BARRIERS AND FACILITATORS TO HUMAN IMMUNODEFICIENCY VIRUS SELF TESTING AMONG UNDERGRADUATE STUDENTS IN KENYATTA UNIVERSITY, KENYA

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DECLARATION

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

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DEDICATION

This thesis is dedicated to my parents, Eng. Pius Muendo Munyao and Agnes Mueni Muendo, for their unwavering support, encouragement, and love throughout my academic journey. Thank you for giving me the roots to grow and the wings to fly.

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ABBREVIATIONS AND ACRONYMS

ABC	-	Abstinence, Be faithful, Condom use
ART	-	Anti-retroviral Therapy
AIDS	-	Acquired Immune Deficiency Syndrome
CDC	-	Centers for Disease Control & Prevention
HAART	-	Highly active antiretroviral therapy
HCW	-	Health Care Worker
HIV	-	Human Immunodeficiency Virus
HIVST	-	Human Immunodeficiency Virus Self Testing
HTC	-	HIV Testing and Counselling
HTS	-	HIV Testing Services
KENPHIA	-	Kenya Population-based HIV Impact Assessment
Kshs.	-	Kenya Shillings
KUERC	-	Kenyatta University Ethics and Review Committee
LVCT	-	Liverpool VCT Care and Treatment
MSM	-	Males who have sex with males
NACOSTI	-	National Council of Science and Technology
NASCOP	-	National AIDS and STI Control Program
PITC	-	Provider Initiated Testing and Counselling
NGO	-	Non-Governmental Organizations
PrEP	-	Pre-exposure prophylaxis
RDT	-	Rapid diagnostic test
STI	-	Sexually Transmitted Infection
STD	-	Sexually Transmitted Disease
UNAIDS	-	The Joint United Nations Program on HIV/AIDS
VCT	-	Voluntary Counselling and Testing
VMMC	-	Voluntary medical male circumcision
WHO	-	World Health Organization

DEFINITION OF OPERATIONAL TERMS

HIV: Human Immunodeficiency Virus. This is the virus that causes Acquired Immune Deficiency Syndrome (AIDS). The human immunodeficiency virus (HIV) targets cells of the immune system, called CD4 cells, which help the body respond to infection. Within the CD4 cell, HIV replicates and in turn, damages and destroys the cell. If highly active antiretroviral therapy (HAART) is not initiated, HIV can lead to the disease, AIDS.

AIDS: is a term that applies to the most advanced stages of HIV infection. It is defined by the occurrence of any opportunistic infections, so named because they take advantage of a weakened immune system. AIDS is an HIV infection with either a CD4+ T cell count below 200 cells per µL or the occurrence of specific diseases associated with HIV infection.

CD4 Cells are a type of T cell that play an important role in the immune system, particularly in the adaptive immune system. They help in the activity of other immune cells by releasing cytokines, small protein mediators that alter the behavior of target cells that express receptors for those cytokines.

HIV self-testing (HIVST): is the process by which a person collects his or her own specimen (oral fluid or blood) to perform an HIV diagnostic test. He/she then interprets the result, either in private or in the company of someone they trust. Rapid test kits, such as finger stick tests (on whole blood) or mouth swab tests (on oral fluid) are used to conduct these tests. HIVST does not provide a diagnosis. Negative self-test results are considered negative, but all positive self-test results need to be confirmed according to national algorithms as laid out by Ministry of Health Kenya.

OraQuick®: is the first FDA-approved oral swab in-home test for HIV-1 and HIV-2. It's an oral swab test that doesn't require blood. It's completely private.

INSTI®: is a qualitative immunoassay that uses blood to detect HIV-1 and HIV-2 antibodies. The test uses simple flow-through technology to detect HIV-1 and HIV-2 antibodies using a drop of human finger stick blood. The test is intended for use by untrained lay users as a self-test to aid in the diagnosis of HIV-1 and HIV-2 infection using a small drop (50μL) of blood obtained through finger stick collection procedures.

HIV self-testing: (HIVST), this is a process whereby an individual collects his or her specimen, performs a test and interprets the results, often in a private setting either alone or with someone he or she trusts. HIVST can either be directly assisted or non-assisted.

Unassisted HIV self-testing: Refers to an individual obtaining a kit for HIV self-testing and performing the HIV test following the instructions in the insert provided by the manufacturer.

Directly assisted HIV self-testing: Refers to when individuals who are performing a self-test for HIV receive an in-person demonstration from a trained provider or peer before or during HIVST with instructions on how to perform a self-test and how to interpret the self-test result. This assistance is provided in addition to the manufacturer-supplied instructions for use and other materials found inside HIVST kits.

Provider-Initiated HIV Testing & Counseling (PITC): refers to HIV testing and counseling which is routinely recommended by health care providers to persons attending health care facilities as a standard component of medical care. With this approach, an HIV test is recommended for all patients whose clinical presentation might result from underlying HIV infection or as a standard part of medical care for all patients attending health facilities in areas of high HIV prevalence.

Client-Initiated HIV testing and counseling (CITC) / Voluntary Counselling and Testing: individuals seek HIV testing and counseling services on their own initiative. It is individualized client-centered counseling.

Service provider: In the context of HIVST is an organization, business or individual which offers service to others either for free or on payment of a fee.

Vendor: In the context of HIVST is an outlet which sells directly to the consumer e.g., chemists.

ABSTRACT

Over 36.9 million people worldwide live with HIV, with 21.7 million receiving ART. In Africa, 1.5 million individuals aged 15-24 are affected, with teenage girls and young women being disproportionately affected. KENPHIA Preliminary Report revealed a nationwide HIV prevalence rate of 4.9%, with women having a higher rate of 6.6% compared to men at 3.1%. HIVST aims to increase accessibility to testing services for at-risk populations. The WHO has preapproved three HIV self-testing kits for Kenya, including OraQuick®, Atomo®, and INSTI®. However, only 62% of young individuals are aware of their HIV-positive status, with university students at a higher risk due to risky sexual behaviors and cross-generational relationships. The UNAIDS aims to achieve 95% HIV status awareness by 2030, but current conventional HIV testing has not effectively ensured widespread availability of HIV prevention, treatment, and care. This cross-sectional analytical study targeted undergraduate students, utilizing multi-stage cluster sampling and self-administered questionnaires to collect comprehensive data on their demographic characteristics, HIV testing practices, and factors influencing HIVST uptake. The results revealed that 24.4% of participants had ever used HIVST, with 65.3% having tested for HIV overall. Among those who had tested, 44.6% had last done so more than a year ago, with facility-based testing being the most common method (71.2%). Age and gender were significant determinants of HIVST uptake; females (50.8%) and older students aged 22-25 years had higher odds of using HIVST. Awareness of HIV prevention methods like PrEP was a particularly strong facilitator, with participants aware of PrEP being 2.4 times more likely to use HIVST. Additionally, 69.1% of participants found HIVST kits affordable, though 57.7% reported difficulty accessing them. Social media emerged as the primary source of information for 56.7% of participants, while 86.6% found the instructions on the kits easy to understand. Despite these barriers, 78.4% of participants were confident in interpreting their HIV status at home, and 88.7% agreed that HIVST kits should be made available free of charge in public health facilities. The study underscored the importance of addressing persistent barriers such as stigma, cost, and accessibility to significantly increase HIVST uptake. Key recommendations include enhancing HIV prevention education, leveraging successful media campaigns like "Chukua Selfie," integrating HIVST into campus health services, and tailoring interventions to specific demographic groups such as young adults. The study provided a nuanced understanding of the determinants affecting HIVST uptake and offered actionable strategies to enhance HIV prevention and control efforts among young adults in Kenya.

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

As at 2017, global estimates suggested that more than 36.9 million individuals were living with HIV. Approximately 21.7 million people were reported to be receiving ART among this population. The number of new HIV infections in 2017 was estimated to be between 1.4 million and 2.4 million. Additionally, the global death toll due to AIDS-related illnesses in the same year was approximately 940,000 (UNAIDS, 2018).Approximately 1.5 million individuals between the ages of 15 and 24 in Africa are living with HIV. This significant statistic emphasizes the continuous difficulty of tackling HIV among young populations in the region. In sub-Saharan Africa, teenage girls and young women between the ages of 15 and 24 constituted almost 77% of the new infections among young individuals in this age bracket in 2022. The most recent figures from the WHO and UNAIDS indicate that the rate of HIV infection among young people aged 15-24 years in Africa differs greatly depending on their gender and the region they are in. Teenage girls and youthful women in sub-Saharan Africa are disproportionately affected, as they have a threefold higher likelihood of acquiring HIV compared to their male counterparts (UNAIDS, 2023).

The Kenya Population-based HIV Impact Assessment (KENPHIA) Preliminary Report, published on January 30, 2020, by the Ministry of Health Kenya in conjunction with the National AIDS & STI Control Program (NASCOP), disclosed that the nationwide prevalence rate of HIV/AIDS in Kenya stands at 4.9 % ; whereas in 2012, the Kenya had attained a testing coverage rate of 72% (KENPHIA, 2018). The Kenya HIV Estimates Report 2020 indicates that the HIV prevalence rate among individuals aged 15-24 in Kenya was 2.4% in 2020. Specifically, the HIV prevalence rate for females in this age group is anticipated to be 2.26%, while for men it is estimated to be

1.3%. The estimated number of individuals between the ages of 15 and 24 living with HIV as of 2020 was around 145,471. Furthermore, the report revealed an estimated 36,000 new cases of HIV infection among adults annually. Disparities in HIV prevalence was noted across different age groups and genders, with women exhibiting a significantly higher rate of 6.6 % compared to men at 3.1 %. This indicates that the prevalence of HIV among women is thrice that of men (NASCOP, 2019; National AIDS Control Council, 2018).

HIV self-testing is defined by WHO as the process by which an individual collects their own sample (oral fluid or blood), conducts an HIV test, and interprets the results in a private setting either alone or with a trusted individual. This method aims to increase the accessibility of HIV testing services to at-risk populations, such as university students. It should be noted that HIV self-testing is not considered a definitive diagnostic tool, as it detects the presence of either the HIV-1 p24 antigen or HIV 1/2 antibodies. Positive HIV results obtained through self-testing must be confirmed by a healthcare professional following national testing guidelines (World Health Organization, 2016).

WHO has preapproved the OraQuick® HIV Self-Test, which is an HIVST kit that utilizes an oral swab sample. The Expert Review Panel for Diagnostics has authorized four HIV self-testing kits that use blood samples obtained through finger pricks. These kits are the Atomo® HIV Self-Test, BioSure® HIV Self-Test, INSTI® HIV Self-Test, and Sure Check® HIV Self-Test. HIVST kits exhibit variations not only in the type of biological samples employed (blood or oral swab), but also in the quantity of components contained within the kit, the level of sophistication involved in administering the kit, and the duration required to obtain results. Currently, there are three HIV self-testing kits that have been licensed for use in Kenya: OraQuick® HIV

Self-Test, Atomo® HIV Self-Test, and INSTI® HIV Self-Test. OraQuick® utilizes an oral swab specimen for testing. The kit has three components, and the process involves four sequential steps, followed by a waiting period of 20 minutes until the results are available. Atomo® utilizes a blood sample obtained using a finger prick. The kit consists of two components, and the administration process involves four sequential steps. The results can be obtained after a waiting period of 15 minutes. INSTI® similarly employs blood obtained through a finger prick. However, the kit is slightly more intricate, consisting of six components and involving over ten procedural stages. Nonetheless, the outcomes are promptly accessible with the completion of the final step, eliminating any waiting period (Kelvin & Akasreku, 2020).

Multiple advantages of HIVST have been documented in literature, including its capacity to cater to diverse demographic segments such as first-time testers, elderly males, at-risk youth, males engaged in homosexual relations, individuals involved in commercial sex work, and transgender persons. HIVST provides conveniences such as ease of use, privacy, anonymity, prompt results, and enhanced accessibility. Moreover, it has the potential to address barriers associated with availing healthcare services or visiting HIV testing facilities due to the social stigma and apprehension of perceived judgment (Beyrer et al., 2017; Figueroa et al., 2015; Hlongwa et al., 2020; Njau et al., 2019; Sharma et al., 2015; World Health Organization, 2016). It is commonly believed that HIVST can yield public health benefits by increasing the number of individuals who receive testing, the frequency of testing, the awareness of one's HIV status, and the linkage to treatment and care services. These elements collectively aid in the mitigation of HIV transmission (Gagnon et al., 2018). Contemporary studies suggest that HIVST could increase the uptake of HIV testing among individuals who face

barriers accessing traditional testing programs, owing to its discreet and convenient characteristics (Hlongwa et al., 2020).

The HIV testing guidelines in Kenya acknowledge the importance of HIVST and suggest that it may represent a feasible option in the future. It is imperative to gather information on the level of awareness, acceptance, and willingness to utilize oral-fluid and blood-based HIV self-testing among undergraduate students in Kenya. Students enrolled in undergraduate tertiary institutions, especially those aged 15-24 years, remain susceptible to an elevated risk of HIV transmission. According to the most recent HIV indicator data from Kenya, the HIV prevalence rate among individuals aged 15-24 years is estimated to be between 1.34 % and 2.61 % as at 2017, compared to the national HIV prevalence rate of 4.9 %. However, only 62 % of young individuals in the same age group are knowledgeable about their HIV-positive status. Research that has been carried out in African countries such as Kenya, Ghana, and Nigeria have revealed that university students are at a higher risk of acquiring HIV due to their engaging in risky sexual behaviors. The study also identified a substantial number of female university students participating in cross-generational relationships, where young women engage in sexual activities with older, financially stable men who may offer benefits such as funding education costs, purchasing essential items like food, clothing, and expensive electronic devices. These relationships play a significant role in escalating the transmission of new infections, thereby increasing the susceptibility of female university students to contracting sexually transmitted diseases, infections, and HIV/AIDS (KENPHIA, 2018; NASCOP, 2019; Ndabarora & Mchunu, 2014).

The UNAIDS has set forth an ambitious global goal to reach the 95-95-95 targets by the year 2030. This goal aims to achieve a 95% rate of HIV status awareness among adults, with 95% of HIV-positive individuals receiving ART, and 95% of those on ART

achieving viral suppression. However, current conventional HTS have not effectively ensured widespread availability of HIV prevention, treatment, and care. This is especially evident among individuals with limited access to testing, those at a heightened risk of HIV transmission, and hard-to-reach communities. In the sub-Saharan African region, a mere 40% of individuals afflicted with HIV are aware of their HIV status, despite the presence of a significant quantity of HIV testing facilities. (UNAIDS, 2018). The World Health Organization has released recommendations supporting the implementation of HIVST as a promising advancement that can complement existing HTS in order to tackle substantial deficiencies in global HIV testing accessibility (World Health Organization, 2016).

Several African nations, Kenya included, have been hesitant in integrating HIVST into their national HTS programs, despite guidance from WHO. Challenges identified by HIV policymakers and government stakeholders that hinder the adoption and implementation of HIVST include apprehensions about the accuracy of results, psychological risks from the lack of counseling, and the difficulty in ensuring individuals with positive HIV diagnoses are linked to appropriate care (Estem et al., 2016; Gagnon et al., 2018; Hlongwa et al., 2020; Makusha et al., 2015; Njau et al., 2019, 2021; Van Rooyen et al., 2015; World Health Organization, 2018). The limited adoption of traditional HTS is linked to the presence of social stigma and prejudice, lack of awareness on the low risk of HIV transmission, perceived absence of privacy, and the distance to testing facilities, particularly for individuals residing in remote areas. Additionally, long waiting times and inadequate confidentiality of test results contribute to the poor uptake (Ahmed et al., 2013; Mukolo, Torres, et al., 2013; Mukolo, Villegas, et al., 2013; Musheke et al., 2013; Njau et al., 2014; Ostermann et al., 2014; Paulin et al., 2015).

However, testing of HIV and linkage to HIV care among adolescents and young adults, remains abysmally low, especially in Sub-Saharan Africa. Research has shown that persons at the age of 15–24 years are unlikely to be knowing their HIV status, be registered in HIV care, and have viral load suppression compared to those who are HIV-positive and are adults who are thirty years and older. This implies that the many of adolescents and young adults who have HIV are ignorant of their status of HIV, even though this age group accounts for roughly a third of all new HIV infections worldwide (Matovu et al., 2020). Despite the limited amount of evidence regarding the potential psychological risks linked to HIVST, the main criticisms against HIVST predominantly arise from vague concerns. Nonetheless, the lack of in-person counseling, a key characteristic of HIV self-testing, remains the primary rationale for opposing its utilization. By instituting globally coordinated efforts, such as the expansion of HIVST, substantial progress has been achieved in the areas of HIV testing, prevention, and treatment. Consequently, nearly 90% of PLHIV are now informed of their HIV status, linked to healthcare services, and undergoing treatment in multiple countries (A. N. Brown et al., 2014; B. Brown et al., 2015; Erum et al., 2019; Hlongwa et al., 2020; Makusha et al., 2015; Matovu et al., 2018, 2020; Mokgatle & Madiba, 2017; Njau et al., 2019; Suthar et al., 2013; Van Rooyen et al., 2015; World Health Organization, 2016). Additionally, the incidence of untreated HIV and the rate of new HIV cases are on the decline, which will have a significant impact on the delivery of HIV testing services. Certain key populations, such as sex workers, men who have sex with men, and young individuals, account for over half of newly contracted HIV infections. An important consideration is the incorporation of HIVST to target priority populations that exhibit the most profound disparities in testing rates (Gupta-Wright et al., 2021).

1.2 Statement of the Problem

HIV/AIDS remains a pressing public health concern in Kenya, with young people aged 15 to 24 years facing a disproportionately high prevalence of the virus (National AIDS Control Council (NACC), 2021) . Despite efforts by the government and NGOs to increase HIV awareness and testing, barriers persist, hindering effective HIV control strategies. In response, HIV self-testing has emerged as a promising approach to reach at-risk populations, such as undergraduate students, who may encounter obstacles accessing traditional testing services (Kim et al., 2016; Mugo et al., 2017). Despite the availability of HIVST kits, their uptake among undergraduate students aged 15-24 years especially in urban high risk HIV areas like Nairobi remains suboptimal. This gap in self-testing is of significant concern given the high prevalence of HIV in this demographic group (Mwangi et al., 2022; UNAIDS, 2023).

Several factors contribute to the low uptake of HIVST among undergraduate students. Firstly, there is a pervasive lack of awareness and accurate knowledge about HIVST. Many students are unaware of the availability and benefits of HIVST kits. Even when they are aware, misconceptions about the accuracy and reliability of these kits persist, deterring their use (Ngure et al., 2020). Studies have shown that misinformation and lack of education are significant barriers to HIVST uptake (C. C. Johnson et al., 2017). While HIV self-testing holds potential benefits, including improved privacy and convenience, various factors may impede its uptake among young people in Kenya. Stigma and discrimination have been identified as significant obstacles to HIV testing, underscoring the need for tailored interventions to address these issues (Mugo et al., 2017).

Despite its potential, the uptake of HIVST among undergraduate students in Nairobi remains suboptimal. Several studies have identified a multitude of barriers hindering the widespread adoption of HIVST in this population. These barriers include:

i. Lack of awareness: Many undergraduate students are unaware of the availability and benefits of HIVST. This lack of knowledge prevents them from considering HIVST as a viable testing option (Shafik et al., 2021).
ii. Social Stigma: The pervasive stigma surrounding HIV/AIDS in Kenya continues to be a major deterrent to testing, even with the privacy offered by HIVST. The fear of being judged or discriminated against prevents many students from seeking testing (Nkuna & Nyazema, 2016).
iii. Misconceptions and Concerns: Some students harbor misconceptions about the accuracy, reliability, and confidentiality of HIVST. Concerns about the potential consequences of a positive result, such as social isolation and discrimination, also contribute to hesitancy in using HIVST (Ng et al., 2012).
iv. Accessibility: Limited availability and affordability of HIVST kits pose a significant challenge, particularly for students from low-income backgrounds. Financial constraints and logistical barriers hinder access to HIVST kits, even for those who are aware of and willing to use them (Bustamante et al., 2017).

Stigma and discrimination related to HIV testing continue to be major obstacles. The fear of being judged by peers or family members for seeking an HIV test leads many students to avoid testing altogether. This social stigma is exacerbated by cultural and societal norms that discourage open discussions about sexual health and HIV. As a result, many students prefer to remain unaware of their HIV status rather than face potential discrimination (Musheke et al., 2013).

The burden of high prices of self-test kits in both low- and high-income settings as is Kenya suggests that widespread adoption of HIVST is unlikely to occur among large segments of the Kenyan youthful population consequently leaving many who do not currently seek testing and who may consider doing so if self-testing were more affordable unable to access this option due to the current pricing structure. This shortfall in testing accessibility is anticipated to disproportionately affect young people who may potentially face discrimination when attempting to utilize existing HIV testing services. This is a significant obstacle to fully harnessing the capabilities of this emerging technology in order to achieve the UNAIDS, 95-95-95 targets and ultimately eradicate the epidemic(Kelvin & Akasreku, 2020).

Accessibility and cost are also significant barriers. While some HIVST kits are available for free or at a low cost through government and NGO programs, many students are either unaware of these resources or find them difficult to access due to distribution inconsistencies. Additionally, the perceived cost of obtaining an HIVST kit can be a deterrent for students with limited financial resources (Ngure et al., 2020; Pant Pai et al., 2013).

The integration of HIVST into existing health services within universities is another critical issue. Many institutions lack the necessary infrastructure and policies to support and promote HIVST. Without institutional support, students are left without adequate guidance on how to use the kits and interpret the results. This lack of support can lead to confusion and hesitation in using HIVST (World Health Organisation, 2016). Kenya has integrated HIVST into its existing HIV testing strategies, yet it is lacking the necessary policy and regulatory framework to adequately scale up the adoption of HIVST. Stakeholders, policymakers, and healthcare providers in Kenya agree that a policy and regulatory framework is essential for the expansion of HIVST.

Consequently, policymakers lack the necessary information to make well-informed decisions regarding the expansion of HIVST programs (Harichund & Moshabela, 2018). Furthermore, psychological factors such as fear of a positive result and the subsequent implications also play a role in hindering HIVST uptake. The anxiety associated with the potential consequences of a positive diagnosis can discourage students from testing. Addressing these psychological barriers requires not only education but also emotional and social support systems to help students cope with the outcomes of HIVST (Kurth et al., 2016).

The low uptake of HIVST among undergraduate students domiciled in tertiary institutions in Nairobi and across the country is a multifaceted issue influenced by a combination of lack of awareness, social stigma, accessibility issues, insufficient institutional support, and psychological barriers. This study aims to explore these barriers and facilitators in detail to develop youth targeted interventions that can enhance HIVST uptake among this vulnerable population.

1.3 Justification of the Study

The World Health Organization recommends conducting repeated testing 3-4 times a year for groups at greatest risk for acquiring HIV like young people. WHO also supports HIVST as a complementary strategy to existing testing services, emphasizing its potential to reach key populations and individuals who have never tested before (World Health Organization, 2016). Repeated HIV testing promotes the utilization of oral HIVST, which is a crucial component of the HIVST strategy for young people, given their propensity for engaging in high-risk behaviors (Vashisht et al., 2022). The critical need to address the HIV epidemic among young people in Kenya, particularly those aged 15-24 years is way overdue and utterly important. This age group is disproportionately affected by HIV, with significant implications for public health and

socioeconomic stability. HIVST emerges as a crucial intervention to enhance early diagnosis and linkage to care, thus reducing transmission and improving health outcomes (UNAIDS, 2023). Given the high prevalence of HIV among young people aged 15-24 years in Nairobi and Kiambu counties, it is essential to explore the potential of HIV self-testing as a strategy to increase testing rates and reduce the spread of the virus (National AIDS Control Council, 2018).

