted infections (STIs)

Abstract

Introduction: harsh working conditions among long-distance truck drivers (LDTDs) expose them to risky sexual interactions while on transit. As a result, the risky sexual interactions among the LDTDs place them at a high risk of contracting human immunodeficiency virus (HIV) and sexually transmitted infections (STIs). This study sought to assess the sexual interactions and associated factors among the LDTDs in Kenya.

Methods: two hundred ninety-six (296) LDTDs were interviewed using interviewer-administered questionnaires. A systematic sampling technique was adopted. The number of sexual acts reported by the respondents was used to generate an ordered outcome variable (frequency of sexual interactions), in the order of; no sexual acts (zero), one to three sexual acts (1), and four to six sexual acts (2). Association between the predictor variables and the outcome variable was analysed using ordered logistic regression analysis in R statistical software.

Results: the mean age of the study participants was 38.4 years, with the youngest being 24 years and the oldest 57 years. Slightly above half of the participants (52.4%) reported no sexual interactions, while the rest (47.6%) had sexual interactions with either casual or regular sexual partners on the week preceding the survey. Age, the number of weeks spent on a transit journey, and drug use were independently associated with the frequency of sexual interactions among LDTDs involved in the study.

Conclusion: the frequencies of sexual interactions are likely to be higher among the younger LDTDs, those who spent more than one week on transit, and those who use alcohol and khat, hence a high exposure risk to HIV/STIs among them.

Advances in Sexual Medicine > Vol.11 No.3, July 2021

Utilization of HIV and Sexually Transmitted Infections Prevention Services, and Associated Factors among the Long-Distance Truck Drivers along the Northern Corridor Highway, Kenya

Cyrus Mutie[1*], Salome Kairu-Wanyoike[2], Susan Mambo[1], Reagan Ngoge[1], John Gachohi[1,3]

[1]School of Public Health, Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya.

[2]Meat Training Institute, Ministry of Agriculture, Livestock, Fisheries and Cooperatives, Nairobi, Kenya.

[3]Washington State University-Global Health Program, Nairobi, Kenya.

DOI: 10.4236/asm.2021.113003 PDF HTML XML

Abstract

Background: Often, long-distance truck drivers' (LDTDs') work predisposes them to sexually transmitted infections (STIs) whose outcomes are influenced by access and behavior of seeking sexual health care. Methodology: In this study, we assessed the utilization of HIV/STI preventive services and associated factors among 296 LDTDs operating along the northern corridor highway using an interviewer-administered questionnaire for data collection at Mlolongo stopover in Machakos, Kenya. Responses for the investigated variables, including condom use, history of HIV testing, frequency of HIV testing, antiretroviral therapy (ART) use and follow-up for the HIV positive and STI treatment, were assigned a score of either 1 or 0 depending on the question's dimension. Following summing up for each participant, we computed a weighted score ranging between 0 and 1 by dividing the summed responses by the number of eligible variables. We arbitrarily multiplied these scores by 8 to generate endpoint scores ranging from one to eight for each participant to help create a dichotomized outcome variable for utilization levels: limited utilization (1 to 4) and good utilization (5 to 8). Association between certain independent variables and the outcome variable (level of utilization of H.I.V./STIs preventive services) was analyzed using binomial logistic regression analysis in R statistical software. Results: The mean age of the LDTDs was 38.4 years, ranging from 24 - 57 years. The majority (n = 287, 97%) of the LDTDs had been tested on HIV at least once since the beginning of their career. Only 4.9% of the LDTDs had been tested on HIV within the previous three months. Of the 175 LDTDs who reported a history of STI, most (n = 173, 98.9%) of them had sought treatment. Condom use rates were higher (97.1%) among the LDTDs who had sexual interactions with casual sexual partners compared to 47.2% among regular sexual partners. Analyses classed most of the respondents (n = 231, 78.0%) as having good utilization, while the rest (22%) had limited utilization. History of STI was independently associated with utilizing HIV/STI preventive services (OR 8.4;

95% CI; 4.5, 16.7; P < 0.001). Conclusion: Although most of the LDTDs were classed to have good utilization of HIV/STI preventive services, the uptake of subsequent HIV testing services among them was low at only 4.9%. The association of STI history with utilization levels that we determined supports policies of integrating HIV and STI services in the delivery of sexual healthcare provision among LDTDs.

Keywords

Utilization, Factors, Sexually Transmitted Infections, HIV/STI Services, Long-Distance Truck Drivers, Northern Corridor Highway, Kenya

Cite:

Mutie, C. , Kairu-Wanyoike, S. , Mambo, S. , Ngoge, R. and Gachohi, J. (2021) Utilization of HIV and Sexually Transmitted Infections Prevention Services, and Associated Factors among the Long-Distance Truck Drivers along the Northern Corridor Highway, Kenya. *Advances in Sexual Medicine*, **11**, 39-58. doi: 10.4236/asm.2021.113003.