HIVST has emerged as a promising solution to overcome the challenges of traditional HIV testing. By offering a discreet, convenient, and empowering way for individuals to know their HIV status, HIVST has the potential to revolutionize HIV testing among young people. Research has demonstrated the effectiveness of HIVST in increasing testing uptake among various populations. The confidential nature of HIVST eliminates the fear of stigma associated with facility-based testing, while the convenience and flexibility of self-testing accommodate the busy lifestyles of young adults (Choko et al., 2017). HIVST empowers young and sexually active individuals to exercise autonomy by allowing them to choose the location and time for testing, as well as control the disclosure of their test results (Hlongwa et al., 2020). The importance of ensuring privacy and confidentiality in testing services has been highlighted as a key facilitator to testing uptake, suggesting the need for comprehensive strategies that prioritize these factors (Dovel et al., 2020).

HIV prevalence among young people in Kenya, especially those in urban centers like Nairobi, remains high. According to recent data, the prevalence rate among youths aged 15-24 years is significant, necessitating innovative strategies to improve testing rates and early diagnosis (NASCOP, 2023) . Traditional facility-based testing methods face barriers such as stigma, discrimination, and logistical challenges, which discourage young people from seeking testing services (Ngure et al., 2020). HIVST offers a

private, convenient, and empowering alternative that can overcome these barriers (Pant Pai et al., 2013). Several recent studies have explored the barriers and facilitators to HIV self-testing among young people in Kenya, for example, one of the study's found that stigma and discrimination were significant barriers to HIV testing among young people. Another study highlighted the importance of privacy and confidentiality in HIV testing services (Kim et al., 2016; Mugo et al., 2017).

The rapid oral fluid-based testing method has been approved and is currently being utilized in most HIV testing facilities globally. The testing kits and testing method have been determined to be highly accurate, significantly safer, and easier to use. As a result, they are strongly recommended for adoption and use in developing countries. This is due to their simplicity, versatility, and feasibility, which allows for easier implementation and use, even in rural areas and private health institutions (Marley et al., 2014).

Research has consistently shown that HIVST can significantly increase testing uptake among populations less likely to access traditional testing services, including young people like shown in a study which found that HIVST is not only acceptable but also feasible and effective in increasing testing rates among high-risk groups (C. C. Johnson et al., 2017). Furthermore it has also been demonstrated that accuracy and acceptability of oral fluid HIVST in a general adult population in Kenya is appealing, highlighting its potential for broader application (Kurth et al., 2016) . Recent studies have shown that HIV self-testing is a feasible and acceptable strategy among young adults. A study by Thirumurthy et al. (2017) found that self-testing increased testing rates among high-risk populations by overcoming barriers such as stigma and lack of privacy (Thirumurthy et al., 2018).

The inclusion of HIVST in Kenya's national HIV testing guidelines by NASCOP reflects the government's commitment to innovative approaches in combating the HIV epidemic (NASCOP, 2019) . Despite this, the uptake of HIVST among university students remains suboptimal, pointing to the need for research to understand and address the specific barriers and facilitators in this context. Factors such as awareness, accessibility, cultural perceptions, and peer influence play crucial roles in shaping students' attitudes toward HIVST (Musheke et al., 2013; Ngure et al., 2020). HIVST remains as an affordable and effective strategy to target individuals who are not undergoing regular HIV testing despite their risky sexual tendencies. This approach can significantly increase the number of people living with HIV who are diagnosed and initiated on HAART (UNAIDS, 2021). Moreover, the high mobility and social connectivity of university students make them an ideal target for interventions that can have a broad impact. By understanding the barriers and facilitators to HIVST among this group, specific interventions can be designed to enhance uptake, leading to early diagnosis and linkage to care. This will not only benefit the individuals but also contribute to broader public health goals of reducing HIV transmission and achieving epidemic control (UNAIDS, 2023).

Overall, by shedding light on the attitudes, perceptions, and behaviors surrounding HIV self-testing among undergraduate students in Nairobi, this study has the potential to make a significant contribution to the broader efforts to combat the HIV epidemic in Kenya. Through targeted interventions and evidence-based policies, we can work towards achieving the goal of an HIV-free generation and ensuring the well-being of all individuals at risk of contracting the virus in line with the 95-95-95 UNAIDS goals. By conducting a study on the barriers and facilitators to HIV self-testing among this population, we can identify ways to promote the uptake of self-testing and address

any challenges that may arise.

1.4 Research Question

What is the uptake of HIV self-testing services among Kenyatta university undergraduate students?

1.1.1 Specific Questions

1. What are the barriers to the use of HIV self-testing among undergraduate students of Kenyatta University?
2. What are the facilitators of using HIV self-testing among undergraduate students of Kenyatta University?
3. What is the association between the barriers and facilitators and the uptake of HIV self-testing among undergraduate students at Kenyatta University?

1.5 Research Hypotheses

Null hypotheses: There are no barriers and facilitators to HIV self-testing services among undergraduate students in Kenyatta University.

1.6 Main Research Objective

To determine the uptake of HIV self-testing services among Kenyatta university undergraduate students.

1.6.1 Specific Objectives

1. To determine the barriers to the use of HIV self-testing among undergraduate students at Kenyatta University.

2. To determine the facilitators to the use of HIV self-testing among undergraduate students at Kenyatta University.

3. To determine the association between the barriers and facilitators and the uptake of HIV self-testing among undergraduate students at Kenyatta University.

1.7 Study Significance

This research has provided useful information about HIV self-testing adoption, including its barriers and facilitators. It has also demonstrated the levels of self-awareness of HIV serological status amongst the youthful population. Beneficiaries including the Ministry of Health-Kenya, Ministry of Education-Kenya, National AIDS & STI Control Program (NASCOP), scholars and various stakeholders will utilize the findings of this study to advise on policy change and formulation of new strategies in the prevention of HIV transmission and infection.

1.8 Study Delimitation

The study accessible population were students between the ages of 18 years to 25 years at the main campus of Kenyatta University. The study focused on factors affecting uptake and use of HIV Self-Testing services, socio-demographic, individual and institutional factors.

1.9 Study Limitations

One of the primary limitations of this study was the potential for social desirability bias, particularly due to the sensitive nature of questions related to sexual behaviors, such as the number of sexual partners. Participants might have provided inaccurate information to present themselves in a more favorable light. To mitigate this concern, efforts were made to ensure confidentiality and anonymity of the responses, and the survey was designed to be self-administered, allowing participants to answer questions without the presence of the researcher or research assistant. Non-judgmental interviewing techniques were also applied, and the research assistants received extensive training in

conducting sensitive interviews which were meant to emphasize the importance of maintaining a non-judgmental and supportive demeanour. This approach helped to build rapport with participants and encourage them to share their experiences openly. Accessing students during their regular study hours was addressed by scheduling data collection sessions at times that were more convenient for the participants. The study also utilized a mixed-methods approach, combining quantitative data from surveys with qualitative data from in-depth interviews. This triangulation of data sources helped to corroborate findings and identify potential discrepancies that might arise from social desirability bias. Finally, the study sample size was adequately realized, and the use of trained research assistants ensured the quality and consistency of data collection, minimizing the impact of the financial and time constraints on the study's outcomes since the researcher was self-sponsoring the research and time to conduct the study was also limited as the researcher was attending to his academic clinical rotations at Kiambu Level 5 Hospital.

1.10 Conceptual Framework

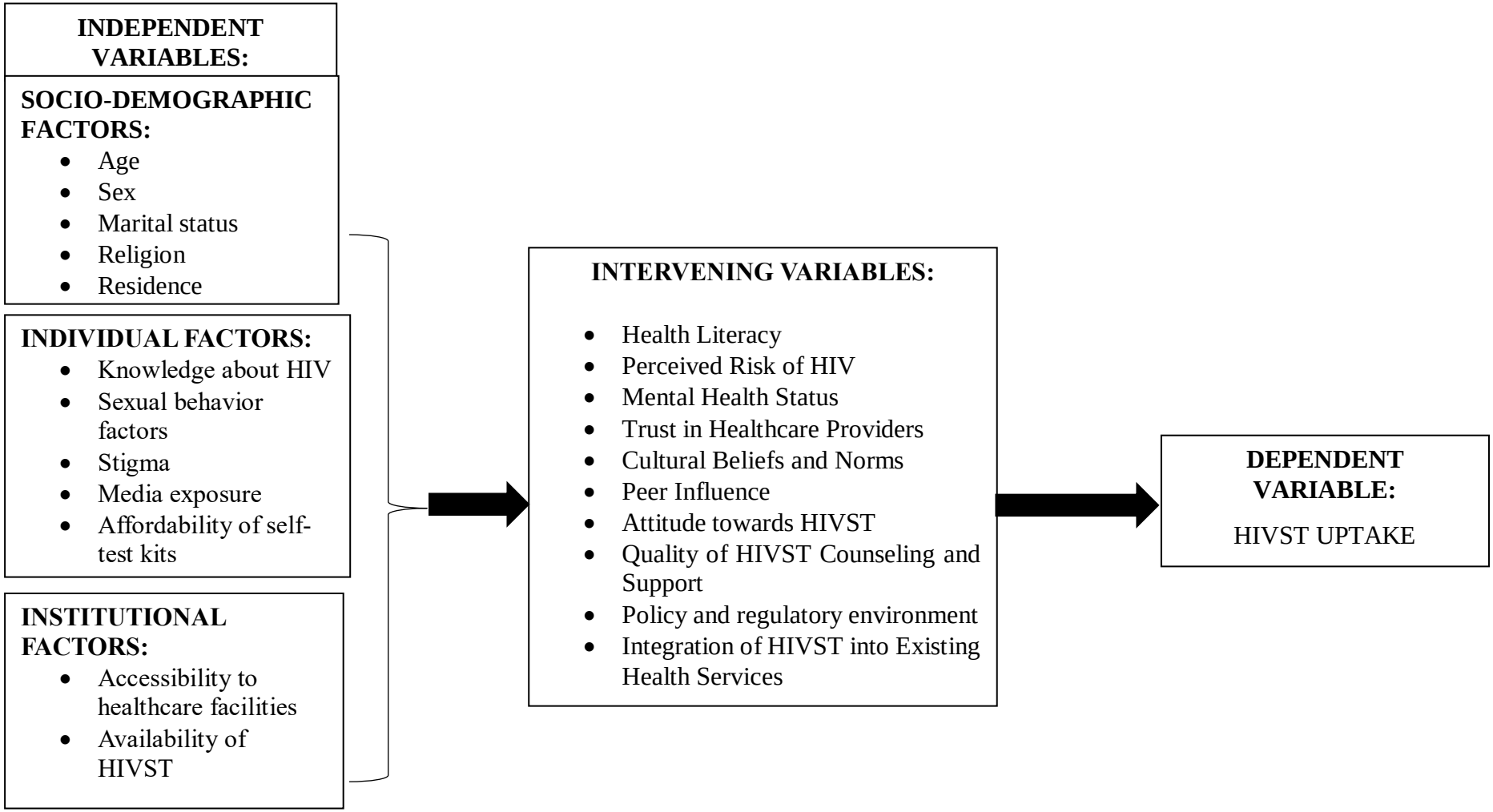

Figure 1.1: Conceptual Framework

Source: Modified from Conceptual Framework for HIV testing (Lakhe et al., 2019)

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Factors influencing HIV testing among young individuals encompass demographic variables (such as age, gender, education, and socio-economic status), engagement in HIV risk behaviors, perception of HIV risk, psychosocial factors associated with HIV knowledge, attitudes towards stigma, communication with families about HIV/AIDS, experiences related to pregnancy, overall self-confidence, regular discussions about HIV, healthcare system factors, involvement in HIV media campaigns, participation in HIV prevention programs, and general media accessibility (Peltzer & Matseke, 2014).This chapter will analyze the available literature on the subject.

2.2 What is Human Immunodeficiency Virus Self-Testing?

HIVST is a method where a person collects a sample from their body, such as saliva or blood, performs an HIV test, then analyzes the results in a confidential manner. This task is commonly carried out with the assistance of a reliable individual or it can be performed within a healthcare institution under the supervision of a healthcare professional. HIV self-testing is a preliminary screening method that does not provide a definitive diagnosis of being HIV-positive. If an individual has been exposed to HIV within the past three months, they are encouraged to repeat the test after three months if they receive a negative result. Qualified healthcare providers must confirm all positive results from reactive self-tests using the national testing protocol provided by the Ministry of Health Kenya. Self-testing for the human immunodeficiency virus is an additional option to the existing facility-based HIV testing services. It is possible that this intervention has the potential to have a significant effect and be cost-effective, reaching communities that are not currently being tested for HIV. Additionally, it may raise the percentage of individuals who are HIV-positive but have not yet been

diagnosed (Figueroa et al., 2015). It employs rapid HIV testing methods, enabling individuals to conduct their own HIV tests and interpret the results. This approach contrasts with self-sampling, as individuals collect their own specimen but subsequently send it to a laboratory for conventional testing (Youngs & Hooper, 2015). A positive reactive self-test result necessitates additional testing and verification by a qualified tester, following the established national testing procedure from the outset. It is crucial to have unambiguous communication to ensure that users comprehend that HIVST does not offer a conclusive HIV-positive diagnosis and that they are knowledgeable about the necessary actions to take following a positive self-test result. The correct interpretation of a non-reactive (negative) self-test result will be contingent upon the current level of HIV exposure risk. Individuals at high ongoing risk, or who test within six weeks of possible HIV exposure, should be encouraged to retest. HIV self-testing is not advisable for individuals who are already aware of their HIV status and are already undergoing antiretroviral therapy. This is because it may result in an inaccurate self-test outcome, namely a false negative result. HIV self-testing can be implemented through diverse methods in both public and private sectors, such as community-based, facility-based, and Internet-based platforms. Approaches may also include the choice of utilizing an oral fluid or blood-based HIV RDT for self-administered testing. Consequently, many communities can derive advantages from a diverse array of options while engaging in self-testing for HIV (World Health Organization, 2016).

2.3 Rationale for Introducing HIVST

The World Health Organization has identified five essential elements that must be present in HIV testing and counselling (HTC): Consent, Confidentiality, Counselling, Correct test results, and Connection to treatment and care. These characteristics are

crucial to consider. The dynamics surrounding the testing session must necessarily change for the sake of individuals who want to voluntary participate in collecting or purchasing their own kits, enjoy the secrecy offered by self-testing, and have the option to choose whether to seek counselling. Within the framework of unsupervised HIVST, the national HIVST programs in Kenya provide an opportunity to explore novel methods of acquiring information and addressing the adoption of counselling and testing, access to healthcare, and potential negative consequences on society. HIVST should devise innovative strategies to address the lack of formal or face-to-face counselling. This can be achieved by implementing various measures such as offering toll-free helpline numbers for counselling, providing guidance on care linkage and testing instructions through text messages, and delivering counselling services through mobile phone applications and internet platforms (van Rooyen et al., 2015).

HIV self-testing has the capacity to shift HIV testing from healthcare facilities to local communities and households. This enables individuals to assess their own health status at their own convenience, therefore avoiding the difficulties encountered at healthcare facilities, such as extended waiting periods and obstacles associated with HIV testing and counseling. Due to this rationale, HIVST is becoming recognized as a testing method that can facilitate the broader adoption of HIV testing services and assist nations especially in Africa in reaching the UNAIDS 95-95-95 targets (Bwalya et al., 2020).

One of the key advantages of self-testing is its ability to motivate individuals in previously untested demographics to undergo testing. Specifically, HIVST may be preferable for those who are worried about the social disapproval or privacy concerns linked to current HIV counseling and testing methods. Key populations identified as potential beneficiaries of HIVST include men, couples, men who have sex with men (, sex workers, and adolescents (Van Rooyen et al., 2015).The purpose of the HIVST

method is to increase access to and expand HIV testing services among demographic groups that are difficult to reach, reluctant to get tested, do not test on a regular basis, or lack the ability to attend normal testing services. The notion of HIVST is positively received by most important players involved in HIV programming, who underline the importance of doing thorough study before implementing it. However, there is a limited understanding of the fundamental elements necessary for choosing and directing the approach to overcome hurdles that are special to a certain setting (Mukora-Mutseyekwa et al., 2022).

HIV testing serves as the entry point to HIV prevention, treatment, and care. Advancements in HIV testing methods and treatment options, along with the increased availability of quick testing equipment, have opened new possibilities for attaining HIV testing objectives at both national and global levels. Precise HIV testing is essential not only for identifying HIV infection, but also for offering crucial chances for behaviour modification interventions, such as education on risk reduction and provision of condoms, as well as connecting affected individuals to care and treatment facilities. A staggering 80% of Kenyans infected with HIV have never received a diagnosis, with the primary reason for not being tested being a low sense of risk. Almost all Kenyans expressed their willingness to engage in home-based testing if it were made available to them (D.Jerene et al., 2017).

Scientific progress and novel strategies, such as HIV self-testing, play a vital role in the effort to eradicate the HIV epidemic. The World Health Organization has formulated a strategy to decrease the incidence of HIV infection from 1.5 million in 2020 to 335,000 by 2030, hence preventing over 500,000 deaths each year. This would require advancements in scientific HIV treatment and diagnosis technology, together with innovative methods for delivering services (Mekonnen et al., 2024).

Conventional HIV testing strategies has primarily focused on individuals being aware of their HIV status, with a particular emphasis on testing children and mothers. However, these strategies have overlooked other vulnerable groups, such as adolescents and young adults, despite studies showing that there is a strong desire, acceptance, and practicality for implementing an HIV self-testing program among this population (Mukora-Mutseyekwa et al., 2022).

Data collected during the HIV/AIDS open day at Mount Kenya University, conducted by LVCT at the main campus in 2010, revealed that only 18.4 % of students had utilized VCT services. Even though 90 % of HIV prevention programs target youth, VCT remains underutilized. While young people are generally aware of the importance of VCT, the low uptake among university students requires further investigation. Early HIV/AIDS testing offers numerous benefits for young people, yet it remains uncommon in many developing and third-world countries. In Kenya, HTS continue to be somewhat limited, possibly due to the perception that the risks of knowing and disclosing one's HIV status may outweigh the benefits. Understanding the extent of youth awareness regarding HIV infections and prevention measures is a major challenge in addressing their needs. HTS plays a crucial role in HIV prevention by promoting behavior change, yet its uptake remains insufficient, particularly among the youth (Museve et al., 2013). HIVST enhances testing rates among individuals with the greatest susceptibility to HIV infection and enables reciprocal HIV testing with sexual partners. Homebased HTC can help overcome the obstacles of limited healthcare facility access, where the availability and reach of facility-based HIV testing programs have hindered global attempts to expand HIV testing at the community level. Home-based HTC has been shown to be the most widely accepted and preferred option for expectant moms and their partners, in comparison to facility-based and VCT-center based HTC. Home-based HTC is easily

available to a significant population and has the capacity to expand the number of individuals who are aware of their HIV status in rural and resource-limited areas with high HIV prevalence (Moshoeu et al., 2019).

HIV self-testing is essential for both diagnosing HIV infection and facilitating important interventions such as behavior change counseling, provision of condoms, and connecting infected individuals to care and treatment providers. The advancement of HIV testing in preventing risk factors and initiating treatment early necessitates the creation of a new, cost-effective, and practical strategy to providing HIV testing services. Scientific progress and novel strategies such as self-testing play a vital role in the effort to eradicate the HIV epidemic. The United States Centers for Disease Control and Prevention advises that individuals aged 13 to 64 years undergo testing at least once as part of regular medical care. Additionally, individuals especially young people with specific risk factors should be tested annually. Youths engaged in high-risk behaviors, such as needle-sharing for drug use or engaging in unprotected sexual intercourse with HIV-positive partners, should get testing every 3 months (Mekonnen et al., 2024).

KENPHIA and WHO have highlighted the increasing popularity of HIVST in Kenya. NASCOP, KENPHIA and WHO have all contributed to the country's strategy to expand HIV testing coverage. The introduction of the national HIV self-testing policy in 2017 allowed for the incorporation of self-testing into current HIV testing approaches. Over 1 million HIV self-test kits have been distributed throughout Kenya, enhancing accessibility to testing facilities and targeting populations that may face difficulties in accessing conventional testing sites. The World Health Organization has also reported positive usage of HIVST, with a growing number of people choosing this easy and private testing approach. Research indicates that self-testing is attractive to many demographics, including youth, same-sex relationships, and marginalized groups. To

eliminate the HIV epidemic in Kenya, it is crucial to focus on enhancing knowledge, distribution channels, and healthcare connections to enhance the effectiveness of self-testing initiatives (KENPHIA, 2018; NASCOP, 2019; World Health Organization, 2018).

HIV self-testing is also thought to yield public health benefits by increasing the number of individuals participating in testing, the frequency of testing, the number of individuals who are aware of their HIV status, and the number of individuals linked to treatment and care. These combined factors play a role in decreasing the transmission of HIV (Gagnon et al., 2018).There is a need for the development of innovative technology and models of service in HIV testing in order to reach individuals who have not yet been reached and to ensure that testing rates are at their highest level. HIV self-testing has the capacity to enhance the availability and acceptance of HIV testing, especially among communities that are not accessible through traditional healthcare services (Vashisht et al., 2022).

2.4 HIVST Targeting Specific Populations

Various demographic groups stand to benefit more from HIV self-testing in comparison to others. Specifically, these groups include individuals who have not undergone sufficient testing, those who may not typically seek out testing, those who require frequent testing, those who do not have easy access to HIV testing services provided by healthcare professionals, those who are unaware of their HIV status, and those who are at a higher risk for contracting the virus. These at-risk populations consist of sex workers, individuals engaging in sexual activities with men, adolescents, young adults, socioeconomically disadvantaged individuals, ethnic and racial minorities, individuals living in rural areas, and those residing in areas with limited resources. The success and

value of HIVST depend on the ability of these demographic groups to obtain and effectively utilize the self-test (Gagnon et al., 2018).

HIVST is efficacious in targeting younger males and individuals who are undergoing HIV testing for the first time. Given that individuals under the age of 35 and males constitute the largest proportion of those who have never undergone HIV testing, it is imperative to incorporate self-testing as part of the strategy aimed at reaching the younger population for testing (Sithole et al., 2021). Self-testing can be an empowering method to reach persons who have concerns about confidentiality, stigma, and the inconvenience of HIV testing in a healthcare facility. An appropriate solution for reaching populations that are difficult to approach, such as MSM's, males, young individuals, and couples who do not often seek HTC in healthcare facilities, would be a self-testing program. Although community HTC programs have made efforts to fulfill this requirement and have demonstrated high rates of testing participation, the rates of positive test results are low. Additionally, there is limited information regarding the connection to medical care, particularly among critical populations that test negative (Suthar et al., 2013).

The success of HIVST has been demonstrated by evidence from multiple countries and disciplines, showing that it is widely accepted and accurate in various delivery models and groups. This includes populations that are often overlooked by healthcare worker-based testing, such as men and younger individuals. Stakeholders in the field of HIV believed that those who are difficult to reach, such as males, MSM's, couples, and young people, who usually do not seek HTC at healthcare facilities, would be the most suitable recipients of a self-testing program. Although community HTC initiatives have made efforts to satisfy this requirement and have achieved high levels of acceptance, particularly among couples, the rates of positive outcomes are modest. Additionally,

there is limited evidence available on the connection to healthcare services, notably for individuals who test negative, and on the acceptance of these approaches among crucial populations (Gupta-Wright et al., 2021). Research conducted at a university in Tanzania among medical students pursuing their undergraduate degrees revealed that a significant proportion of the young participants had been involved in risky sexual activities. Although most reported having a single sexual partner, a notable proportion admitted to not using condoms during their most recent sexual encounter, thereby heightening their vulnerability to HIV infection (Vara et al., 2020).

HIV self-testing is an effective method to enhance the extent and regularity of HIV testing among critical populations such as men who have sex with men. For instance, in a study done among MSM's, only a small number of MSM in Hong Kong followed the WHO's recommendation of undergoing repeated testing for HIV, with two rounds of testing conducted six months apart. There was a low level of HIV testing coverage among them. Approximately 80% of men who have sex with men infected with HIV were aware of their HIV status, according to estimates. Consequently WHO strongly advises that HIVST should be provided as an additional method for HIV testing services to priority populations such as young people and MSM's (Chan et al., 2021). The correlation between the acceptability of HIVST among young individuals and factors such as age of sexual debut and condom use during recent sexual activity is significant. These results add to the growing body of evidence demonstrating the widespread acceptance of HIVST, particularly through oral saliva-based kits, among diverse youth populations, including those from Sub-Saharan Africa (Vara et al., 2020). Young women show a lack of influence over their partners' actions and feel compelled to participate in transactional sexual activities. Within the setting of prevalent transactional sex, young individuals hold the belief that older men have a role in the

transmission of HIV, leading to the perception of higher infection rates among both young women and young men because of these interactions characterized by significant age differences. Although both men and women may desire several partners, the distinctions between genders indicate that young people face different sexual expectations and challenges when it comes to embracing or altering these expectations (Owino et al., 2024).

2.5 Implementation of HIV Self-Testing Services in Kenya: Operational Guidelines and Accessibility

In 2017, the Ministry of Health of Kenya, along with NASCOP, issued comprehensive operational guidelines for HIV self-testing services. The guiding principles of HIV testing services include acceptance, confidentiality, counseling, accurate results, and linkage to care. However, increasing HIV testing rates, especially among the youth, is challenged by factors such as perceived low risk of HIV infection, fear of positive results, stigma and discrimination, healthcare providers' attitudes, violence, and limited access. HIV testing is freely available to the public at public health institutions including select private healthcare facilities & pharmacies, and online platforms, with subsidized kits priced between Kshs. 250 and Kshs. 500 (NASCOP, 2023). Kenya allows the use of three types of HIVST kits: INSTI® (manufactured by bioLytical Laboratories, Canada), INSTI® HIV Self-Test (Pouch), OraQuick® HIV Self-Test (manufactured by Ora-Sure Technologies, USA), and Atomo® HIV Self-Test (manufactured by Atomo® Diagnostics, Australia). The Ministry of Health has been actively endorsing and distributing the OraQuick® HIV Self-Test through public health institutions. NASCOP is spearheading the expansion of HIVST programs to the general population in partnership with stakeholders (NASCOP, 2019).

In Kenya, HIVST is legally permitted, but there is currently no established policy or guidance for its widespread implementation. Additionally, HIV test kits must undergo approval for usage, and confirmatory testing is required. The existing HIV guidelines do not include provisions for HIVST, and there is no established system to oversee the quality and dependability of these self-tests (Van Rooyen et al., 2015). To identify the remaining undiagnosed cases of HIV, the Ministry of Health Kenya has implemented HIVST through pilot initiatives carried out by NGOs in several regions of the nation. Several NGOs implemented a pilot study in Kenya where they incorporated oral HIVST into the already existing HIV testing services provided in the community and healthcare facilities (Pasipamire et al., 2020).

Self-testing has become increasingly prevalent in resource-limited nations like Kenya, particularly through the private sector where professional-use rapid diagnostic tests (RDT) are distributed and sold directly to consumers. Despite a high utilization of HIV services offered by private sector entities for testing and treatment, these services often operate without sufficient regulation or inclusion in national HIV policies. Governments in these countries struggle to ensure the availability of appropriate and high-quality RDTs due to limited capacity, resulting in the ongoing distribution of these tests through a variety of commercial channels such as pharmacies, online retailers, and grocery stores (Wong et al., 2017). To fully achieve the potential of HIVST, it is essential to integrate it into broader testing initiatives, especially when carefully designed scientific evaluations are included in the program designs. The programs should provide both self-testing choices, including the widely accepted but less precise oral fluid testing, as well as the more precise but less widely accepted finger stick blood test (Mekonnen et al., 2024).

Efforts to enhance the awareness of HIV status among young people and teens can be expedited by well-coordinated and organized initiatives that are both practical and enduring for this demographic. Prior research has demonstrated that intentionally planned and promoted HIVST programs are effective in producing favorable outcomes among young people (Mukora-Mutseyekwa et al., 2022).

2.6 Socio-Demographic Factors and HIV Self-Testing

Historically, there has been a global disparity in HIV testing and care between men and women. Several factors contribute to this discrepancy. Firstly, the hours of operation of HIV testing services, especially in healthcare facilities, have been identified as a barrier to testing for men. Additionally, men's perception of being in good health often deters them from seeking HIV testing. The mobile nature of employment opportunities in the informal sector further limits men's access to healthcare facilities. Men have also reported that health facilities do not adequately cater to their specific needs. Furthermore, some men view clinics as spaces primarily for women and associate HIV testing with femininity. Men also engage in a behavior known as 'testing by proxy', where they believe that the test findings of their female companions will accurately reflect their own test results (Muwanguzi et al., 2021). A study conducted in South Africa examined the HIV testing rates among individuals who had prior sexual experience and performed self-testing. The overall uptake of HIV testing was found to be 63.6%, with a rate of 47.7% amongst men versus 80.5% among women. This study indicates that there is a comparable level of HIV testing among young people (aged 18-24 years) as there was in 2008, 47.8% of the participants reported having undergone HIV testing at some point in their lives. Among men, this percentage was 31.4%, while among women it was 64.1%. Among those who had engaged in sexual intercourse, 56.3% had been tested for HIV. For men, this percentage was 36.3%, while for women

it was 75.5% (Peltzer & Matseke, 2014). . Men have been shown to be less likely to participate in both processes, primarily due to a perception of good health that limits men's inclination to undergo HIV testing. The nomadic nature of informal sector employment options constrains men's access to health services, further exacerbating the issue. Moreover, men have reported feeling neglected by health services that do not cater to their specific needs. Some individuals perceive clinics as spaces exclusively for women and associate HIV testing predominantly with females. Additionally, men often rely on their female partners to undergo testing, banking on the assumption that their results will mirror their own (Muwanguzi et al., 2021).

Men who engage in less risky behavior and women with lower levels of education and wealth are less inclined to utilize HIVST. Conversely, conventional blood-based testing (also known as provider testing) indicates that men, young individuals, and those with higher levels of what is deemed HIV-related stigma, lower apparent risk of HIV infection, time constraints, and concerns about privacy and confidentiality are more likely to decline testing (Shaba et al., 2024). HIV self-testing has empowered women to exert significant influence and control over their partners' testing procedure, to the extent that they can effectively persuade, entice, and even deceive them. HIV self-testing has facilitated the process of doing HIV tests at home, which aligns with women's strategies of influencing their spouses and also disrupts established power dynamics (Bwalya et al., 2020).

Studies conducted have found that individuals in the age range of 20 to 29 years have a greater tendency to use HIVST components, while individuals aged 50 years and beyond show a lesser inclination towards self-testing. A study conducted in Malawi revealed a similar pattern of declining usage of HIVST among older age groups. This may be attributed to the convenient availability of healthcare services that dispense

HIVST packages to young individuals (Mwangi et al., 2022).

Studies have correlated between being older and being female with HIV testing. The age difference may be attributed to the fact that younger individuals have had less sexual encounter and are less knowledgeable about sexual matters compared to older individuals with greater HIV testing uptake among women due to the distinct healthcare seeking behaviors exhibited by men and women. Typically, women exhibit a greater tendency to seek medical assistance and utilize healthcare facilities compared to men. This has been confirmed by several research that have demonstrated that women exhibit a significantly higher propensity to employ services for HIV testing or undergo HIV testing in comparison to men (Peltzer & Matseke, 2014). The prevalence of HIVST has been found to be greater among women of reproductive age compared to nulliparous women. In contrast to men, no correlation was seen between marital status and the variable in question. Men who are married or in a cohabiting relationship are more inclined to employ home-based HIVST rather than testing in a healthcare facility (Mwangi et al., 2022; Tonen-Wolyec et al., 2020).

A study carried out at a Tanzanian University among medical students revealed that male participants exhibited a higher prevalence of sexual experience in comparison to their female counterparts. This disparity can be attributed to the cultural norms and societal expectations surrounding sexuality, which tend to encourage males to openly discuss their sexual encounters more than females. Additionally, the study found that approximately 66% of participants who had engaged in sexual activity had their first sexual experience after the age of 18 years. This contrasts with a prior study conducted in the same location in 2009, which reported an average age of 11 years for sexual debut. These findings align with research conducted in diverse contexts, indicating a pattern of early sexual initiation among young individuals (Vara et al., 2020). HIV self-

testing has emerged as an innovative method that is appealing to individuals of both genders and holds promise for potentially being more effective in reaching male partners when compared to other established testing methods. HIV self-testing is inherently characterized by its adaptability and autonomy in contrast to traditional HIV Testing and Counselling approaches, suggesting its value as an alternative option within the realm of couples-HTC services. Although gender and power dynamics continue to impact decision-making processes at various junctures, the discreet nature of HIVST allows individuals to assert control over the circumstances and timing of testing, ultimately empowering women to influence domestic decision-making without necessarily provoking negative reactions from their male partners (Izizag et al., 2018). Men using existing HIV testing methods have a lower uptake rate compared to women. The increased acceptance rates seen in men suggest that implementing HIVST may be an effective strategy to increase their utilization of HIV testing. Further research is needed to understand the reasons for the gender disparity in lower acceptance rates of HIVST among women. HIV self-testing has the potential to address gender-related challenges encountered by men at HIV testing centers, such as unfriendly testing environments, limited operating hours, and healthcare personnel lacking sensitivity to male needs (Harichund & Moshabela, 2018). The disparity based on gender may be attributed to the heightened challenges faced by transgender women in encountering social disapproval and obtaining necessary medical care. Considering their elevated vulnerability to HIV infection, it is imperative for the healthcare system to address this issue (Bustamante et al., 2017). Men exhibit a lower rate of HIV testing compared to women. Consequently, a significant number of men who have HIV are ignorant of their infection and may partake in unsafe sexual activities that result in the spread of HIV. males have a lower rate of HTS uptake compared to women, which leads to increased

HIV-related mortality among males. This is because men are diagnosed at a later stage and start antiretroviral treatment when their CD4 cell counts are lower (Zishiri et al., 2023). Men have demonstrated a stronger inclination towards utilizing HIVST due to its lower direct nonmedical costs and the absence of the need to miss work. Studies focusing solely on male participants have reported higher rates of acceptance, varying from 70% to 94%, in contrast to studies encompassing both genders, where acceptance rates ranged from 22.3% to 64% (Harichund & Moshabela, 2018).

Facility based-HIVST has shown notable effectiveness in diagnosing men, leading to the most cost-effective outcome of detecting individuals unfamiliar with their status and commencing ART treatment, in comparison to women and adolescents. This disparity in cost-effectiveness can be attributed to the higher yield among men. The potentially lower yield among women utilizing facility based-HIVST may be a result of differing health-seeking behaviors in comparison to men, as well as the comprehensive screening provided by programs designed to prevent mother-to-child transmission (Nichols et al., 2020). Self-testing is highly embraced by males due to its discreet and convenient nature. However, men express that utilizing HIVST disrupts the established relationship with hospital protocols and healthcare workers, hence restricting external assistance for initiating ART. Studies have demonstrated that men often seek additional assistance, such as counseling, education, and guidance in navigating healthcare facilities, after using a reactive HIVST kit. Recent research also indicates that males desire to be actively involved as customers. Health professionals should actively involve men as equal participants and active decision-makers in their own treatment. These findings emphasize the significance of care approaches that prioritize the needs and empowerment of male clients, offering support for their engagement in treatment without resorting to coercion (Hubbard et al., 2022).

Adolescents who are acquainted with any individuals living with HIV and have experienced the death of someone due to AIDS are more inclined to have undergone HIV testing. If young individuals are influenced by firsthand awareness of a death caused by AIDS, to the extent that they modify their actions, it is imperative for them to persistently promote open discussions about HIV/AIDS. This is done with the intention that those suffering from AIDS will be more at ease in revealing their illness to the youth they are acquainted with and others (Peltzer & Matseke, 2014).

2.7 Barriers to HIVST

HIV self-testing isn't a panacea to HIV testing. There are still obstacles preventing people from getting tested for HIV, with the two most prevalent reasons being a lack of readiness to undergo testing due to absent pre-testing counselling and the fear of stigma that traditionally surrounds HIV testing. One's own preparedness to undergo testing is also a significant aspect that affects the decision to test or abstain from testing. People may lack readiness to undergo testing for various reasons, such as apprehension about receiving a positive test outcome, insufficient awareness of the advantages of promptly treating and managing HIV, and fears of social discrimination (Shaba et al., 2024).

Several factors, including the lack of trust in self-testing outcomes, limited education, the expensive nature of self-test kits, and the emotional distress caused by positive test results, may hinder the effectiveness of HIV testing in different African settings. These findings align with previous research findings on the barriers to HIV testing worldwide, including the presence of stigma and discrimination (Mekonnen et al., 2024).

Additional obstacles that affect the adoption of HTS include user charges, absence of privacy, extended waiting periods, unfavorable attitudes of healthcare providers, low perception of risk, and distance from a healthcare facility (Mukora-Mutseyekwa et al.,

2022). Other obstacles to obtaining HIV testing services include concerns about health workers' ability to keep information confidential, anxiety about being stigmatized due to HIV, both the direct and indirect expenses associated with accessing HTS, making assumptions about one's own HIV status based on a partner's status, misunderstandings about HIV testing, the fear of receiving a positive result, and gender inequity (Bwalya et al., 2020). Reported obstacles by other authors also echo the above findings which encompass travel duration and expenses, apprehension of unintended exposure, extended waiting periods at clinics, uncertainties or misunderstandings regarding the reliability of HIVST kits, and individuals' capacity to independently employ and interpret HIVST kits (Mphande et al., 2021).

2.7.1 Impact of Stigmatization on HIV Self-Testing Uptake

The presence of stigmatization has been recognized as a major hindrance to the uptake of HIV self-testing, particularly stemming from concerns about facing societal judgment during the process of acquiring test kits. These observations are in accordance with the outcomes of a research study carried out in Eastern Uganda, where participants expressed reservations about the challenges associated with accessing HIV testing services outside of traditional healthcare settings. A key contributing factor to this reluctance was perceived informal scrutiny and lack of privacy, with individuals feeling exposed to scrutiny from others while undergoing the testing procedure (Muwanguzi et al., 2021).

The stigma associated with being observed while testing at a health facility together with concerns about the confidentiality of testing in health facilities, are barriers that prevent people from using facility-based HIV testing services. HIV self-testing has been acknowledged by health experts as a diagnostic approach that can mitigate

instances of stigma associated with testing at healthcare facilities. This has positioned HIVST as a more appealing alternative to testing at health facilities, which is the primary obstacle to testing. Nevertheless, some individuals who utilize self-testing express the belief that HIVST may hinder open discussions and efforts to combat HIV stigma, as it could potentially intensify internalized stigma. Consequently, there is a possibility that while HIVST reduces one type of stigma (associated with health facilities), it may inadvertently amplify another form (self-stigma) (Bwalya et al., 2020).

HIV/AIDS-related stigma decreases the probability of individuals getting tested for HIV due to the connection between the diagnosis and the potential for social damage (Mukora-Mutseyekwa et al., 2022). Prospective HIVST users perceive it as capable of diminishing the prejudice and social disapproval linked to HIV testing, hence promoting the utilization of HIVST services among young individuals. HIVST allows individuals to ascertain their HIV status without the need to visit a healthcare facility, hence promoting increased self-testing among the population (Choko et al., 2017).

HIV self-testing may be considered unethical if it leads to heightened vulnerabilities, infringes upon individual freedoms and rights, lacks follow-up care and treatment options, lacks necessary infrastructure for quality testing and protection of human rights, and is viewed in isolation without consideration of broader social, political, cultural, and legal influences on self-testing experiences (Gagnon et al., 2018). Although research demonstrates the advantages of being aware of one's HIV status, the potential for stigma and negative psychological consequences significantly influences an individual's choice to engage in self-testing. It is necessary to distribute messages that provide assurance to users of HIVST kits regarding the resources that are accessible to help and educate them (Mukora-Mutseyekwa et al., 2022).

2.7.2 Absence of linkage to HIV Treatment and Care in HIVST

Barriers specific to HIV self-testing revolve around the lack of healthcare workers present during the testing process. This leads to two main issues: (1) self-testers have few outside incentives to seek medical care, as there is no HCW available to encourage or accompany them to treatment; and (2) self-testers receive minimal to no counseling, which results in the persistence of fears and misconceptions about antiretroviral therapy regimens, discouraging them from starting treatment. This is especially prevalent among individuals who use secondary HIVST. The desired linking tactics encompassed peer support from a mentor who is living with HIV, gender-specific counseling, ART services provided outside the facility, and assistance with navigating the facility (Hubbard et al., 2022). Connecting individuals to healthcare services is a difficulty encountered by all methods of HIV testing, and particularly so with HIVST. Efforts to enhance the connection between testing and subsequent actions in society are crucial, especially for the dissemination of HIV self-tests to individuals who have already been tested. Most individuals who report reactive HIVST undergo confirmatory HIV testing, which serves as an initial connection to healthcare for those who choose to test without assistance. Additionally, most of the individuals who receive a positive result aligns with the results of standard HIV testing, indicating a high level of concurrence between HIVST and typical HIV testing (Pasipamire et al., 2020).

Policymakers, healthcare providers, and HIV experts have highlighted the concern of insufficient follow-up treatment and care after an individual tests positive for HIV. HIV counseling is closely linked to treatment and care, which are crucial aspects of HIVST. It is emphasized that HIVST should be regarded as a screening tool rather than a definitive testing method. Therefore, a positive result from HIVST requires confirmation through laboratory testing at a healthcare facility to ensure proper

treatment and care (Njau et al., 2019). A critical element of the HIVST model involves facilitating robust connectivity to healthcare services, enabling individuals to access treatment and care facilities post HIV testing. The lack of counseling may result in inadequate linkage to healthcare services, as individuals diagnosed with HIV may lack the requisite understanding to access suitable healthcare and treatment options. Precise documentation of language and information related to linkage to care is essential in user instructions for HIV self-testing kits. An evaluation of the determinants influencing an effective HIV self-testing kit is crucial. Educational initiatives targeting populations unfamiliar with HIV self-testing may be required to enhance the utilization of HIV self-testing kits (Harichund & Moshabela, 2018).

Studies have demonstrated that certain strategies, such as providing home-based antiretroviral therapy, can significantly improve the rate at which individuals who have undergone HIVST be connected to treatment. In fact, these techniques have been demonstrated to bring about in a triple rise in the number of people who successfully get care after HIVST. The linkage to care after HIV self-testing can be similar to the existing national rates of linkage. However, there is a need to reduce the interval between diagnosis and enrollment in care to enhance overall linkage rates. Additional investigations are required to determine methods for improving the connection between individuals and healthcare services after HIVST, especially for critical populations. These populations may have challenges in accessing services due to laws and regulations that impose restrictions (C. C. Johnson et al., 2017). HIVST also provides an opportunity to connect individuals who have negative HIV test results to HIV preventive services. HIV self-test kits are typically provided to sexual partners of clients who visit prenatal and postnatal care, tuberculosis/sexually transmitted infection, and family planning clinics in the public sector. Additionally, it is advised to employ a plan

that focuses on men, critical populations, and young individuals between the ages of 15 and 25 years. Adolescents between the ages of 15 and 17 years should be given additional attention when they need to perform a self-test. It is important that they receive help from a skilled health provider (NASCOP, 2019).

2.7.3 Economic Barriers for HIV Self-Testing

The cost associated with purchasing an HIV self-test kit presents a notable barrier that may hinder an individuals' inclination to obtain and utilize such kits. Despite expressing a willingness to procure the self-test kits, most medical students in a study done in Kilimanjaro Tanzania revealed reluctance to purchase self -test kits. This finding contradicts the results of previous studies conducted in different localities involving other youthful populations, which indicated a strong propensity for individuals to invest in self-test kits for HIV testing. This discrepancy underscores the importance of addressing the financial aspect linked to the procurement of self-test kits, particularly within low-income communities like Kenya, in order to promote the uptake of HIV self-testing (Vara et al., 2020). The capacity to financially buy HIVST items is likewise a crucial aspect. The high price of acquiring HIV kits for prospective HIVST users, particularly among young people, could potentially hinder HIV testing (Jennings et al., 2017).

One significant barrier to the implementation of HIVST is the elevated cost and restricted availability of self-test kits, making them beyond the means of many individuals. Even though the cost may not be exorbitant, it may still be unfeasible for marginalized communities and impoverished individuals. Additionally, there is a risk that the distribution of testing kits may not effectively target those in the greatest need. Many self-test users propose reducing the price of the kits or distributing them free of

charge, mirroring the approach taken with other forms of HIV testing. This is consistent with previous recommendations for offering financial incentives or complimentary self-testing kits to low-income individuals at higher risk of HIV transmission (Muwanguzi et al., 2021).The high cost of HIV self-testing kits may lead to their primary use by the middle-class "worried-well" demographic instead of individuals at high risk for HIV infection. This may lead to numerous false positive results, causing psychological distress as individuals seek further confirmation testing. Additionally, this could erode trust in the overall accuracy of HIV testing methods. It is possible that individuals who stand to benefit most from HIV self-testing kits may exhibit hesitation in making a purchase. Those lacking the resources or motivation to acquire a self-testing kit have the option of accessing complimentary testing services at public health facilities. The unequal distribution of self-testing kits raises concerns regarding the optimal utilization of their potential benefits. To mitigate this issue, a viable solution would entail government health institutions providing financial aid or dispensing free self-testing kits to individuals with limited financial means and heightened vulnerability to HIV, or alternatively, to the general populace. (Youngs & Hooper, 2015).

Rolling out a screening test on a large scale involves considerable expenses. The cost-effectiveness of HIVST is contingent on the health benefits of early identification of HIV, which hinges on a sizable number of undiagnosed HIV cases. Currently, a considerable proportion of funding for HIVST is provided by external donors. Nevertheless, the implementation of more sustainable and economically efficient distribution methods, such as community-led projects or collaborations between public and private sectors, may aid in transitioning towards reliance on domestic healthcare budgets. This shift will become imperative as financial support from donors' declines. The present expenses associated with delivering HIVST are still relatively high and

continue to be a significant concern for expanding beyond programs funded by external donors. (Gupta-Wright et al., 2021). The price of the test kits is a significant obstacle to the implementation of HIV self-testing. Although the expense may not be excessively high, it can still be significant for vulnerable populations and the impoverished. Unfortunately, it may not effectively reach those who are most in need of testing. Users perceive the advantages of HIV self-testing as a way to save money that would otherwise be spent on testing in medical facilities or private clinics, as well as on follow-up expenses. Additionally, it saves time that can be used for income-generating activities. This enhances the convenience of HIV self-testing (Muwanguzi et al., 2021). In a study surveying HIVST acceptability most self-testers surveyed conveyed the viewpoint that the government should provide HIVST kits free of charge, whereas others were amenable to purchasing HIVST kits if they were conveniently available at distribution sites that ensure privacy and confidentiality, such as pharmacies (Harichund & Moshabela, 2018).

The potential consumer market for HIVST is believed to be immense, according to estimates. Although there is a significant market potential, the current high cost of validated HIVST kits, lack of competition in the market, little information on demand in resource-limited settings, and the requirement for appropriate packaging and instructions for HIVST in different situations are all factors that contribute to the continuation of hurdles to adoption. To expand the adoption of HIV self-testing, it is necessary to develop methods that would lower prices, generate demand, and leverage current knowledge on acceptability, feasibility, and implementation. To expand the implementation of HIVST, it is necessary to develop methods that would lower prices, generate demand, and leverage current information on the acceptability, feasibility, and implementation of HIVST. The persistently high costs will perpetuate uncertainties

over the future accessibility of cost-effective test kits, restrict the execution of implementation science initiatives, and ultimately impede the progress and expansion of HIV self-testing (C. Johnson et al., 2014). Research indicates that HIVST should ideally be provided at no cost or at a low cost, with findings differing across various populations. A study conducted in Kenya revealed a strong preference for free HIV testing compared to charging a nominal fee or even being paid to undergo testing. There may be resistance among those who have the means to afford an HIVST kit. The established practice of offering free HIV testing services may have established a precedent that will be challenging to challenge, potentially hindering the effectiveness of implementing a fee-based model for HIVST. Qualitative studies have highlighted cost as a significant barrier to the adoption of HIVST, with majority of users expressing a belief that such testing should be free of charge and subsidized by the government, much like traditional HIV testing services in many countries (Kelvin & Akasreku, 2020). Providing HIVST kits for free has the potential to enhance the adoption and regularity of testing for HIV among individuals who utilize them. In a research, participants who had acquired the kits reported a rise in the rate of HIV testing. This leads to a decrease in the percentage of users who are uninformed about their status since they have not undergone screening for various reasons. The total outcome may exhibit a reduction in new infections, aligning with the objective of reaching the goal of "End AIDS by 2030" (Vashisht et al., 2022).

Regarding cost preferences, individuals with low income across both high- and low-resource contexts generally favor free self-tests. Conversely, those with greater incomes in both settings are prepared to spend on average, up to US$20. This discovery suggests that the cost of a self-test kit can play a crucial role in influencing the adoption of self-tests. Qualitative research can provide valuable insights to inform the desired cost

ranges. This is essential for policy initiatives in both strategies and situations (Pant Pai et al., 2013). The average reported price for unauthorized HIVST kits is US$1, indicating that this could be a feasible price for a large-scale implementation. Nevertheless, it is imperative that HIV diagnostics are provided to pharmacists at no cost or with significant financial support. In order to mitigate the occurrence of price increases for subsidized tests, it would be necessary to implement certain measures, such as prominently displaying the price on the packaging and publicizing it through various media channels (Mugo et al., 2017).

2.7.4 Accuracy and Reliability Concerns in HIV Self-Testing

HIV self-testing carries the potential for yielding inaccurate negative results for HIV infection. While self-testing is often highly specific, it may still yield a few false negatives. This emphasizes the significance of targeting those who are more inclined to test positive for HIV as first-time testers (Sithole et al., 2021). Many potential HIVST users believe that self-test results are unreliable. This perception arises from doubts about the accuracy of self-test kits, which are often based on misunderstandings about the presence of HIV in a blood sample and the possibility of incorrectly interpreting results when testing privately (Njau et al., 2014). An inherent constraint of HIV self-testing methods that identify HIV antibodies is their reduced ability to identify new HIV infection within the window period, leading to an inaccurate negative test outcome. The window period refers to the timeframe, often ranging from 25 days to 8 weeks, immediately after initial infection when HIV antibodies may not yet be detectable, but the viral load remains elevated (Stevens et al., 2018).

HIV self-testing has been considered an accurate and reliable tool that allows individuals to perform self-testing at their convenience and chosen location. It is viewed

as capable of carrying out the function of an HIV test. However, some authors have cautioned against viewing HIVST as a substitute for traditional laboratory-based HIV testing. These authors have often expressed concerns that while HIV self-testing can be utilized as a screening tool, it may not match the accuracy of a standard laboratory test. There has been a consensus advocating that a reactive self-test should be followed up with a confirmatory laboratory test to reduce the likelihood of false positive results. Based on this rationale, it has been argued that HIV self-testing should be considered primarily as a screening method rather than a standalone testing tool (Gagnon et al., 2018). Misunderstandings surrounding the proper usage of self-test kits, especially when using unsupervised HIVST, are the main source of user errors and inaccuracies. It is crucial to offer training on the use of HIVST, along with clear graphic instructions in the local language. These instructions should explain how to perform the HIVST, provide straightforward instructions for interpreting the test result, and include information on accessing assistance and counseling services. Manufacturers should exercise caution in designing a user-friendly HIVST product in order to minimize user errors associated with new HIVST devices (Mekonnen et al., 2024).

Some studies have found that the introduction of HIVST in high-risk populations may affect the expansion of rapid oral HIV testing. These studies have shown that the self-test kits have lower sensitivity (77.5%) compared to the sensitivity claimed by their manufacturers. This discrepancy may decrease the credibility and acceptance of the self-test kits among populations at risk for HIV, particularly young people (Marley et al., 2014). In resource-constrained environments HIVST poses challenges attributable to various factors, including but not limited to the test's cost, accuracy, user-friendliness, and stability in higher temperatures, the necessity for confirmation testing alongside HIVST, and the requisite infrastructure for regulation, healthcare, and legal

safeguards (Gagnon et al., 2018). The OraQuick® test demonstrates a specificity rate of 99.8%. A systematic review indicated that when the OraQuick® test was utilized in a population with a low prevalence of HIV (<1%), it showed a positive predictive value (PPV) of 88.6%. However, in settings with a higher prevalence (>1%), the PPV rises to 98.7%, which merits comparison (Youngs & Hooper, 2015).

The OraQuick® test demonstrates a sensitivity rate of 92%, indicating that approximately 1 out of every 12 HIV-positive individuals who undergo the test may receive a false negative result. False negatives can arise from human error or limitations inherent in the technology's ability to detect HIV antibodies in saliva, especially during the 'window period' - the period between HIV acquisition and when antigens and antibodies become detectable. Most self-tests utilize advanced second or third-generation technology that specifically targets HIV antibodies, such as OraQuick®, which has a window period of 6-12 weeks. False negatives are concerning as they may lead to individuals remaining unaware of their HIV status until a later stage of the disease, potentially harming both themselves and others by increasing the risk of HIV transmission if someone erroneously believes they are not infected (Youngs & Hooper, 2015). An important discovery that could affect the expansion of quick oral HIV testing is that the kit used for testing has demonstrated a lower sensitivity (77.5%) than what was claimed by its manufacturers. This discrepancy in sensitivity may undermine the reliability of the test and, as a result, decrease its acceptance among populations vulnerable to HIV. The distinction between consultancy testing and client self-testing has demonstrated a low sensitivity among self-testers. This observation may be attributed to errors made by the self-testers throughout the testing procedure, resulting in inconclusive results, invalid tests, and missing data. The difficulty of obtaining indeterminate findings and invalid tests, which reduces the sensitivity of the test, is a

significant real-world concern (Marley et al., 2014). Based on the theoretical premises of mathematical models studying sensitivity and specificity of HIVST kits, it has been noted that decreased antibody levels and extended detection time for oral HIV self-testing kits are correlated with increased incidence of inaccurate negative results, as opposed to conventional HIV testing and counseling conducted within clinical settings (Izizag et al., 2018).

2.7.5 Impact of Education and Literacy on the Accuracy and Adoption of HIV Self-Testing

People with lower levels of education are more likely to misinterpret or obtain inaccurate results when using the HIV self-testing kit due to potential challenges in effectively administering it (Hlongwa et al., 2020). A significant barrier is the lack of knowledge, particularly among those in rural areas. Illiteracy is believed to negatively affect the use of HIVST by potential users (Njau et al., 2014). Considering the diverse literacy and educational capacities in environments with limited resources, it is imperative to carefully deliberate on the dissemination strategies for educational initiatives advocating for the adoption of HIVST. Moreover, novel methods in the design and presentation of HIVST kits may also have a notable impact (Harichund & Moshabela, 2018). Factors that enhance an individual's capacity to effectively execute or comprehend the HST encompass higher educational attainment, pre-test instruction, younger age, previous experience with HIV testing, and location in an affluent neighborhood (Stevens et al., 2018).

There is concern regarding the potential for errors in self-testing procedures conducted without supervision. For example, in a study conducted in Spain showcased a decrease in test accuracy from 99% to 92% when the demonstration of the testing process was

omitted. Additionally, illiterate individuals appear to exhibit higher rates of user error. This is particularly concerning in light of the National Institute for Health and Care Excellence's emphasis on the importance of HIV testing within the black African population, some of whom may have English as their second language (Youngs & Hooper, 2015). Supervised self-testing technique may be the most suitable choice for impoverished and less educated groups who are unable to finance self-tests or have difficulty understanding the testing procedure. Prior to implementing a self-testing strategy, it is imperative to engage physicians and stakeholders. This is crucial because it ensures that treatment and staging options are accessible for those who have recently been diagnosed with HIV (Pant Pai et al., 2013). Customized strategies, such as HIVST brochures that are adapted to specific settings and the utilization of multimedia messaging, improve comprehension of the HIVST procedure and also encourage modifications in behavior (Mukora-Mutseyekwa et al., 2022).

It is imperative to provide innovative strategies to accommodate the needs of users who are illiterate. Specifically, the instructions for HIVST kits should incorporate visual aids. Furthermore, for HIVST kits distributed in Kenya and potentially throughout the broader East African region, it is advisable to include package inserts in both English and Kiswahili (Mugo et al., 2017). Studies suggest that implementing rapid oral fluid HIV testing as an additional method of testing or screening in urban areas with high HIV prevalence is very possible, despite some existing challenges like low level of knowledge about rapid oral fluid testing among high-risk population groups, such as youths. This lack of knowledge could lead to operational errors in using HIV self-test kits, which may affect the accuracy and sensitivity of the tests (Marley et al., 2014). In a study encompassing young medical students and their uptake of HIV self-testing they demonstrated a proficient understanding of HIV oral fluid tests and regarded HIVST as

an innovative technology. Additionally, they expressed no difficulties in comprehending the instructional video and instruction sheets for utilizing oral fluid self-test kits, highlighting a substantial level of comprehension of HIVST within this demographic group (Vara et al., 2020). Majority of studies looking into uptake of HIV testing and literacy of its users have demonstrated that the concept of employing saliva based HIV testing as a nationwide alternative HIV testing method is highly viable, provided that the public's understanding of how to utilize the test kit and its constraints is enhanced by educational efforts prior to its deployment (Marley et al., 2014).

2.7.6 Psychosocial Challenges of HIV Self-Testing Due to Fear of Positive Results

Individuals participating in HIV self-testing may encounter challenges in effectively handling their test results, which could have adverse ramifications for their overall health. Coercive testing has the potential to trigger instances of gender-based violence between partners, as well as within familial connections (Harichund & Moshabela, 2018). Receiving a positive result from a self-administered HIV test may cause substantial psychological distress for individuals who self-test, possibly exceeding that experienced if the test had been conducted by a healthcare professional. There is a potential for self-harm or suicide as a result. Failure to seek medical assistance following a positive result due to a perception of hopelessness associated with an HIV diagnosis could lead to unnecessary suffering and prevent informed decision-making, highlighting the importance of post-test counseling (Youngs & Hooper, 2015).

The fear and anxiety associated with receiving a positive result has always been a significant concern when undergoing an HIV test, potentially deterring the use and uptake of HIVST. Previous studies have noted that some individuals even described the experience as akin to "buying death" or "purchasing poison for committing suicide"

(Jennings et al., 2017). The possible psychological impacts of obtaining a positive result from a self-testing kit encompass feelings of fear, anxiety, depression, distress, and even suicidal ideation. Furthermore, misuse of the test poses social risks like coercion, abuse, and contributes to the overarching matter of HIV-related stigma. It is crucial to emphasize that erroneous positive or negative results could result in potential medical harm (Gagnon et al., 2018). A research study involving heterosexual couples revealed that the influence of their partners motivated them to undertake HIV self-testing, leading to challenges in coping with serodiscordant results. Furthermore, a cohort study conducted in Kenya identified instances of intimate partner violence among post-partum women who distributed HIVST kits to their male partners. Additionally, incidents of physical abuse were documented among female sex workers who provided HIVST kits to their clients (C. C. Johnson et al., 2017).

2.7.7 Quality Assurance and Regulatory Challenges in HIV Self-Testing

HIV self-testing is recognized as a convenient and dependable way for individuals to test themselves. Nevertheless, it is important to note that HIVST is not meant to replace traditional laboratory HIV testing. Although HIV self-tests are useful for initial screening, they do not match the accuracy of laboratory tests. To minimize the risk of false positive results, it is essential to confirm a positive self-test with a laboratory test. (Gagnon et al., 2018). Personal perspectives pose a significant concern in HIVST, including previous experiences with low-quality self-test kits, counterfeit medical devices, and misleading advertisements. Many individuals worry about the quality of self-test kits and the impact of false advertising due to inadequate quality assurance standards, which can hinder the uptake of HIV testing (Makusha et al., 2015). The significance of implementing a regulatory framework for HIVST is to guarantee quality

and accuracy as emphasized by the World Health Organization underscores the need for adjustments in regulations and policies to facilitate the utilization of HIVST, despite its promising potential (Wong et al., 2017).

2.7.8 Impact of Lack of Face-to-Face Counseling in HIV Self-Testing

A significant worry among HIVST users is the lack of a counsellor when testing for HIV. The primary factor driving the decision of self-testing users to choose pharmacy testing over home testing is the requirement for post-test counselling. Pharmacy providers of HIVST should have the necessary skills to offer counseling before the test, and those who perform the self-test should receive support in the form of counseling after the test. This assistance can include providing printed material along with the test and access to a telephone hotline (Mugo et al., 2017). A primary concern with HIVST is the absence of face-to-face counseling. Many individuals consider counseling a crucial component, and its absence in HIVST raises the risk of psychological issues, coercion, and suicidal thoughts (Makusha et al., 2015). Young people have been shown to have mixed reactions towards HIVST as they report the absence of post-test counselling or follow-up care as a major concern because they believe it can lead to suicide or self-harm after learning the results (Obiezu-Umeh et al., 2021). Healthcare workers infrequently provide post-test counseling, a service that self-testers greatly value, regardless of the outcome of their HIVST. Research has indicated that the likelihood of individuals revealing sensitive information is greatest when they anticipate receiving assistance from healthcare workers, and lower when they anticipate being subjected to criticism and prejudice by HCWs. Future interventions for HIVST should aim to create an inclusive and supportive atmosphere, where healthcare workers

proactively inquire about HIVST outcomes and offer a secure setting for counseling after the test (Mphande et al., 2021).

The absence of mandatory counseling in HIV self-testing is regarded as a beneficial feature by certain scholars, who believe that counseling could serve as a hindrance to HIV testing. Conversely, some experts posit that remote post-test counseling via telephone may offer higher quality compared to in-person counseling provided during traditional provider-administered HIV testing. However, the absence of counseling requirements is noted as a significant drawback of HIVST. Additionally, HIVST is highlighted as not being universally accessible and effective only when specific individuals opt for testing and have access to treatment and care after receiving a positive test result, assuming the accuracy of the result (Gagnon et al., 2018). The lack of in-person HIV counseling may lead to increased susceptibility to psychological distress and suicidal ideation. It is imperative to offer in-person HIV counseling tailored to the individual's preferences. Self-testers who indicate a willingness to participate in HIVST suggest that telephone counseling would be more suitable than in-person counseling (Harichund & Moshabela, 2018). An additional contention against self-testing is that the absence of pretest counseling for HIV results can potentially result in increased harm. Formerly, pretest counseling was mandated to mitigate the severe consequences that accompany a positive HIV diagnosis. However, current evidence suggests that the risk of significant psychological harm from self-testing is now minimal. Opting out of pretest counseling deprives individuals of the opportunity to receive additional benefits, such as sexual health guidance and screening for other sexually transmitted infections. This issue is particularly crucial, given that individuals with HIV are at a heightened vulnerability to other sexually transmitted infections (Youngs & Hooper, 2015).

One proposition that has been raised to increase uptake of sef-testing is to offer additional support to individuals utilizing HIV self-test kits to improve their integration into post-test services and fulfill the demand for post-test aid, such as access to a counselor for detailed guidance on future actions. The absence of a connection to post-test services is identified as a considerable challenge for HIV self-testing. Consequently, there is an imperative need for the development and assessment of interventions designed to bolster the association with HIV prevention or treatment after HIV self-testing. There have been concerns raised about the inadequate support offered for HIV self-testing outside of the pretest counseling stage. Some individuals have been reluctant to undergo an HIV self-test due to the lack of counseling provided. Certain individuals have expressed a preference for a standardized testing approach, citing concerns about managing test results independently and the lack of access to follow-up services. Policymakers are concerned that the absence of in-person support may increase the risk of psychological distress, suicidal ideation, and coercion (Muwanguzi et al., 2021). In contrast to HIV testing conducted by healthcare professionals, home self-testing provides numerous benefits, such as privacy, anonymity, convenience, accessibility, acceptance, satisfaction, safety, and cost efficiency. In HIV self-testing, formal counseling is not obligatory. Certain scholars consider counseling to be advantageous, as it may discourage individuals from seeking HIV testing. Conversely, other scholars contend that post-test counseling via phone may offer superior quality when compared to counseling provided in healthcare settings during testing (Gagnon et al., 2018).

2.7.9 Risk Compensation and Behavioral Impact of HIV Self-Testing

Risk compensation is a potential drawback of HIVST, especially when there is a false-negative test outcome. Risk compensating refers to the phenomenon of individuals engaging in more high-risk behaviors after receiving a negative HIV test result. Users of HIVST may exhibit adverse behavioral modifications, such as discontinuing condom usage after receiving a negative HIV test result (Stevens et al., 2018). Engaging in HIV testing before engaging in sexual activity to confirm a negative status, especially while discussing the usage of condoms, may be considered a risk compensating technique. While not entirely secure, this approach serves as the most effective means for certain individuals to safeguard themselves in situations where establishing a secured relationship is challenging. Although certain uses of HIVST may not be officially endorsed, individuals have the autonomy to choose their own methods and conduct their own assessment of the benefits and risks involved (Ky-Zerbo et al., 2023). HIV self-testing does not encourage or strengthen risky behaviors. In fact, it can promote the use of condoms, particularly among female sex workers and young people, and have a favorable effect on their health-related behaviors. Self-testing for HIV does not lead to an increase in adverse social repercussions or unwanted events or behaviors.(Kra et al., 2021). There is no evidence to imply that HIVST increases risky behavior amongst persons at risk. Randomized control studies have provided evidence of very low quality indicating that HIVST may lead to a rise in the number of sexual partners in critical populations like youths. Although HIVST may not directly lead to an increase in risky behaviors, there is some ambiguity. It is crucial to communicate messages that emphasize the significance of utilizing effective HIV preventive strategies, such as condoms (C. C. Johnson et al., 2017). Remarkably, HIVST does not have any adverse effects on condom usage, contradicting a commonly expressed worry.

No significant adverse events have been observed, and instances of social injury are exceedingly uncommon, hence refuting frequent worries. Due to its high level of acceptance and effectiveness, there should be a broader implementation and expansion of HIVST among young people (Witzel et al., 2020).

2.8 Facilitators to HIVST

In Kenya, the acceptance rate of HIVST among PrEP users was 98%. Users mentioned confidentiality, simplicity, and convenience as the main factors influencing their preference for this testing procedure (Pasipamire et al., 2020).Factors that contribute to the success of HIVST include enhanced privacy, perceived independence of testing, anonymity of test findings, perceived convenience, and low testing time (Mphande et al., 2021). The motivators for self-testing, whether supervised or unsupervised, in all contexts, include convenience, quickness of obtaining test results, privacy, a sense of autonomy, and control over one's health choices (Pant Pai et al., 2013). Undergoing HIV testing on two or more occasions during the past year, possessing a higher level of education, and demonstrating greater understanding of HIV/AIDS are factors that contribute to a greater acceptance of HIVST. Offering free HIVST and actively promoting the test to one's partner have also been identified as factors that make it easier for individuals to engage in testing. Several studies have identified various factors that enable the use of HIVST. These factors include understanding the significance of the test, awareness of counseling services, consideration of pre- and post-test procedures, willingness to take the test with a partner, access to HIVST kits, assurance of privacy and confidentiality, convenience, and disclosure of one's HIV status (Izizag et al., 2018; Liu et al., 2020; Mekonnen et al., 2024).

2.8.1 Acceptance and Feasibility of HIV Self-Testing Across Diverse Populations

Due to its novelty, HIVST commonly elicits a range of responses, from astonishment to opposition. However, common self-testing users have generally succeeded in persuading secondary users to embrace HIVST. Secondary distribution can be challenging and necessitates a certain level of exertion from initial consumers. Periodically, they employ astute tactics to persuade others to utilize HIVST. When it comes to committed partners, primary users of HIVST generally employ a common method known as couple testing. This strategy involves first determining one's personal HIV status and then retesting together. It is typically utilized by individuals who receive nonreactive results from HIVST and wish to address any resistance or suspicions within the relationship (Ky-Zerbo et al., 2023).Evidence about the practicability and level of acceptance of HIVST is expanding. A recent analysis of acceptability, measured by the adoption of HIVST, has revealed a strong acceptance in several settings, including both low-income and high-income countries, as well as among specific demographics. The findings indicate that oral swab testing may be more widely accepted compared to finger-prick testing (Knight et al., 2017). Studies conducted in Malawi and Kenya have shown a generally favorable reception of HIVST among healthcare professionals and the general public (Wong et al., 2017). The popularity of HIVST is primarily influenced by an individual's motivation to undergo HIV testing. Adolescents' acceptability of HIVST is most influenced by the confidentially of the test, with the convenience of use and prompt results being secondary factors. Upon completing the self-test, the level of acceptability for sharing HIVST with others rises (Tonen-Wolyec et al., 2019).

Self-testing for HIV is deemed to be acceptable among young people as majority have not reported negative incidents among youthful self-testers who have used the HIV test kits and provided feedback. The feedback revealed that the community-based HIVST

approach reaches a larger number of people and distributes a greater quantity of HIV self-testing kits compared to the traditional facility-based HIV testing approach (Pasipamire et al., 2020). HIV self-testing has been found to enhance PITC among outpatients in areas with a high prevalence of HIV. Research has demonstrated that HIVST is widely embraced by individuals. In previous studies, randomized control trials conducted have discovered that the use of facility-based HIVST can result in a 200% increase in testing rates among adult outpatients, compared to the traditional PITC approach (Mphande et al., 2021).

The effectiveness of HIVST has been substantiated through empirical data gathered from studies from numerous countries and academic fields, indicating its widespread acceptance and reliability across diverse delivery approaches and demographic groups. This encompasses segments of the population that are typically underserved by traditional healthcare worker-administered testing, such as men and younger cohorts (Gupta-Wright et al., 2021). The acceptability rate of HIV testing among undergraduate students in a study done in Congo was found to be very high (81.4%), and most of them expressed willingness to engage in HIV self-testing with their partners. The strong acceptance of HIVST has also been demonstrated in various youthful population groups in other studies conducted in Sub-Saharan countries. Therefore, implementation of an HIVST program could potentially lead to an increase in the frequency of HIV testing among undergraduate students (Izizag et al., 2018). The high levels of acceptability for HIVST ranged from 81-100%, with participants expressing a preference for oral HIVST over other testing methods 81-91% of the time. The favorable reception of self-testing can be attributed to factors such as the privacy it affords, the convenience and simplicity of HIVST, and the non-invasive nature of oral testing (Stevens et al., 2018). HIV self-testing is widely welcomed, especially among critical communities and

individuals who do not undergo conventional HIV testing. Preliminary feedback indicates that HIVST is deemed acceptable, feasible, and demonstrates outstanding clinical performance. HIVST facilitates privacy and independence, and significantly enhances testing uptake (Kra et al., 2021).

The acceptability of HIVST is strong, as evidenced by meta-analytic research that reported an uptake rate of over 90%. This finding aligns with assessments of HIVST programs conducted in various facility-based and community settings, where self-testing has been widely embraced by patients. The acceptance of HIVST in emergency care settings may be influenced by factors such as the perception of self-testing procedures as being easy and convenient, as well as promoting greater patient autonomy compared to testing provided by healthcare providers, as indicated by the study (Aluisio et al., 2022). Research has been carried out in both the United States and certain regions of Africa on the efficacy of utilizing HIV rapid oral fluid tests for self-testing. Many of these studies have indicated that widespread implementation of saliva testing as an alternative method is indeed feasible at a national level, provided that public awareness regarding the proper utilization of testing kits and their constraints is increased through educational initiatives prior to implementation. A significant number of young individuals who engage in HIVST are open to using rapid oral fluid HIV tests. This indicates that the use of such tests is very feasible among young populations, who also show a preference for HIV home testing due to its convenience. Additionally, most self-testers opt for home testing to maintain their privacy (Marley et al., 2014). Finally HIV self-tests are very accessible and widely accepted, ensuring secrecy, privacy, and effectively eliminating the obstacles associated with facility-based services (Knight et al., 2017).

2.8.2 HIV Self-Testing Among Youth: Risk Behaviors and Perceptions

Younger groups and individuals who engage in hazardous sexual conduct, particularly men, are less inclined to decline HIVST. Employed individuals in their youth are frequently less inclined to utilize conventional testing services compared to unemployed young populations due to conflicting commitments and time limitations. Moreover, individuals engaging in hazardous sexual activities are often at a heightened risk of contracting HIV, making it imperative to target this particular group with HIVST (Shaba et al., 2024). There is no connection between engaging in risky conduct related to HIV, having negative views towards those affected by HIV, feeling confident in one's ability to avoid HIV, being exposed to HIV prevention programs, and getting tested for HIV. One concern is that engaging in high-risk behavior for HIV, such as having more than one sexual partner and not consistently using condoms, does not result in a higher proportion of HIV testing. This means that young people, especially men, are putting themselves at greater risk for HIV and are more inclined to unknowingly transmit the virus to their numerous partners. This can further exacerbate the prevalence of HIV, particularly among individuals aged 15-24 years (Peltzer & Matseke, 2014).

A study investigating the health belief model on HIV risk perceptions after self-testing among youths aged 15-24 in selected East African nations found that youths felt that intentional transmission of HIV may occur due to a lack of disclosure of their HIV status among themselves. The young individuals also believe that their increased vulnerability to HIV is a result of inconsistent condom usage, alcohol misuse, and engaging in intergenerational (transactional) sexual relationships with their peers. It is also reported that young men are involved in risky competitions to establish dominance based on the number of sexual partners they have. On the other hand, young women promote the idea of having several sexual partners as a way of assisting each other.

They engage in discussions about whether to prioritize their sexual desires or be more discerning in their choices, all while aiming to obtain more sexual experience and maturity. These young people have also normalized the risk of obtaining HIV and using ART, and their view of the severity and risk of HIV is low within the same group (Owino et al., 2024).

2.8.3 Enhancing HIV Self-Testing Through Effective Testing Instructions

HIV self-testing program's success can be attributed to the comprehensive guidance provided, including a detailed explanation of the test's performance, aids, video links, frequently posed inquiries, and instructions in the primary recipients' native language. These resources are provided to the primary recipients along with the self-test kit for distribution to their partners (Zishiri et al., 2023). Guidelines for the appropriate utilization and accurate interpretation of test results, as well as information on accessing HIV prevention, care, and treatment services, should be incorporated into HIVST programs. Self-testing Instruction kits should include comprehensive guidelines on post-self-testing procedures (Izizag et al., 2018). The high-risk demographic groups like young people have a limited understanding of quick oral fluid testing, and the precision and sensitiveness of the test are affected by operational errors. Therefore, it is imperative to provide widespread education prior to the adoption of this novel approach. An effective approach for widespread instruction could involve the creation of a user-friendly movie that can be easily disseminated online, thereby enhancing both knowledge and precision of how to use the self-test kit (Marley et al., 2014).

Young people appreciate having several avenues to obtain information about HIV testing, such as detailed instructions on how to perform the test and services for counseling before and after the test. In addition, they would get advantages from the

many methods of teaching how to utilize the self-test kits, such as online video tutorials on the usage of the HIVST kit, as well as culturally-tailored booklets containing visual depictions, cartoons, and concise writings translated into accessible languages(Obiezu-Umeh et al., 2021). Majority of studies done in youthful populations have concluded that the instructions for the HIVST kit are generally perceived as clear and simple to follow. However, there are some instances where the specific type of test and the language used in the instructions poses difficulties in comprehending the test kit instructions. Regions characterized by greater stigmatization towards HIV have a worse level of comprehension about the package instructions for HIVST resulting in a higher frequency of errors (Stevens et al., 2018). Studies have observed the proficiency of HIVST users in using self-test kits and interpreting results. These studies have revealed that approximately half of the users find the instructions to be overly complex, leading to most errors during the self-testing process. Some users' express reluctance to watch or read the introductory self-testing booklet that accompanies the self-test kit, citing its complexity and use of language full of medical jargon that they do not comprehend. The inaccuracies have a negative effect on both the sensitivity and accuracy of the test kit. These inaccuracies can be eradicated by conducting instructional seminars and providing media education on the reliability and precision of the self-test kits. Additionally, simplifying the operational steps for using the self-test kits and interpreting the results can also help eliminate errors. Additionally, instructional videos that guide testers through the various stages of testing could prove to be beneficial (Marley et al., 2014). Oral fluid-based HIV rapid diagnostic tests demonstrate a notable degree of accuracy for self-testing, particularly when supplemented with a demonstration phase and clear instructions accompanied by visual aids. A study done in South Africa revealed that a finger stick HIVST coupled with tailored instructions,

achieved a substantial level of accuracy in individuals residing in both rural and urban areas of KwaZulu-Natal with limited educational backgrounds. Within this study, 99% of participants obtained a valid outcome, with a sensitivity rate of 97.4% (95% confidence interval: 86.47% - 99.57%) (Wong et al., 2017).

When designing HIVST programs for young people, it is important for implementers to carefully consider the packaging and instructions of the HIVST kits. These should be tailored to meet the specific needs of the youth, considering their local level of education and context. It is emphasized that the packaging of testing kits should be accessible to people from various backgrounds in language and appealing to young individuals. This can be achieved using multilingual instructions, visually appealing graphic designs, vibrant colors, and minimal writing. Ensuring that participants can easily comprehend the testing instructions is crucial for boosting their confidence during the testing process. Failure to comprehend the instructions may result in inaccuracies when interpreting the test outcomes (Mukora-Mutseyekwa et al., 2022).

2.8.4 User Confidence and Ease of HIV Self-Testing: Key Factors and Benefits

HIV self-testing, whether supervised or unsupervised, is often considered straightforward by many participants. The capacity of individuals to self-administer tests is partially contingent upon their literacy levels and prior experience with HIV testing but can be enhanced with a demonstration of proper usage and explicit instructions. Many individuals who perform self-tests find that using instructions for use with visual aids, such as informative photographs, together with flip charts and demonstrations by healthcare experts, simplifies the self-testing procedure (Bwalya et al., 2020). HIV self-testers consistently indicate a high level of implied ease of use when using HIVST prototypes. They largely express favorable views, including

feeling confident and finding it easy to use. According to literature, mouth swab tests are considered more favorable than finger prick testing. Nevertheless, research has demonstrated that despite some individuals experiencing pain and encountering challenges, the general consensus is that HIV self-testing (whether through oral swabs or finger-pricks) is often regarded as user-friendly(Knight et al., 2017).

Despite the presentation of HIVST, certain users still lack clarity on the proper usage of the kit. They find it beneficial to seek assistance from other individuals who have already used the self-test kits, since they may provide guidance throughout the procedure. HIV self-testing initiatives should aim to increase possibilities for aiding and guidance to guarantee accurate and appropriate utilization of HIVST, hence ensuring the most effective testing outcomes. Research indicates that possibilities for assistance do not always have to come just from healthcare workers. Other young individuals who have witnessed HIVST demonstrations may be capable and eager to offer support (Mphande et al., 2021). A significant proportion of young people lack knowledge about HIVST, particularly the oral-based self-testing kit, which has a detrimental impact on the rate at which they adopt this method. However, the use of HIVST kits is prevalent among young people due to its ability to decrease the prejudice and shame typically associated with healthcare testing. Both access and timeliness are equally important criteria when electing to use the HIVST kit instead of facility-based testing. Young people particularly value the convenience of being able to take the HIV test at home, which saves time and avoids long waiting periods (Mwangi et al., 2022; Obiezu-Umeh et al., 2021).

The ethical use of HIVST involves providing individuals with expanded options, autonomy, choice, and empowerment, while also yielding public health benefits. Additionally, it involves offering individuals valuable and precise information about

their health, enabling them to take action such as seeking healthcare, informing partners, adhering to medications, and adjusting behaviors. Furthermore, the ethical use of HIVST necessitates a safe environment that protects the rights and freedoms of individuals. Ultimately, the ethical implementation of HIVST should result in benefits that outweigh any potential risks (Gagnon et al., 2018). Most individuals who perform self-testing choose the unaided approach for HIVST. This indicates that those who use HIVST value the convenience, independence, and privacy that this self-screening test offers, similar to home pregnancy tests and blood glucose monitoring tests (Pasipamire et al., 2020).

According to most studies, participants find oral HIVST to be either very easy or not difficult at all. This is consistent with their perception of blood-based HIVST. Additionally, most participants feel confident in their ability to accurately read and interpret their self-test results, indicating a high level of self-assurance in performing HIVST. Multiple studies conducted on young populations evaluated the efficacy of the HIVST method by comparing oral and blood-based tests. The findings indicate that a significant number of participants who used both oral and blood tests felt confident in their ability to correctly perform the test and collect the oral sample. Additionally, the performance of the blood-based HIVST, including the finger prick and sample transfer, was also deemed satisfactory (Stevens et al., 2018).

2.8.5 Perceived Impact and Benefits of HIV Self-Testing

HIVST is emerging as a novel component of several risk mitigation techniques. Currently, it is uncertain if this approach enhances or diminishes the risk of HIV transmission. Engaging in unprotected sex after receiving a false negative HIV test result, or having intercourse with a long-term partner, could potentially raise the

chance of acquiring HIV, unless unprotected sex would have happened regardless of the HIV self-test result. In the latter scenario, HIVST would serve as an effective strategy for reducing the risk of HIV transmission by preventing sexual encounters with individuals who are at risk of passing the virus (Ky-Zerbo et al., 2023). The main justification for the utilization of HIVST lies in its ability to increase testing rates by appealing to individuals who may favor self-testing over seeking testing services at a healthcare facility. This approach has the potential to improve the timeliness of HIV diagnosis, leading to numerous positive outcomes. The popularity of self-testing can be attributed to the anonymity it provides and the convenience of conducting the test in the privacy of one's own residence (Wong et al., 2017). Students' willingness to go through HIV testing is influenced by their impressions of the societal and psychological obstacles associated with testing for HIV, as well as their attitudes towards the potential positive and negative consequences of HIV testing (Ayodele, 2017).

Several studies have noted that HIVST provides numerous advantages, such as improved confidentiality and privacy, reduced burden on healthcare facilities, decreased instances of mandatory testing by medical personnel, and decreased stigma and discrimination related to HIV testing. The autonomy to choose a preferred method of HIV testing is also seen as a positive aspect (Harichund & Moshabela, 2018). Self-testers for HIV commonly cite ease, convenience, and privacy as the primary advantages of self-testing. Conversely, concerns have frequently been raised regarding the adequacy of pre- and post-test counseling, the accuracy of the results, and the financial implications of these tests (Stevens et al., 2018).

2.8.6 Preferences and Perceptions of Oral vs. Blood-Based HIV Self-Testing

Most HIV self-testers choose oral administration of HIVST over the blood-based HIV test due to their concern of pain and discomfort caused by the needle prick. On the other hand, some individuals opt to undergo testing in the clinic due to their belief that the blood-based HIV test provides more precise outcomes. A small proportion of young people are concerned about the HIVST kit's limited use and the potential for errors or unintended consequences during interpretation. Participants in a research study conducted in Botswana demonstrated a readiness to utilize HIV self-tests, particularly those involving blood samples, due to a perception of increased reliability associated with these tests. (Muwanguzi et al., 2021; Obiezu-Umeh et al., 2021). Other studies have shown that the HIVST blood-based test kit is the preferred choice over the oral HIVST kit. This contradicts the findings of other studies, which have found that self-test users strongly prefer the oral-based HIVST kits. These findings are consistent with other studies that also found a greater preference for oral-based tests compared to blood-based tests among both male and female users. The differing tastes for oral and blood-based HIVST in varied African settings highlight the necessity of offering a selection between oral and blood-based assays when providing HIVST kits (Sithole et al., 2021).

The requirement for a confirmatory HIV test in conjunction with HIVST decreases confidence in the accuracy of HIVST outcomes. This has led to skepticism among certain individuals regarding the effectiveness of HIVST in detecting HIV, particularly when saliva is used as the testing medium instead of a blood sample. Consequently, some individuals express reservations about the reliability of HIVST and opt for traditional clinic-based HIV testing, raising doubts about the accuracy of HIVST outcomes (Hlongwa et al., 2020). Contributing factors to a significant error rate in

HIVST include the utilization of a blood-based kit unsuitable for HIVST and inadequate comprehension or disregard of the instruction booklet, particularly among participants whose primary language was not English. The primary errors seen in HIVST include inadequate preparation of the test kit, improper swabbing or blood sampling techniques, and accidental spillage of the buffer solution (Stevens et al., 2018). Finally, the utilization of rapid oral fluid testing as a means of testing or screening for HIV antibodies has been shown to be both safe and highly effective, making it a viable option in numerous countries. Research suggests that individuals from high-risk populations often choose HIV testing methods based on the accuracy of the results, the need for privacy, and the cost of testing. The test results obtained from oral-saliva based tests kit are in agreement with the results obtained from the blood HIV self-test kits, and they are equally reliable and precise as other testing methods such as facility antibody HIV blood tests (Marley et al., 2014).

2.8.7 Youth Experiences and Perceptions of HIV Self-Testing

A vast majority of young individuals who have undergone previous HIV testing perceive their past testing experiences and the perceptions of healthcare professionals as significant obstacles, in comparison to hospital-based HIV testing which results in them preferring to utilize the oral HIVST kit. For some individuals, the lack of compassion between the person doing the test and the person who is being tested, as well as concerns about potential manipulation of test results at healthcare institutions due to a lack of trust and a strong provider-patient relationship, are important factors that influence their decisions regarding HIV testing (Obiezu-Umeh et al., 2021).

HIV self-test users from studies done in Kenya, Malawi, USA, Spain, and Singapore

express the belief that utilizing a saliva-based HIV test empowers people to have greater agency over their health. They find the self-test to be a simple procedure and would confidently endorse self-testing to their loved ones (Bustamante et al., 2017). Most HIV self-testers in a different survey indicated their willingness to acquire an HIVST kit directly from a store and expressed their intention to advocate the self-testing technique to their friends (Stevens et al., 2018). Initial self-testers often encounter difficulties in tasks like as swabbing, opening the testing kit, and interpreting the results, whereas individuals who have previously tested have fewer difficulty in the testing procedure (Bwalya et al., 2020).

2.8.8 Effective Care and Support Following HIV Self-Testing Among Youth

To attain the UNAIDS 95-95-95 goals, it is crucial that individuals who test positive through HIVST seek medical care. There is limited information indicating that the rates of connecting individuals to healthcare services among those who use HIV self-testing are comparable to those who undergo regular onsite testing. Insufficient research has been conducted on methods to connect individuals who test negative for HIV on their own to suitable preventive treatments, such as counseling for risk reduction and PrEP. Although risk reduction counseling is typically provided during pre- and post-test counseling in conventional HIV testing programs, it may be more challenging to ensure the transmission of this knowledge when individuals self-test (Kelvin & Akasreku, 2020). Conducting HIV testing and identifying PLHIV is an essential initial stage in the care cascade, albeit it is merely the beginning. To guarantee that HIVST programs have a significant influence on achieving global targets, it is crucial to provide confirmatory follow-up HIV testing and, if necessary, facilitate the connection to healthcare services. The research on HIVST has shown

promising results in terms of successfully connecting individuals to healthcare services and starting antiretroviral therapy afterwards (Aluisio et al., 2022).

The primary issue associated with self-testing for HIV is ensuring that individuals who receive a positive result follow up with confirmatory testing at a clinic and initiate appropriate care. Should individuals who test positive with self-tests fail to confirm their results and receive proper care and treatment, the overall public health impact of HIVST may be restricted, particularly within high-risk populations (Bustamante et al., 2017). Most young individuals prefer post-test counseling from a health practitioner who is younger in age, as well as an easily accessible toll-free hotline number for any further inquiries and linkages to the local health facility for appropriate care and assistance. Reasons for pursuing a definitive HIV test after receiving a positive HIV self-test result may include receiving support and motivation from friends, relatives, or healthcare providers; experiencing disbelief or skepticism about the initial screening result; feeling dissatisfied with the outcome; and recognizing the potential for extended life expectancy with proper treatment and care (Obiezu-Umeh et al., 2021).

An additional constraint associated with HIVST is the challenge of connecting users to essential resources such as counseling, confirmatory testing, and treatment for those who receive a positive HIV diagnosis. Research indicates that many individuals utilizing HIV self-testing recognize the importance of counseling, even in cases of a positive test result. While successful linkage to care is feasible for self-testers who receive a positive HIV result, further studies are needed to explore the effectiveness of connecting individuals to care post-HIV self-testing, including the provision of counseling, in a non-clinical environment (Stevens et al., 2018). Support services are often and traditionally offered to individuals living with HIV. Within the counseling

and testing sector, it is important to recognize that counselors possess differing levels of education and exhibit varying attitudes toward their clients. Additionally, counselors' perspectives on counseling both pre- and post-testing are of great significance and can greatly influence the final result (Izizag et al., 2018).

2.8.9 Expanding HIV Self-Testing Availability among Youth

The World Health Organization suggests that self-tests should be distributed by educated lay cadres, such as community health workers, peer educators, or traditional healers. Supplementary conventional HTS and HIVST approaches ought to be employed to target marginalized populations beyond regular testing facilities (Pasipamire et al., 2020). The association between HIVST and the general public health is problematic due to its separation from the conventional health care system, which challenges the traditional relationship between testing and public health activities, such as surveillance, reporting, and partner notification (Gagnon et al., 2018). HIV policymakers, scholars, and health care professionals recognize that the availability of HIVST can significantly increase the adoption of HIV testing. This can facilitate re-testing, identify persons who test positive for the first time, and lead to earlier diagnosis, thereby connecting people to treatment and care (van Rooyen et al., 2015). Various potential methods exist for disseminating HIV self-testing, including distribution through healthcare facilities, workplaces or educational institutions, retail outlets like pharmacies or vending machines, community-based distribution through in-person methods or mail, as well as secondary distribution through peers, partners, or other social networks. The most suitable distribution approach may differ depending on the specific target population (Kelvin & Akasreku, 2020).

Studies have shown that the use of HIVST conducted by lay counsellors in people's

homes is well-received, even among persons who are typically more difficult to reach, such as young people, spouses, men, and other important population groups. Furthermore, research has demonstrated that the secondary dissemination of HIVST kits through partners can complement the traditional method of door-to-door distribution by effectively reaching males who are frequently on the move or have hectic schedules (Bwalya et al., 2020). Data indicates a notable disparity in HIV testing uptake rates between pharmacy clients seeking HIV testing (84%) and those seeking other services (11%), implying that implementing a client-initiated approach may be more practicable than a pharmacy-initiated testing model. These results suggest a potentially high demand for pharmacy-based HIVST in Kenya, as it is already informally available. Formal implementation of pharmacy HIVST services is essential to ensure quality control through the dissemination of tests intended for unassisted self-testing and the implementation of training and monitoring protocols (Mugo et al., 2017). The most reported locations for acquiring HIVST kits include private licensed drug stores, youth-appropriate facilities, supermarkets, and online platforms. Typically, young individuals tend to perceive public and government-owned establishments as having less dependable HIV test outcomes and lower standards, whereas private medical centers are associated with more precise HIV test results and superior environments (Obiezu-Umeh et al., 2021).

HIVST users, particularly those who test at home, find ART dispensing attractive. Establishing home-based distribution centers is an advantageous approach to facilitate the start of HIVST among its consumers. Providing ART in the community for initial or subsequent refills might facilitate the transition of HIV testers into care, offering a route to receiving care at healthcare facilities (Hubbard et al., 2022). Primary self-testers also effectively distribute HIV tests to their spouses, peers, and other families.

This study validates the practicality of distributing HIVST across critical populations to enhance access to HIV testing for their partners, peers, and other family members. Their primary objective is to safeguard both themselves and others from contracting HIV (Ky-Zerbo et al., 2023). The younger demographic could get advantages from the option of acquiring HIV self-testing kits for personal use, allowing them to perform the test at their convenience, without the distraction of any pressing acute disease (Shaba et al., 2024).

Facility based-HIVST has the capacity to decrease the expenses and workload associated with testing, hence resulting in a decrease in the financial and personnel needs to identify persons who are HIV-positive. The possible cost reductions are linked to a decrease in personnel time and consumables needed (Nichols et al., 2020). Young individuals who have the opportunity to utilize resources or get assistance through outreach programs can serve as conduits for connecting with their partners, friends, and other family members. Several nations are presently working on establishing availability of HIVST in private drug stores for the wider public. Once accessible, widespread community-based communication on HIVST in the broader public could be significant, as it would also be advantageous to critical population members, including young individuals (Ky-Zerbo et al., 2023).

2.8.10 Privacy and Confidentiality Benefits of HIV Self-Testing

The privacy and anonymity of HIVST are highly valued, since it allows individuals to avoid waiting hours and potential exposure at health facilities. Additionally, HIVST offers the convenience of being able to fit testing into one's daily schedule and mobility (Bwalya et al., 2020). Other benefits of HIVST encompass heightened confidentiality and privacy, alleviated burden on healthcare infrastructure, minimized instances of

compulsory testing by healthcare personnel, and a reduction in the stigma and discrimination related to HIV testing (Harichund & Moshabela, 2018). HIVST in sub-Saharan Africa have reported that it is highly acceptable as it overcomes significant barriers to clinic based HTS, such as privacy and confidentiality (Bwalya et al., 2020). HIV self-testing has the potential to enhance the privacy of HIV test results, as opposed to conventional HIV testing approaches such as mobile counseling and testing, provider-initiated counseling and testing, and voluntary counseling and testing (Makusha et al., 2015).

HIV self-testing advancements present a significant chance to diminish the negative perception and worries about privacy among marginalized communities. Global research indicates that HIVST provides users with confidentiality, resulting in a testing experience that is devoid of fear and stigma. Conducted reviews have indicated that HIVST may enhance the acceptance of HIV testing among men who have sex with men. The reviews encompassed a range of study formats, from observational studies to randomized controlled trials (Vashisht et al., 2022). Self-testing provides a viable option for persons seeking privacy and anonymity to determine their serostatus. It is also beneficial for under-resourced healthcare systems and contexts where stigma and discrimination may be prevalent. The technology has the potential to encourage more individuals to perform self-screening and actively seek medical care and preventive measures. However, its effectiveness in maximizing these connections has not been shown yet. Nevertheless, if properly tailored, self-testing has the potential to facilitate and incentivize individuals who initially confirmed affirmative for HIV to actively seek out healthcare and counseling services (Pant Pai et al., 2013). The research participants indicated that HIV self-testing afforded them a feeling of confidentiality while undergoing testing and preserved the confidentiality of their test results, particularly

from their employers and peers. Further studies have shown that a considerable number of individuals prefer HIV self-testing due to its ability to offer increased privacy and confidentiality. Potential advantages of HIVST include enhanced privacy of test results, as well as a sense of personal control and empowerment in the decision-making process to undergo testing (Mekonnen et al., 2024; Muwanguzi et al., 2021).

2.8.11 Empowerment and Autonomy in HIV Self-Testing

The sense of empowerment that comes with self-testing has the potential to enhance patient autonomy in seeking care and adhering to treatment. However, it is important to consider that this could also result in delayed involvement in HIV care. Further research should be conducted to investigate this phenomenon among prospective cohorts of HIV self-testing users (Pasipamire et al., 2020). Some of the cited justifications for endorsing self-testing includes the anonymity it affords and the convenience of conducting the test quickly and easily at home. Through self-testing, individuals are able to augment their autonomy by broadening their choices and taking ownership of their HIV testing procedures (Youngs & Hooper, 2015). Research that has been carried out to evaluate the effects of HIV self-testing compared to traditional HIV testing services demonstrates a prevalent sense of satisfaction with HIVST and a willingness to recommend it to others. Additionally data from these studies indicated that a significant portion of users' view HIVST as a means of empowerment (C. C. Johnson et al., 2017).

The ability to choose an individual's own HIV testing technique and individual's enablement to be responsible for ones 'own life, as well sexual health, are viewed by HIV specialists, HIV care providers, policymakers, and HIVST users to be facilitators to the increased acceptance of HIVST. It is thought that self-empowerment and sense

of autonomy might lead to a person taking a more active part in their general health and making decisions concerning HIV testing (Makusha et al., 2015). HIV self-testing users appreciate the autonomy they have in deciding if they wish to reveal their HIVST results to healthcare workers. The inclination to withhold information primarily arises from a perceived lack of confidence in healthcare workers' capacity to uphold confidentiality, while certain individuals simply want to avoid the stress associated with relying on others to comprehend their test results (Mphande et al., 2021).

2.8.12 Perceived Convenience of HIV Self-Testing

HIVST serves to reduce the imbalance of power between healthcare providers and patients, thereby enabling patients to take more control of their healthcare decisions. In the future, patients may opt to bring the results of their self-administered HIV test to their doctor instead of waiting for the doctor to deliver the results in person. The reliability of HIV self-test results surpasses that of those obtained by conventional HIV testing services at healthcare facilities (Muwanguzi et al., 2021; Youngs & Hooper, 2015). One perceived advantage of self-testing in a private setting or at home is its potential to encourage self-testing. HIVST is believed to make testing services more accessible to consumers, minimize waiting times at health facilities, reduce travel expenses, and free up time for other income-generating activities. These benefits can collectively enhance the uptake of HIV testing (Jennings et al., 2017). While most individuals who use self-testing for HIV report that it has enhanced their relationships with family members, there are some negative social consequences associated with this practice. These include invasion of privacy, deception, coerced testing, threats or acts of violence, emotional distress, and separation of couples. However, other studies that have examined the evidence on social harms related to HIV self-testing have found that

such cases are rare. Providing test kits in quiet places helps to create a sense of comfort for self-testers, enabling them to test themselves or embrace the kit for future usage. Research conducted on public health based HIV testing services have shown that the privacy and secrecy provided by this method of distribution has a favorable impact on its acceptability (Bwalya et al., 2020).

2.8.13 Couples' HIV Self-Testing and Serostatus Disclosure

Partner-delivered self-testing for HIV is usually well-received, with a large percentage of partners seeking medical care. HIV index testing yields a significant number of individuals infected with HIV. Improving the rates of effective follow-up can yield more definitive evidence regarding the utilization of kits. Providing HIVST kits to individuals with HIV for them to give to their partners has the capacity to detect individuals with HIV who are ignorant of their HIV status (Zishiri et al., 2023). In instances where female participants in relationships fail to regularly communicate their health issues to their male partners, particularly in their absence, the delivery of HIVST kits is postponed. When partners in a relationship engage in productive dialogue regarding health issues and exhibit a high level of relationship satisfaction, it has been observed that around 50% of women in such partnerships report timely delivery of health kits to their partners within one or two days of receiving them from healthcare facilities (Matovu et al., 2018). HIV policymakers believe that HIVST will enable couples to discuss their intentions before testing themselves. This face-to-face communication could facilitate easier disclosure of HIV status and potentially reduce gender-based violence related to positive HIV results (van Rooyen et al., 2015).

HIV self-testing has facilitated joint testing for couples, leading to enhanced relationships and the establishment of supportive conditions for disclosure. This

reinforces the acceptability of distributing HIVST kits to others and can enhance the adoption of self-testing among couples. It also highlights the importance of considering gender and social dynamics within households when providing test kits to women for supplementary distribution, in order to prevent any potential social harm (Bwalya et al., 2020). There is a notable eagerness among HIV self-test users to ensure access to care for partners who test positive following an HIV self-test (Stevens et al., 2018). Findings from studies on HIVST preferences suggest that most male partners show little apprehension in receiving self-testing kits from their female partners. Nonetheless, a minority of male partners' express concerns regarding potential vulnerabilities associated with obtaining the kit from their wives. In cases where individuals decline HIV testing, it is likely that their female partners might perceive their refusal as indicating a possible HIV infection or promiscuous behavior. Nonetheless most studies surrounding HIVST indicate that self-testing facilitated by females is positively received and holds promise for improving HIV testing among male partners and couples (Matovu et al., 2018).

2.9 Comparing Barriers and Facilitators to uptake of HIVST

2.9.1 Factors Influencing HIV Self-Testing Utilization: Insights from Multivariable Logistic Regression Studies

Prior research has utilized multivariable logistic regression models to identify the characteristics linked to HIVST among young individuals. A specific instance is a cross-sectional study carried out in Cambodia during the period of June to September 2017. The study focused on individuals aged 18 and above and was conducted at 21 research locations in 12 regions with a significant prevalence of HIV and drug abuse. Binary logistic regression models were employed to determine the components linked

to HIVST. Variables having a p-value of less than 0.05 were then selected for the construction of the model. A backward stepwise selection strategy was employed to eliminate variables that were deemed inconsequential, while also reintroducing the known confounding variables. The findings indicated that variables such as gender, prior participation in rehabilitation programs, utilization of HIV services during the last six months, recent education on HIV, and perception of increased risk of HIV were strongly correlated with HIVST. However, the data analysis did not consider the clustering effect in the provinces and research locations. This may have influenced the results in a partial or unfair manner (Eng et al., 2021). A study utilized data from the National South Africa Demographic and Health Survey conducted in 2016 to examine the factors that influence the utilization of HIVST. The data exhibited a 2-level and hierarchical structure, where individuals were organized inside households, and households were further organized within communities. Random effects for household and community variables were included in the analysis to account for clustering within these units. Initially, they applied a null model without any predictor variables to demonstrate the extent to which the clustering affects the fluctuation of the result variable. Subsequently, distinct multivariable models were constructed, incorporating predictor factors related to individuals, households, and communities. A final model was fitted, including covariates at all levels, to evaluate their importance in predicting the usage of HIVST. The Intra-Class Correlation coefficient (ICC) of the 5 fitted models exceeded 5%, suggesting that there was a significant clustering of the result inside the units. The study revealed that factors such as age, level of education, marital status, media exposure, gender, and participation in sexual activity had an impact on the utilization of HIVST (Awopegba et al., 2021).

2.10 Summary of Identified Gaps in HIV Self-Testing Among Young People

The following gaps were identified from literature review on use of HIV self-testing kits among diverse populations:

1. Knowledge and understanding of HIVST: there are limited awareness and understanding of HIVST among young individuals, especially regarding the oral-based self-testing kits, which affects their adoption rates. There is also insufficient educational initiatives targeting the effective use of HIVST kits and interpretation of results, particularly among individuals with low literacy levels.

2. Access and distribution of HIVST kits: the availability of HIVST kits in various settings (e.g., pharmacies, supermarkets, online platforms) is inconsistent, leading to unequal access among different demographic groups. There is need for more innovative distribution strategies to ensure that marginalized and high-risk populations, including youths, have better access to HIVST kits.

3. Cost and economic barriers: the cost of HIVST kits is a significant barrier, particularly for young people and low-income individuals. There is a need for subsidized or free kits to increase uptake. Furthermore, financial incentives or complimentary self-testing kits for high-risk individuals are recommended but not widely implemented.

4. Linkage to care and support services: there is limited information on effective strategies to connect individuals who self-test negative to preventive treatments and counseling services. There is also insufficient follow-up care and confirmatory testing after a positive HIVST result, leading to potential public health impacts if individuals do not seek proper medical care.

5. Psychosocial barriers and stigma: persistent stigma and discrimination associated with HIV testing affects the willingness of individuals to engage in self-testing. There is also potential psychological distress and lack of post-test counseling support for individuals receiving positive HIVST results, which could lead to negative mental health outcomes.

6. Quality assurance and reliability: concerns about the accuracy and reliability of HIVST results, particularly during the window period when antibodies may not yet be detectable may affect the uptake of HIVST as well as variability in user proficiency and comprehension of HIVST instructions which can lead to potential errors in self-testing and result interpretation.

7. Behavioral impact and risk compensation: there is unclear impact of HIVST on risky sexual behaviors, with some studies indicating potential risk compensation behaviors post-negative HIVST results.

8. Cultural and gender dynamics: cultural norms and gender dynamics influences the adoption and use of HIVST, with some studies indicating differences in acceptance and use between men and women. There is also potential for gender-based violence and coercion in the context of partner-delivered HIVST.

9. Preferences and perceptions of test types: there is mixed preferences for oral versus blood-based HIVST kits, with some individuals favoring one type over the other due to perceived accuracy, convenience, or discomfort with blood-based testing.

10. Impact of educational interventions: there is limited evidence on the effectiveness of different educational interventions and instructional materials (e.g., videos, brochures) in improving the use and accuracy of HIVST among young individuals.

CHAPTER THREE: MATERIALS AND METHODS

3.1 Research Design

This research was a cross-sectional analytical study design. The design facilitated data collection on all defined variables from a large and geographically dispersed sample of students at Kenyatta University's main campus. The data for the study was obtained from degree, diploma, and certificate students.

3.2 Variables

The dependent variable was uptake of HIVST. The independent variables were grouped into; socio-demographic factors (age, sex, marital status, religion, residence) individual factors (knowledge about HIV, sexual behavior factors, stigma, media exposure, affordability of self-test kits) and institutional factors (accessibility to healthcare facilities, availability of HIVST). Intervening variables that were mediating the relationship between the above mentioned independent and dependent variables were: health literacy, perceived risk of HIV, mental health status, trust in healthcare providers, cultural beliefs and norms, peer influence, attitude towards HIVST, quality of HIVST counseling and support, policy and regulatory environment, integration of HIVST into existing health services

3.3 Location of Study

The study was conducted at the Kenyatta University main campus, which is 23 kilometers North of Nairobi, the capital city of Kenya. It is off Thika Superhighway. It has other three campuses within Nairobi which are City-Centre, Ruiru and Parklands campuses. It also has satellite campuses located in Kitui, Migori, Dadaab, Nakuru, Mombasa, Nyeri, Kericho, Embu.

3.4 Study Population

Undergraduate students at Kenyatta university main campus were the population of study. Kenyatta University was chosen because it is a public university that draws students from all over the country hence a representation of university students. The university has a student population of approximately just over 50000 undergraduate students. There are seventeen schools (Faculties) at Kenyatta University offering different programs at both undergraduate and postgraduate (master's and doctoral) levels. These include School of Public Health, School of Humanities & Social Sciences School of Medicine, School of Security, School of Nursing Sciences, School of Environmental Sciences, School of Pure & Applied Sciences, School of Education, School of Applied Human Sciences, School of Engineering and Technology, School of Architecture and Built Environment, School of Business, School of Economics, School of Agriculture & Enterprise Development, School of Visual & Performing Arts, School of Hospitality and Tourism, School of Virtual and Open Learning, School of Creative, Film and Media Studies, Diplomacy and Peace Studies (Likoye, 2014).

3.5 Sampling Techniques and Sample Size

3.5.1 Sampling Techniques

Multi-stage cluster sampling method was used. The design involved two-stage cluster sampling. The clusters were the various faculties or schools. Simple random sampling was used to pick random clusters (schools). Clusters randomly picked were used to randomly pick individuals from them using SRS. These methods were used because undergraduate students come from the eighteen faculties of Kenyatta University. The faculties and students are many and diversely spread, justifying its use.

3.5.1.1 Sample Size

Fischer's formula et al. (1998) is the formula that was used to calculate the number of undergraduate students to form the sample size that took part in the study.

$$n=Z^2 P(1-P)/I^2$$

Where: n= Sample size [where population> 10,000] (N = 52552)

Z= Normal deviation at the desired confidence interval. In this case, it will be taken at 95 %, Z critical value at 95 % is 1.96

P= Proportion of the population with the desired characteristic is 55 % (55 % of youth living with HIV in 2017 according to Kenya HIV Estimates,2018) (National AIDS Control Council, 2018)

I^2= Degree of precision; will be taken to be 5 %.

Therefore:

$$n=Z^2 P(1-P)/I^2$$

$$n=1.96^2\times 0.55\times [1 - 0.55] / [0.05]^2= 380.3184\approx 381$$

$$n_1 = 381$$

Adjusting for the size of population since the targeted population at Kenyatta University is > 10000

$$n_2 = n_1 \times [N/ (N + n_1)]$$

$$n_2 = 381 \times [52552 / (52552 + 381)] = 378.2576$$

$$n_2 = 378.2576$$

Adjusting for the response rate to determine the final sample size, the estimated response rate, r, is 95 %.

$$n = n_2 / r$$

$$n = 379 / 0.95$$

$$n = 398.1659$$

$n \approx \mathbf{398}$

3.5.2 Eligibility of Study Participants

Inclusion Criteria:

1. Undergraduate student of Kenyatta University Main campus.
2. Students aged between 18-25 years (Youth, 2014)

Exclusion Criteria:

1. Students already HIV positive and on HAART treatment as they have already been diagnosed as having HIV, counselled, and linked to care and treatment.
2. Students doing end-of-semester/year exams as it will go against the ethical requirement for not interfering with the participants' academic schedules/program by participating in the study.

3.5.3 Sample Size Distribution Across Schools

To address the unequal distribution of undergraduate students across schools, a sampling technique called proportional sampling was employed. This method ensured that the sample size determined was proportional to the size of each school's population. Subsequently, the sample size for each individual school was evenly dispersed across the specific schools, as indicated in Table 3.1.

Table 3.1 Sample Size Distribution Across Schools

School	**Number of students *(a)***	**Proportion (*b*)** $(a)/52552=(b)$	**Sample size allocation per school *(c)*** **(*b*) × 398 = (*c*)**
Agricultural and Environmental Sciences	1717	0.03266331658	13
Business, Economics and Tourism	15449	0.29396984925	117
Education	16109	0.30653266332	122
Engineering and Architecture	1584	0.03015075377	12
Health Sciences	4885	0.09296482412	37
Law, Arts and Social Sciences	8583	0.16331658291	65
Pure and Applied Sciences	4225	0.08040201005	32
Sum	**52552**	**1**	**398**

3.6 Data Collection Instruments

Data was collected using questionnaires. The questionnaires were self-administered using both open and closed-ended questions.

3.7 Pilot Study

The pilot study was conducted on undergraduate students at Kenyatta University Parklands campus, which hosts the School of Law.

3.8 Validity of the Study

Validity which is defined as meaningfulness and accuracy of inferences based on the study findings defines the strength of study inferences, propositions, conclusions, or the extent to which results gotten from the analysis of data does represent the phenomenon of understanding (Oso & Onen, 2005)

Validity assesses if an instrument measures what it is required to measure. To ensure the study's internal validity, we carefully examined the variables, ensuring that acceptable indicators were linked to each variable and that the required data was obtained using the appropriate research instrument. For external validity, we selected

samples which were appropriate and representative for the study, which provided a guarantee for the generalization of the results to the population.

3.9 Study Reliability

Reliability measures the extent to which an instrument of research produces consistent results or produces data the same way for every time it is applied under similar conditions with similar subjects (Mugenda & Mugenda, 1999)

The reliability of this study was ensured through triangulation, in which obtained data was checked using various research instruments. This ensured the study results were a true reflection of the situation studied. The researcher did a pilot study to test the research instruments and trained his research assistants so that they recorded responses from respondents accurately.

3.10 Data Collection Techniques

Quantitative data was collected using a self-administered questionnaire. Questionnaires collected specific information from the students. They collected quantitative data on individual, demographic, and institutional factors.

Questionnaires were convenient as they saved time for the researcher and respondents. The researcher also gave ample time to the respondents to fill the questionnaire when they were free which helped minimize errors. To ensure questionnaires were returned the researcher and research assistant made close follow-up of the respondents.

3.11 Data Analysis

To ensure accurate data entry responses from the questionnaires were coded by assigning numerical codes to categorical variables (e.g., gender, school, religion) and entered into a database using R Studio version 4.2. The data was cleaned by removing incomplete or duplicate responses identifying and managing values that are outliers verifying data entry accuracy, identifying and correcting any errors, missing values, or

any other inconsistencies. Descriptive statistics were used to summarize the demographic characteristics of the respondents. Frequency distributions and percentages were calculated for categorical variables (e.g. age, gender, religion, and school). Descriptive analysis (using frequency distributions and percentages) was also used to summarize the identified HIVST barriers/facilitators and HIVST uptake (yes/no). Continuous variables were analyzed through means, standard deviations, and ranges for relevant continuous variables (e.g., age of participants).

Bivariate Analysis was used to show association between barriers and facilitators (independent variables) and the uptake of HIVST (dependent variable), bivariate analysis was conducted using odds ratios. Chi-square tests were used to assess the association between categorical variables (e.g., gender and HIVST uptake, school and HIVST uptake). Odds ratios and their 95% confidence intervals were calculated to measure the strength of these associations.

Multivariate analysis through logistic regression was used to control for potential confounding variables and to determine the independent effect of each barrier and facilitator on the uptake of HIVST. Multivariate logistic regression analysis was performed to identify independent predictors of HIVST uptake (dependent variable) while controlling for potential confounders while including relevant demographic factors, barriers, and facilitators as the independent variables. Adjusted odds ratios (at 95% confidence interval) to estimate the independent effect of each predictor variable. After adjustment for those variables with $p < 0.2$ in the bivariate analysis, the association between barriers/facilitators related to uptake of HIVST and the dependent variable were then assessed by adjusted odds ratio. Each adjusted odds ratio was obtained by fitting a single logistic regression model, which involved one of the perceptions and the significant background variables. Subgroup and stratified analysis

were also done to explore potential differences in HIVST uptake and associated factors across different subgroups (e.g., by gender, age, school).

Results from the above descriptive, bivariate, and multivariate analyses were presented in tables and figures.

3.12 Logistical and Ethical Considerations

Ethical approval was sought and granted from KUERC (reference PKU/2598/11723). Permission to do research was obtained from NACOSTI (reference NACOSTI/P/22/21909). Consent was sought from the Kenyatta University administration to do the study on its students and granted (reference KU/DVCR/RCR/VOL.3/352). Prospective participants were made aware about the study after explaining the study benefits and the study risks. They were also informed their participation in the study was voluntary after which the researcher obtained informed consent from them. Confidentiality and privacy of the participants was observed at all the stages of the study by assigning respondents unique numbers. Study participants were informed that they were free to pull out of the study at any stage. In addition, the participants were informed and reassured the study will not affect their academic program in addition to not harming them during the study period.

CHAPTER FOUR: RESULTS

4.1 Introduction

A total of 450 questionnaires were distributed, of which 406 were duly completed and free of error. The response rate was 100%. Eight questionnaires from the Department of Law (School of Law, Arts and Social Sciences) were excluded as they were part of a pilot study. The remaining 398 completed questionnaires were analyzed.

4.2 Socio-Demographic Characteristics

The mean age of the study participants was 21.1 (standard deviation 1.8) years, where the youngest was 18.0 years and the oldest was 25.0 years, while their median age was 21.0 (IQR 20.0 – 22.0) years. Majority of the study participants were aged between 18-21 years (n=257, (64.6%)), were female (n=202, (50.8%)), were single (n=390, (98.0%)), were Christian (n=373, (93.7%)), were residing out of school (n=261, (65.6%)), and were from the school of education (n=122, (30.7%)). The results are as shown on Table 4.1.

Table 4.1:Socio-Demographic Characteristics

	Frequency, *n=398*	**Percent %**
Age in years		
18 – 21	257	64.6
22 – 25	141	35.4
Gender		
Male	196	49.2
Female	202	50.8
Marital status		
Single	390	98.0
Married	8	2.0
Religion		
Christian	373	93.7
Muslim	25	6.3
Residency status		
In school	137	34.4
Out of school	261	65.6
School		
School of Agricultural and Environmental Sciences	13	3.3
School of Business, Economics and Tourism	117	29.4
School of Education	122	30.7
School of Engineering and Architecture	12	3.0
School of Health Sciences	37	9.3
School of Law, Arts and Social Sciences	65	16.3
School of Pure and Applied Sciences	32	8.0

4.3 HIV self-testing

4.3.1 Uptake of HIV Self-testing

Results of Figure 4.1 below indicate that almost a quarter (n=97, (24.4%)) of the participants have ever used the HIV self-test kit.

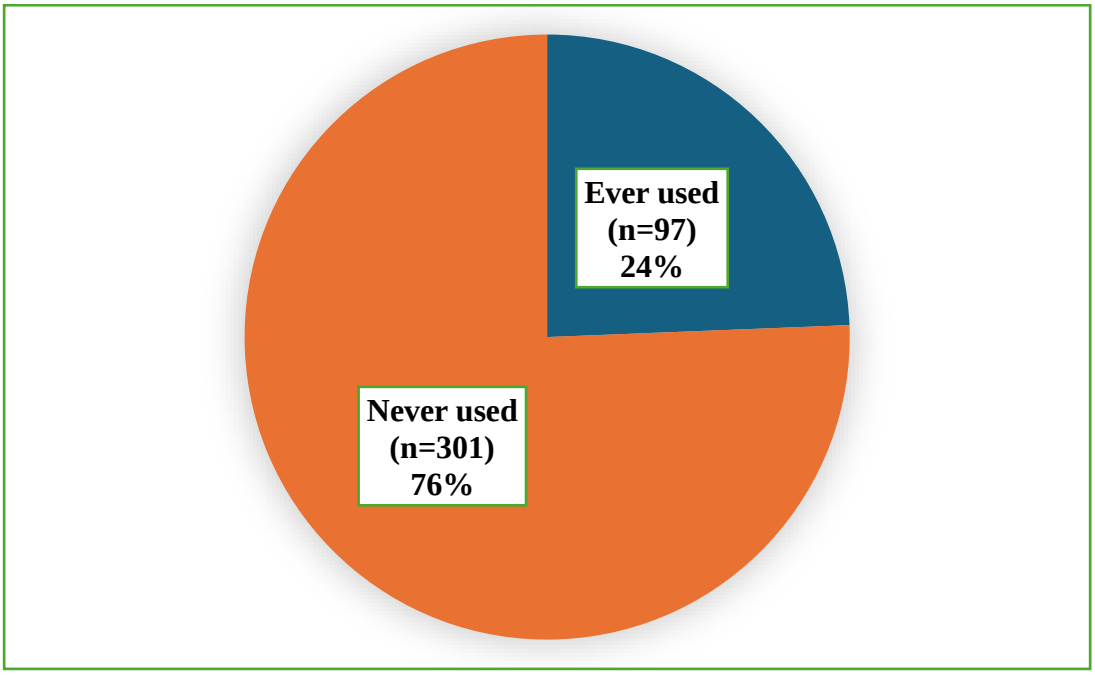

Figure 4.1 Uptake of HIVST

4.3.2 HIV Self-testing Practices

As shown in Table 4.2 below, more than half (n=260, (65.3%)) of the study participants had ever tested for HIV, and of these participants, almost half of them had last taken the HIV test more than 1 year ago (n=116, (44.6%)). Further to this, the last type of test that was done by a majority was the facility-based testing (VCT) (n=185, (71.2%)). It is also noted that out of the 97 participants that had indicated to have ever used the HIV self-test kit, 75 (28.8%) of them had done it as their last type of test. OraQuick® kit was used by a majority (n=59, (60.8%)) of those that have ever used a HIV self-test kit. Participants that had ever used a HIV self-test kit reported their favored source of information about the self-test kits was from social media platforms (n=55, (56.7%)), of which the most preferred (n= 72, (74.2%)) kit mentioned were the blood-based kits. A majority of them (n=84, (86.6%)) also reported the instructions on the kit were easy

to understand, with most (n=64, (66.0%)) of them also reporting to have had an easy access to them. The self-test kits were also mentioned to be affordable by most (n=67, (69.1%)), where almost half of them (n=43, (44.3%)) reported the cost of the self-test kit to be less than Kshs. 1,000. Majority of the participants (n=76, (78.4%)) were confident of interpreting their HIV results at home, and when asked if they have ever tested the kits with sexual partner, more than half of them (n=51, (52.6%)) had never, but most of them (n=65, (67.0%)) had reported sharing the results with them.

Difficulty accessing kit was the challenge most encountered (n=56, (57.7%)) amongst those who had used HIVST service. A majority of these participants (n=73, (75.3%)) also did not seek a second opinion or counselling after doing the HIV self-test, while amongst those that actually did contact a qualified healthcare professional mostly were (n=15, (62.5%)) offered HIV prevention education services. Most of these participants (n=86, (88.7%)) strongly agreed that HIVST should be offered free of charge in public health facilities and hospitals.

Table 4.2 HIV Self-Testing Practices

Ever tested for HIV	**Frequency**, *n=398*	**Percent %**
Yes	260	65.3
No	138	34.7
Last time tested for HIV	**Frequency**, *n=260*	**Percent %**
Last 3 months	69	26.5
Last 6 months	75	28.8
More than 1 year ago	116	44.6
Type of test done at that time		**Percent %**
Facility test (VCT)	185	71.2
HIV self-testing	75	28.8
HIV self-test used *	**Frequency,** *n=97*	**Percent %**
INSTI®	25	25.8
OraQuick®	59	60.8
Atomo® HIV self-test	18	18.6
Source of info on HIV self-test kit *		**Percent %**
Print Media	19	19.6
Social media	55	56.7
Outdoor advertising	18	18.6
Hearsay	10	10.3
Referral from a friend	28	28.9
Health education from a health worker	35	36.1
Internet	26	26.8
TV/Radio	19	19.6
Journal/article/manuscripts	9	9.3
Preferred HIV self-test kit		**Percent %**
Blood	72	74.2
Oral	22	22.7

Table 4.2 continued		
None	3	3.1
Instructions on kit easily understood		**Percent %**
Yes	84	86.6
No	13	13.4
Easily accessed HIV self-test kits		**Percent %**
Yes	64	66.0
No	33	34.0
Self-test kit affordable		**Percent %**
Yes	67	69.1
No	30	30.9
Cost of self-test kit		**Percent %**
More than 1000 Kshs.	28	28.9
Less than 1000 Kshs.	43	44.3
Free of charge	26	26.8
Confident interpreting HIV status at home		**Percent %**
Yes	76	78.4
No	21	21.6
Ever tested self-test kit with sex partner		**Percent %**
Yes	46	47.4
No	51	52.6
Shared results with sex partner(s)		**Percent %**
Yes	65	67.0
No	32	33.0
Challenges encountered using HIV self-testing services		**Percent %**
Difficulty accessing kit	56	57.7
Unaffordability of kit	37	38.1
Difficulty understanding how to use kit	19	19.6
Difficulty interpreting results	24	24.7
Difficult medical jargon in instruction material in kit	7	7.2
Difficulty accessing linkage to care & counselling after testing	19	19.6
After HIV self-testing second opinion or counselling sought		**Percent %**
Yes	24	24.7
No	73	75.3
After contacting qualified healthcare professional, services accessed *	**Frequency**, *n=24*	**Percent %**
Linkage to HIV care	11	45.8
HIV Prevention Education	15	62.5
Assisted partner notification services	4	16.7
Voluntary medical male circumcision	2	8.3
Agreement on *"HIV self-test kits should be free in all public health facilities"*	**Frequency**, *n=97*	**Percent %**
Strongly agree	86	88.7
Agree	9	9.3
Neutral	2	2.0

4.3.3 HIVST at Healthcare Facilities

The study results on accessibility to HIVST at healthcare facilities are as shown on Table 4.3 below. More than half (n=63, (64.9%)) of the participants that have ever done a HIVST had accessed the services at a healthcare facility. From these that had accessed the services at a healthcare facility, more than half of them mentioned that it was an out of campus facility (n=33, (52.4%)), more than half were counselled before and after the test (n=44, (69.8%)), and also more than half were not charged for the testing service or the self-test kit (n=41, (65.1%)).

Table 4.3 HIVST Accessibility at Healthcare Facilities

Ever accessed HIV self-testing services in a healthcare facility	**Frequency**, *n=97*	**Percent %**
Yes	63	64.9
No	34	35.1
Location of facility	**Frequency**, *n=63*	**Percent %**
Within campus	19	30.2
Out of campus	33	52.4
Both	11	17.5
Counselled before and after the test	**Frequency**, *n=63*	**Percent %**
Yes	44	69.8
No	19	30.2
Charged for the testing service or the self-test kit	**Frequency**, *n=63*	**Percent %**
Yes	22	34.9
No	41	65.1

4.3.4 Stigma

The study sought the perception of the immediate society from the participants on various aspects of HIV, and the results are shown on Table 4.4 below. Most participants mentioned that they have no fear of contracting HIV from saliva of person living with HIV (n=240, (60.3%)), most would also not be ashamed if someone in their family had HIV (n=317, (79.6%)), and most also mentioned that people are hesitant to take a HIV test due to fear of people's/partner's reaction if the test turns to be positive for HIV (n=314, (78.9%)), and most also mentioning that people talk badly about people living or thought to be living with HIV to others (n=237, (59.5%)). Majority of the participants mentioned they have no problem buying fresh meat from a butcher who was HIV positive (n=247, (62.1%)), that persons living with HIV should be in a relationship or get married to a partner who is HIV negative (n=231, (58.0%)), and also that persons

living with HIV can safely get a child with a HIV negative person without transmitting the virus as long as he/she is on HIV care (n=330, (82.9%)).

Table 4.4 Stigma

Fear contracting HIV from saliva of person living with HIV	**Frequency, *n=398***	**Percent %**
Yes	158	39.7
No	240	60.3
Agreement on *"I would be ashamed if someone in my family had HIV"*		**Percent %**
Yes	81	20.4
No	317	79.6
People hesitant to take HIV test due to fear of people's/partner's reaction of test is positive for HIV		**Percent %**
Yes	314	78.9
No	84	21.1
People talk badly about people living or thought to be living with HIV to others		**Percent %**
Yes	237	59.5
No	161	40.5
Buy fresh meat from a butcher if this person had HIV		**Percent %**
Yes	247	62.1
No	151	37.9
Person living with HIV should be in a relationship or get married to a partner who is HIV negative		**Percent %**
Yes	231	58.0
No	167	42.0
Person living with HIV can safely get a child with a HIV negative person without transmitting the virus if he/she is on HIV care		**Percent %**
Yes	330	82.9
No	68	17.1

4.3.5 Sexual Behavior Factors

The results on sexual behavior factors by the participants is as shown on Table 4.5 below. Majority of the participants (n=278, (69.8%)) mentioned ever having sex, of which most (n=228, (57.3%)) considered themselves sexually active. Participants were asked to mention one or more factor they consider as risky towards sexual behavior of which most mentioned alcoholism and drug abuse (n=255, (64.1%)).

Table 4.5 Sexual Behavior Factors

Ever had sex	**Frequency, *n=398***	**Percent %**
Yes	278	69.8
No	120	30.2
Consider self sexually active		
Yes	228	57.3
No	50	12.6
Never had sex	120	30.2
Factors considered risky sexual behaviours	**Frequency**, *n=398*	**Percent %**
Early age of sexual debut	220	55.3
Pre-marital sex	230	57.8
HIV/AIDS transmission misinformation	167	42.0
"Sponsor" mentality	189	47.5
Unemployment	130	32.7
Lack of religious guidance	100	25.1
Alcoholism and drug abuse	255	64.1
Stress and mental anguish	134	33.7
Social media	172	43.2
Online dating applications	111	27.9
Misinformation about contraceptives	154	38.7
Pornography	234	58.8
Lack of parental guidance & mentorship	169	42.5
Peer pressure	237	59.5

Table 4.6 below illustrates how most of the participants that had engaged in sex mentioned always using protection (n=170, (61.2%)). Majority also did not have multiple sexual partners (n=223, (80.2%)), with most having never had an STI (n=261, (93.9%).

Table 4.6: Sexual Behaviors in those Sexually Active

Always use protection	**Frequency, *n=278***	**Percent %**
Yes	170	61.2
No	108	38.8
Have multiple sex partners		**Percent %**
Yes	55	19.8
No	223	80.2
Ever had an STI		**Percent %**
Yes	17	6.1
No	261	93.9

4.4 Barriers to HIVST Testing and the Uptake of HIVST (Bivariate Analysis)

The study sought to determine the association between barriers to HIVST testing and the uptake of HIVST as illustrated in Table 4.7 below. There were no significant statistical association found between the barriers and uptake of HIVST, though the likelihood for uptake was higher for the those aged 22 to 25 years old (OR=1.2, 95% CI (0.7-1.9, *p*=0.520), those who were female (OR=1.5, 95% CI (1.0-2.4, *p*=0.071), and those who were married (OR=1.9, 95% CI (0.4-8.1, *p*=0.520).

Table 4.7 Barriers to HIVST (Bivariate Analysis)

	Ever used, *n=97*	**Never used, *n=301***	**OR (95% CI)**	**p-value**
Age (Years)				
18 – 21	60 (61.9%)	197 (65.4%)	Reference	
22 – 25	37 (38.1%)	104 (34.6%)	1.2 (0.7 – 1.9)	0.520
Gender				
Male	40 (41.2%)	156 (51.8%)	Reference	
Female	57 (58.8%)	145 (48.2%)	1.5 (1.0 – 2.4)	0.071
Marital status				
Single	94 (96.9%)	296 (98.3%)	Reference	
Married	3 (3.1%)	5 (1.7%)	1.9 (0.4 – 8.1)	0.390

4.5 Facilitators to HIVST testing and the uptake of HIVST (Bivariate Analysis)

The study sought to determine the association between facilitators to HIVST testing and the uptake of HIVST as shown in Table 4.8 below. Facilitators to HIV testing that were statistically significantly associated with uptake of HIVST were for participants that were aware of HIV pre-exposure prophylaxis (OR=2.7, 95% CI (1.7-4.3, $p<0.001$), those that considered themselves sexually active (OR=2.1, 95% CI (1.3-3.4, *p*=0.004), those that mentioned that people talk badly about HIV positive people to others (OR=1.7, 95% CI (1.1-2.8, *p*=0.029), those that agree that discordant couples should

marry (OR=1.8, 95% CI (1.1-2.8, *p*=0.023), and for those that knew about *"Chukua selfie"* (OR=1.6, 95% CI (1.0-2.6, *p*=0.038).

Though participants who mentioned that HIV/AIDS is a serious disease (OR=2.6, 95% CI (0.9-7.5, *p*=0.083), those that mentioned that HIV has no cure (OR=1.9, 95% CI (0.5-6.5, *p*=0.324), those that mentioned that they would not be ashamed if someone in family has HIV (OR=1.3, 95% CI (0.7-2.3, *p*=0.427), and for those that mentioned that they would hesitate taking a HIV test fearing partners reaction if result is positive (OR=1.8, 95% CI (1.0-3.4, *p*=0.067) were more likely to have uptake for HIVST, the differences in the results were not large enough to establish an association.

Table 4.8 Facilitators to HIVST (Bivariate Analysis)

	Ever used, *n=97*	**Never used,** *n=301*	**OR (95% CI)**	**p-value**
HIV/AIDS is a serious disease				
Yes	93 (95.9%)	271 (90.0%)	2.6 (0.9 – 7.5)	0.083
No	4 (4.1%)	30 (10.0%)	Reference	
Aware of HIV Pre-exposure prophylaxis				
Yes	64 (66.0%)	126 (41.9%)	2.7 (1.7 – 4.3)	**<0.001**
No	33 (34.0%)	175 (58.1%)	Reference	
HIV has a cure				
Yes	3 (3.1%)	17 (5.6%)	Reference	
No	94 (96.9%)	284 (94.4%)	1.9 (0.5 – 6.5)	0.324
Consider self sexually active				
Yes	68 (70.1%)	160 (53.2%)	2.1 (1.3 – 3.4)	**0.004**
No	29 (29.9%)	141 (46.8%)	Reference	
Ashamed if someone in family has HIV				
Yes	17 (17.5%)	64 (21.3%)	Reference	
No	80 (82.5%)	237 (78.7%)	1.3 (0.7 – 2.3)	0.427
Hesitant testing fearing partners reaction if result is positive				
Yes	83 (85.6%)	231 (76.7%)	1.8 (1.0 – 3.4)	0.067
No	14 (14.4%)	70 (23.3%)	Reference	
People talking badly about HIV positive people to others				
Yes	67 (69.1%)	170 (56.5%)	1.7 (1.1 – 2.8)	**0.029**
No	30 (30.9%)	131 (43.5%)	Reference	
Discordant couples should marry				
Yes	66 (68.0%)	165 (54.8%)	1.8 (1.1 – 2.8)	**0.023**
No	31 (32.0%)	136 (45.2%)	Reference	
Know about *"Chukua selfie"*				
Yes	55 (56.7%)	134 (44.5%)	1.6 (1.0 – 2.6)	**0.038**
No	42 (43.3%)	167 (55.5%)	Reference	

4.6 Multivariate Analysis for Determinants of the Uptake of HIVST

The results of the univariate analysis for the barriers and facilitators of all the variables that had a p-value<0.2 were selected and subjected to multivariate analysis with the use of binary logistic regression. Table 4.9 below shows the results of the multivariate analysis.

The results of the multivariate analysis indicate that the odds of the likelihood of participants to have uptake for HIVST were more or less comparable at the univariate and multivariate level. Determinants to HIVST that maintained their statistical association with HIVST on the multivariate analysis were for participants that were aware of HIV pre-exposure prophylaxis (OR=2.4, 95% CI (1.5-4.0, p<0.001), participants considering themselves sexually active (OR=2.3, 95% CI (1.4-4.0, p=0.002), and for those participants who agreed that discordant couple should marry (OR=1.7, 95% CI (1.1-2.8, p=0.047).

Those determinants that were statistically associated with uptake of HIVST at the univariate but on multivariate were not statistically associated with HIVST were for participants who mentioned that people talk about HIV positive people to others (OR=1.6, 95% CI (1.0-2.8, p=0.072), and for participants that mentioned knowing about *"Chukua selfie"* (OR=1.3, 95% CI (0.8-2.2, p=0.248).

Those determinants that were not statistically significantly associated and maintained the status quo at multivariate were for the participants' gender (OR=1.5, 95% CI (0.9-2.6, p=0.092), participants that agreed that HIV7AIDS is a serious disease (OR=2.1, 95% CI (0.7-6.3, p=0.196), and participants that mentioned that they would be hesitant to test for HIV fearing their partner's reaction if result is positive (OR=1.3, 95% CI (0.6-2.5, p=0.519).

Table 4.9 Determinants to HIVST Uptake (Multivariate Analysis)

	cOR (95% CI)	p-value	aOR (95% CI)	p-value
Gender				
Male	Reference		Reference	
Female	1.5 (1.0 – 2.4)	0.071	1.5 (0.9 – 2.6)	0.092
HIV/AIDS is a serious disease				
Yes	2.6 (0.9 – 7.5)	0.083	2.1 (0.7 – 6.3)	0.196
No	Reference		Reference	
Aware of HIV Pre-exposure prophylaxis				
Yes	2.7 (1.7 – 4.3)	**<0.001**	2.4 (1.5 – 4.0)	**<0.001**
No	Reference		Reference	
Consider self sexually active				
Yes	2.1 (1.3 – 3.4)	**0.004**	2.3 (1.4 – 4.0)	**0.002**
No	Reference		Reference	
Hesitant testing fearing partners reaction if result is positive				
Yes	1.8 (1.0 – 3.4)	0.067	1.3 (0.6 – 2.5)	0.519
No	Reference		Reference	
People talking badly about HIV positive people to others				
Yes	1.7 (1.1 – 2.8)	**0.029**	1.6 (1.0 – 2.8)	0.072
No	Reference		Reference	
Discordant couples should marry				
Yes	1.8 (1.1 – 2.8)	**0.023**	1.7 (1.1 – 2.8)	**0.047**
No	Reference		Reference	
Know about *"Chukua selfie"*				
Yes	1.6 (1.0 – 2.6)	**0.038**	1.3 (0.8 – 2.2)	0.248
No	Reference		Reference	

cOR-crude odds ratio; aOR-adjusted odds ratio

CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Discussion

5.1.1 Demographic Information

The demographic information of the study participants provides valuable insights into the sample and its implications for the study's objectives. The majority of participants were undergraduate students aged 18-21 years, indicating that the findings may be particularly applicable to this age group, similar to the study by Hatzold et al., where many youths aged 16-24 years were first-time testers (Hatzold et al., 2019). This age group is critical in HIV prevention strategies due to increased sexual activity (UNAIDS, 2018).

The gender distribution showed a nearly equal representation, with females constituting 50.8% of participants. This aligns with previous studies indicating that women are more likely to access HIV testing services compared to men (Hensen et al., 2014). Men, however, prefer HIVST due to its confidentiality and autonomy (Zishiri et al., 2023). Despite this, there is a notable shift towards HIVST, with a significant portion (77.3%) using it as their last type of test, suggesting that men and women alike are finding value in the privacy and convenience of self-testing.

Marital status revealed that 98% of participants were single. Single individuals may have different motivations and barriers to HIVST compared to married individuals (Conserve et al., 2019). The predominance of Christian participants (93.7%) suggests that cultural and religious factors could influence the acceptability of HIVST due to associated stigma (Ajong et al., 2018). Most participants were full-time students, with 65.6% residing off-campus, potentially allowing more privacy for self-testing. This

demographic information underscores the importance of targeted HIVST interventions that consider age, gender, marital status, and residency.

The largest group of participants came from the School of Education (30.7%), followed by the School of Business, Economics, and Tourism (29.4%), highlighting the need for tailored HIVST campaigns for different academic disciplines. Despite no statistically significant associations between barriers and HIVST uptake, trends indicated that participants aged 22-25 years and females had a slightly higher likelihood of using HIVST (Hensen et al., 2014; Njau et al., 2019). Married participants also showed a higher, though not statistically significant, likelihood of using HIVST (Conserve et al., 2019). These findings align with previous research but also highlight the unique context of university students.

5.1.2 HIV Self-Testing

5.1.2.1 Uptake of HIV Self-testing

The results indicated that almost a quarter (24.4%) of participants had ever used an HIV self-test kit. This underscores a growing acceptance and utilization of HIVST among university students, a critical demographic in HIV prevention efforts. The study revealed a low adoption of HIV testing at 52.2%, despite the rise in advertising encouraging HIV testing and the growing number of HCT services (Belihu, 2024). However, the overall HIV testing rate among participants was relatively high, with 65.3% having ever tested for HIV. Concerning, almost half (44.6%) had last tested more than a year ago, highlighting the need for more frequent testing. The majority of last HIV tests were facility-based (71.2%), indicating a preference or reliance on traditional testing methods over self-testing. These findings align with studies by Njau et al. (2019), which found similar barriers to frequent testing (Njau et al., 2019).

Among participants who had used HIVST, a significant portion (77.3%) had used it as their last type of test, suggesting a shift towards more personal and convenient testing methods. The OraQuick® kit was the most used (60.8%), likely due to its ease of use and accessibility. This trend is consistent with findings from studies by Hensen et al. (2014) and Zishiri et al. (2023), which emphasized the convenience and confidentiality of saliva based test kits as major facilitators (Hensen et al., 2014; Zishiri et al., 2023). It also agrees with findings from Nguyen et al. (2021) who reported that key populations who are at risk of contracting sexually transmitted infections found it favorable to use saliva based HIV testing kits (Nguyen et al., 2021).

Social media emerged as the predominant source of information about HIVST kits (56.7%), highlighting the crucial role of digital platforms in disseminating health information to young adults. This finding is consistent with previous studies that have shown the effectiveness of social media in promoting health behaviors among youth (Evangeli et al., 2016). Another study also concurred with our findings and alluded that providing online access to HIVST is a viable and well-received option for HIV high risk populations, especially for those who have never been tested or would not have been tested using existing approaches (Bell et al., 2021).

The preference for blood-based kits (74.2%) over oral kits may be attributed to perceived accuracy and reliability, which is a common concern among users. This differs from a study done on long distance truck drivers on which modality of self-testing they preferred of which majority were indifferent to either blood or saliva based methods of self-testing (Mantell et al., 2022). In contrary a different study showed participants who were mostly male exhibited a preference for blood-based HIVST over oral HIVST. This preference was driven by a greater sense of risk and a desire for a test

that offers greater accuracy, as well as factors such as autonomy, speed, privacy, and secrecy (Adepoju et al., 2023).

Moreover, most participants found the instructions on the kits easy to understand (86.6%) and reported easy access (66.0%) and affordability (69.1%), indicating that the kits are user-friendly and accessible for most students. This contrasts to a study done to assess the ability to understand and correctly follow HIV self-test kit instructions on participants about to be screened for HIV and found that most participants reported difficulty in understanding manufacturer's instructions unless it was translated and interpreted to them in a language and manner they could understand (Simwinga et al., 2019). Another study which was assessing feasibility and acceptability of HIVST among South-African youths found that most youths found self-testing kits expensive due to their unemployed status and most recommended the kits to be given free of charge by government health facilities (Ritchwood et al., 2019). However, challenges remain. The most frequently reported barrier was difficulty accessing the kits (57.7%), followed by affordability issues (38.1%) and difficulty interpreting results (24.7%). These barriers highlight the need for improved distribution channels, subsidized costs, and enhanced educational efforts to support users in correctly interpreting their results (Witzel et al., 2020). Another study that had similar findings to ours regarding affordability and cost of HIVST kits was done in Nigeria among university students found that majority (65.2%) of them were ready to pay for the HIVST kit and did not consider cost as an issue when purchasing HIVST kits (Babatunde et al., 2022).

Despite these challenges, the confidence in interpreting HIV status at home was high (78.4%). However, this contradicts a study on adolescents' acceptability of oral HIV self-test kits which was done in Lesotho and which showed that it was difficult for them to interpret their own HIV test results unless aided a village health worker (Amstutz et

al., 2020). A substantial proportion of participants (67.0%) shared their results with their sexual partners, indicating that HIVST could play a vital role in facilitating partner notification and mutual testing as concurs in a study where both male and female partners reported that it was for them to share their HIV results as they saw it as an opportunity to learn about each other's HIV status with no significant negative outcomes expected (Matovu et al., 2018). Additionally, the strong agreement (88.7%) among participants that HIVST kits should be free in public health facilities underscores the need for policy interventions to make HIVST more accessible. Providing free or subsidized kits could significantly increase uptake and regular use among students, thereby enhancing early detection and treatment of HIV(Choko et al., 2017). However, the majority (75.3%) did not seek a second opinion or counselling after self-testing, which is a critical gap that needs to be addressed to ensure linkage to care and support following an HIV diagnosis (C. C. Johnson et al., 2017).

5.1.2.2 HIVST at Healthcare Facilities

More than half (64.9%) of the participants who had ever conducted an HIVST accessed the services at a healthcare facility. This high rate of facility-based HIVST usage suggests that healthcare facilities play a crucial role in providing and promoting self-testing services among students. This concurs with a study done to assess missed opportunities for HIV testing among at risk populations in South Africa which showed that despite facility based HTS offering efficient HIV testing services and being associated with a higher linkage to care for those that turn sero-reactive after self-testing, the service is grossly underutilized in the healthcare facilities (Mabuto et al., 2019). Other Previous research have shown that integrating HIVST within healthcare settings can significantly increase the accessibility and uptake of HIV testing, especially in resource-limited settings (C. C. Johnson et al., 2017).

Of those who accessed HIVST services at healthcare facilities, a majority (52.4%) did so at out-of-campus facilities. This indicates a potential gap in the availability or accessibility of HIVST services within campus healthcare facilities. Ensuring that on-campus health centers are well-equipped with HIVST kits and adequately staffed to provide pre- and post-test counseling could enhance the convenience and uptake of these services among students. The role of proximity and convenience in increasing HIV testing rates has been highlighted in several studies, emphasizing the need for easily accessible testing options within educational institutions. These findings are the same as the ones shown in a study done to assess reasons for low HIV testing services uptake among tertiary students in university in South Africa which showed the main motivators to these youthful students accessing HTS within campus health facilities was a conveniently and strategically located health facility's' as well as supportive and friendly health care workers (Pant Pai et al., 2013; Tshivhase et al., 2021). In contrast to our study findings, a study done in Zimbabwe assessing youth friendly HIV self-testing showed that most youths were skeptical of campus based HIVST due to lack of privacy and social coercion from their partners to do the test (Koris et al., 2021).

Counselling is a critical component of the HIV testing process, providing individuals with necessary information and support before and after taking the test. In this study, a significant proportion (69.8%) of participants who accessed HIVST services at healthcare facilities received counselling before and after the test. This aligns with best practices for HIV testing and underscores the importance of comprehensive care in supporting individuals through the testing process (World Health Organisation, 2016). Counselling can help mitigate the anxiety associated with HIV testing, improve understanding of the results, and facilitate linkage to care if necessary as can be evidenced in a study where the youthful participants expressed fears that missing

counselling before and after HIVST could expose them to risks like suicide ideations if they test alone (Ritchwood et al., 2019).

Cost is a notable barrier to accessing HIVST services. Encouragingly, the majority (65.1%) of participants who accessed HIVST services at healthcare facilities did not incur any charges for the testing service or the self-test kit. This finding supports the notion that providing free or subsidized HIVST kits can significantly enhance their uptake among young adults, who may otherwise be deterred by cost (Choko et al., 2017). Financial barriers to HIV testing are well-documented, and removing these barriers is essential for improving testing rates and early detection of HIV as reported among youthful students in a tertiary institution participating in a cross-sectional HIVST survey where they reported that HIVST uptake could be up scaled if the kits would be offered at zero charge from the government and relevant stakeholders (Mthiyane et al., 2023).

5.1.3 Stigma

Stigma remains a significant barrier to HIV testing and treatment, including HIVST. The results of this study revealed various dimensions of stigma and their impact on HIV testing behaviors among undergraduate students at Kenyatta University, Kenya. Most participants (60.3%) indicated that they do not fear contracting HIV from the saliva of a person living with HIV. This understanding reflects accurate knowledge about HIV transmission, which is essential in reducing stigma and promoting healthy interactions with PLHIV. Previous studies have highlighted that misconceptions about HIV transmission contribute to stigma and discrimination, which can hinder efforts to control the epidemic (Obeagu, 2024). Moreover, most participants (79.6%) stated that they would not be ashamed if someone in their family had HIV, suggesting a shift

towards more accepting attitudes within the immediate social circles of the respondents. However, the finding that a substantial number of participants (78.9%) believe people are hesitant to take an HIV test due to fear of others' reactions if the result is positive indicates that external stigma still plays a significant role in HIV testing behavior. This fear of social rejection or negative reactions from partners and peers is a well-documented barrier to HIV testing and disclosure (Rueda et al., 2016). More than half of the participants (59.5%) mentioned that people talk badly about those living with or suspected of living with HIV. This indicates the persistence of negative social attitudes and gossip about PLHIV, which can perpetuate stigma and deter individuals from seeking testing and treatment. Combating such stigma requires community-based interventions and educational campaigns to change societal perceptions and promote acceptance of PLHIV (Nyblade et al., 2019).

Despite these challenges, there are positive signs of changing attitudes. A majority (62.1%) of participants expressed no problem buying fresh meat from a butcher who is HIV positive, indicating a reduction in discriminatory attitudes towards PLHIV in everyday transactions. Additionally, 58.0% of participants believe that PLHIV should be in relationships or get married to HIV-negative partners, and 82.9% agree that PLHIV can safely have children with HIV-negative partners if they are on HIV care. These attitudes are crucial for the social integration and psychological well-being of PLHIV and reflect an understanding of the advances in HIV treatment and prevention, such as ART and PrEP (UNAIDS, 2021).

5.1.4 Sexual Activity and Perceived Risk Factors

A significant majority of the participants (69.8%) reported having ever had sex, with 57.3% considering themselves sexually active. This high level of sexual activity among

university students is consistent with findings from other studies in similar settings, indicating that young adults in higher education institutions are a sexually active group (Belihu, 2024). Understanding these behaviors is crucial for designing effective HIV prevention and testing strategies for young people.

Participants identified several factors they considered risky towards sexual behavior. The top-mentioned factor was alcoholism and drug abuse (64.1%), followed by peer pressure (59.5%), and pornography (58.8%). These factors are well-documented in the literature as significant contributors to risky sexual behaviors, including unprotected sex and multiple sexual partners, which increase the risk of HIV transmission (Dodge et al., 2016; Rehm et al., 2017). Alcohol and drug use, in particular, have been associated with impaired judgment and increased likelihood of engaging in unprotected sex (Berry & Johnson, 2018).

Other notable risk factors mentioned by the participants include early age of sexual debut (55.3%), pre-marital sex (58.8%), and misinformation about HIV/AIDS transmission (42.0%). These factors highlight the need for comprehensive sexual education that addresses these misconceptions and promotes safer sexual practices. Interventions should target not only the students but also their social environments to mitigate these risks (Adekola & Mavhandu-Mudzusi, 2023).

Among those who have engaged in sex, a majority reported always using protection (61.2%). This is a positive finding, indicating a level of awareness and practice of safer sex among the students. However, the 38.8% who do not always use protection represent a significant risk group that requires targeted interventions to promote consistent condom use (Ajayi et al., 2019).

Most participants did not have multiple sexual partners (80.2%) and had never had an STI (93.9%). These findings suggest relatively low levels of high-risk sexual behavior

among the students, which could be attributed to effective health education and HIV prevention programs already in place. However, the presence of multiple sexual partners among 19.8% of the participants and the 6.1% who reported having had an STI indicate ongoing risks that need to be addressed through continuous education and access to health services (Santelli et al., 2016).

The high level of sexual activity and identified risk factors underscore the need for accessible and user-friendly HIVST kits to encourage regular testing among students. The reported use of protection and low incidence of multiple partners and STIs are encouraging, suggesting that students are receptive to health-promoting behaviors, which can be leveraged to promote HIVST (Owino et al., 2024). Educational campaigns should emphasize the importance of regular HIV testing as part of routine sexual health care, particularly for those engaging in high-risk behaviors. Additionally, addressing the barriers to consistent condom use and correcting misinformation about HIV transmission are critical for reducing stigma and encouraging HIVST (Witzel et al., 2020).

5.1.5 Barriers to HIVST Testing and the Uptake of HIVST

Gender appeared to influence HIV self-testing (HIVST) uptake, with females showing higher odds (OR=1.5, 95% CI (1.0-2.4), p=0.071) of using HIVST compared to males. Although this association was not statistically significant, it aligns with existing literature suggesting that women are generally more proactive in seeking health services, including HIV testing, due to higher health literacy and health-seeking behaviors (De Jesus et al., 2015). Marital status also showed an interesting trend, with married participants having higher odds (OR=1.9, 95% CI (0.4-8.1), p=0.390) of using HIVST compared to single participants. This could be explained by the increased

perceived necessity for HIV testing among married individuals who are concerned about their partners' and family's health. However, the small number of married participants in the study limits the generalizability of this finding (Qiao et al., 2018).

Age was another factor influencing HIVST uptake. Participants aged 22 to 25 years old had slightly higher odds (OR=1.2, 95% CI (0.7-1.9), p=0.520) of using HIVST compared to those aged 18 to 21 years. This trend, though not statistically significant, suggests that older students might be more likely to use HIVST, possibly due to increased health awareness and responsibility that often comes with age and maturity (Njau et al., 2019).

In relation to the knowledge about HIV, the study found most participants demonstrated a good understanding of the severity of HIV/AIDS and its modes of transmission. They also had knowledge of preventive measures, including sexual abstinence and protected sex. Additionally, participants showed awareness of HIV as a chronic disease without a cure and believed that individuals on HIV medication can live a normal life. These findings indicate a positive overall knowledge of HIV among the participants. However, this contrasts with a study done among health and non-health sciences university students in Malaysia, which found that knowledge of non-HIV causes of STDs was still lacking, and the risky behavior practiced by sexually-active students was alarming (Elshiekh et al., 2021; Folasayo et al., 2017).

Regarding HIV testing acceptance, the study found that a significant proportion of participants had been tested for HIV, either through facility-based testing or HIV self-testing. The most used HIV self-test kits were OraQuick®, INSTI®, and Atomo®. Social media was the primary source of information about HIV self-test kits. Privacy, ease of understanding instructions, and the ability to interpret test results were important factors in choosing HIV self-testing. Fear of a positive test result and difficulty

accessing self-test kits were identified as barriers to HIV testing. These findings align with a study by Marks et al., which investigated HIV testing preferences among young men who have sex with men and found similar barriers and facilitators to HIVST uptake (Marks et al., 2021).

The study also analyzed sexual behavior and perceptions of the participants. A significant proportion reported being sexually active, but only around 61% reported consistent use of protection during sex, indicating the need for improvement in promoting safe sex practices. Some participants engaged in risky behaviors such as having multiple sexual partners. Contributing factors included early sexual debut, premarital sex, substance abuse, and exposure to pornography. Other influences mentioned were misinformation about HIV transmission, the "sponsor" mentality, unemployment, lack of guidance, stress, and peer pressure. These findings are consistent with a study by Clifton et al., which examined the relationship between HIV risk behavior, risk perception, and testing among the British population, concluding that those who perceive themselves at risk often do not test regularly (Clifton et al., 2016).

Despite the lack of statistically significant associations between the identified barriers and the uptake of HIVST, certain trends suggest that specific demographic groups may have a higher likelihood of using HIVST. Common barriers identified in the study include fear of social stigma, lack of awareness, concerns about the accuracy of self-tests, and the cost of HIVST kits. Addressing these barriers through targeted interventions can enhance the uptake of HIVST among university students (Witzel et al., 2020).

The trends observed in this study highlight the importance of considering demographic factors in the promotion of HIVST. Tailored interventions that address the specific needs and concerns of different demographic groups can improve the uptake of HIVST.

For instance, educational campaigns that emphasize the confidentiality and convenience of HIVST might particularly appeal to younger students who may fear stigma and discrimination. Additionally, providing free or subsidized HIVST kits could alleviate cost-related barriers, making HIVST more accessible to all students (Choko et al., 2017).

Furthermore, integrating HIVST promotion into existing health services on campus, such as sexual health education and counselling, can provide students with comprehensive support and encourage regular testing. Engaging student leaders and peer educators in these initiatives can also help normalize HIVST and reduce associated stigma (C. C. Johnson et al., 2017).

5.1.6 Facilitators to HIVST Testing and the Uptake of HIVST

Several facilitators were statistically significantly associated with the uptake of HIVST. Awareness of HIV PrEP emerged as a strong facilitator (OR=2.7, 95% CI (1.7-4.3), $p<0.001$), underscoring the importance of HIV prevention education in promoting HIVST. Awareness of PrEP reflects proactive health-seeking behavior, which is crucial for the uptake of HIVST (Eakle et al., 2018). Participants who considered themselves sexually active were also more likely to use HIVST (OR=2.1, 95% CI (1.3-3.4), $p=0.004$), consistent with the notion that sexually active individuals are more aware of their HIV risk and more likely to seek testing services (Ngure et al., 2020).

The perception that people talk negatively about HIV-positive individuals was another significant facilitator (OR=1.7, 95% CI (1.1-2.8), $p=0.029$), highlighting the role of stigma in motivating HIVST uptake. Participants aware of negative social attitudes towards PLHIV may prefer the privacy and confidentiality of self-testing to avoid potential stigma and discrimination (Figueroa et al., 2015). Additionally, agreeing that

discordant couples should marry was positively associated with HIVST uptake (OR=1.8, 95% CI (1.1-2.8), p=0.023), reflecting an understanding of the effectiveness of HIV treatment in preventing transmission (Montaner et al., 2014).

Knowledge of the "Chukua Selfie" campaign, promoting HIVST, was another significant facilitator (OR=1.6, 95% CI (1.0-2.6), p=0.038), indicating the effectiveness of targeted health campaigns in increasing awareness and uptake of HIVST among young adults (Mavodza et al., 2021). While not statistically significant, other facilitators such as viewing HIV/AIDS as a serious disease (OR=2.6, 95% CI (0.9-7.5), p=0.083) and hesitation to test due to fear of a partner's reaction (OR=1.8, 95% CI (1.0-3.4), p=0.067) suggested trends towards increased HIVST uptake, emphasizing the importance of privacy and control in HIV testing (C. C. Johnson et al., 2017).

The study revealed that while some respondents showed understanding and empathy towards individuals living with HIV, others expressed fear and misconceptions, such as concerns about a partner's reaction to a positive HIV test result and negative gossip about people living with HIV. However, most respondents had positive attitudes, believing that individuals living with HIV can lead a normal life with proper care. These results are comparable to those found by Qin et al. (2018), who demonstrated that HIVST was associated with less stigma compared to facility-based testing, as HIVST brought the experience of HIV testing into people's homes, normalizing it and reducing associated stigma (Qin et al., 2018).

The impact of media exposure on HIVST awareness was also highlighted, with nearly half of the respondents being aware of the "Chukua Selfie" campaign, primarily through social media. Mobile phones were the preferred tool for accessing knowledge about HIVST, followed by TV and radio. The toll-free phone number and social media links provided with self-test kits were underutilized, though those who accessed these

resources were successfully connected to healthcare providers or counselors. These findings align with a study by Birdthistle et al. (2022), which examined the effects of a multimedia campaign on HIVST among young people in South Africa. The study found that exposure to the Pan-African MTV *Shuga* series, "Down South 2" (DS2), was associated with increased awareness and use of HIVST (Birdthistle et al., 2022).

Confidence in interpreting HIV status at home was reported by most participants, consistent with findings by Aizobu et al. (2023), who noted that privacy and confidentiality were key enablers of HIVST. Participants appreciated the ability to test at home and in private, without external influence, allowing them to keep their results confidential. Similarly, Nwaozuru et al. found that youths preferred HIVST for better privacy protection compared to facility-based testing, as sexual health service facilities often remain stigmatized. Moreover, individuals were able to tailor HIVST to their schedules and needs, offering a more personalized testing experience (Aizobu et al., 2023; Nwaozuru et al., 2019).

Our study found that HIV self-test kits were generally accessible and affordable, with many participants accessing HIVST services at healthcare facilities, particularly university clinics. However, a significant proportion of participants did not receive counseling before or after testing, and cost was identified as a barrier for some, as they were charged for testing services or self-test kits. This preference for avoiding healthcare facility visits aligns with Hlongwa et al.'s (2023) findings, where self-test kits were accessible from various venues, including vending machines, community centers, and pharmacies, increasing their uptake. Contrarily, d'Elbée et al. (2023) found that participants in their study viewed the kits as too expensive, highlighting a potential area for intervention. Approaches for improving linkage to HIV care among HIV self-testing individuals in sub-Saharan Africa, (d'Elbée et al., 2020; Hlongwa et al., 2020).

The study also revealed a high willingness among students who had ever used an HIV self-test kit (98.9%) to use it again in the future, indicating a positive attitude towards self-testing. This finding concurs with the "4 Youth by Youth" HIVST crowdsourcing contest in Nigeria by Iwelunmor et al. (2020), which concluded that active youth participation in HIV prevention activities can increase the uptake of HIVST among peers (Iwelunmor et al., 2020). Other facilitators included access to HIV prevention education through qualified health professionals, routine testing, protection of loved ones, early treatment, and prevention of transmission to unborn babies. These motivators were similarly identified in a study among African-American youths in North Carolina, United States, where they were found to be significant enablers of HIVST (Mathews et al., 2020).

5.1.7 Associations Between Barriers, Facilitators, and Uptake of HIVST

The univariate and multivariate analyses conducted in this study revealed important associations between various factors and the uptake of HIVST. Significant sociodemographic determinants of HIVST uptake included age, gender, marital status, and residency. Specifically, participants aged 22-25 years and females demonstrated a higher likelihood of using HIVST. Married participants, though not statistically significant, also exhibited higher usage rates, which aligns with findings by Leblanc et al. (2022) on the perceived necessity of knowing one’s HIV status within marital relationships. Despite these trends, a significant portion of the population continued to rely on traditional facility-based testing, highlighting persistent barriers such as accessibility and privacy concerns (Leblanc et al., 2022).

Similar to the results of Babatunde et al. (2022) the general trend toward increased HIVST usage is evident. However, exceptions such as lower uptake among males and

older students suggest differing attitudes toward health and testing, potentially driven by factors like perceived privacy, autonomy, and ease of access associated with HIVST (Babatunde et al., 2022).

The multivariate analysis identified several key determinants that maintained their statistical significance, emphasizing their strong association with HIVST uptake. Awareness of HIV PrEP emerged as a particularly significant factor, with participants who were aware of PrEP having significantly higher odds of using HIVST (aOR=2.4, 95% CI (1.5-4.0), p<0.001). This finding underscores the critical role of HIV prevention education in promoting HIVST, as awareness of PrEP reflects a higher level of HIV knowledge and a proactive approach to health (Eakle et al., 2018).

Another significant determinant was self-identification as sexually active, which was strongly associated with HIVST uptake (aOR=2.3, 95% CI (1.4-4.0), p=0.002). This aligns with the understanding that sexually active individuals are more conscious of their risk of HIV infection and are therefore more likely to seek out HIV testing services, including self-testing (Woldeyohannes et al., 2017). Additionally, participants who agreed that discordant couples should marry had higher odds of using HIVST (aOR=1.7, 95% CI (1.1-2.8), p=0.047), reflecting an understanding of the effectiveness of HIV treatment in preventing transmission and suggesting a higher likelihood of engaging in HIVST as part of health management (Montaner et al., 2014).

However, some factors that were significant in the univariate analysis did not maintain their statistical significance in the multivariate analysis. For instance, the belief that people talk badly about HIV-positive individuals was initially significant (OR=1.7, 95% CI (1.1-2.8), p=0.029), but this significance was lost in the multivariate analysis (aOR=1.6, 95% CI (1.0-2.8), p=0.072). This suggests that while stigma is an important factor, other elements might play a more direct role in influencing HIVST uptake

(Figueroa et al., 2015). Similarly, knowledge of the "Chukua Selfie" campaign, which was significant in the univariate analysis (OR=1.6, 95% CI (1.0-2.6), p=0.038), did not remain significant in the multivariate analysis (aOR=1.3, 95% CI (0.8-2.2), p=0.248), indicating that awareness campaigns are crucial but may need to be part of a broader strategy to effectively increase HIVST uptake (Mavodza et al., 2021).

Other factors remained non-significant in both univariate and multivariate analyses. For example, gender differences were observed, with females having higher odds of using HIVST compared to males, but this was not statistically significant in the multivariate analysis (aOR=1.5, 95% CI (0.9-2.6), p=0.092). While gender differences in health-seeking behaviors are well-documented, other factors may overshadow the influence of gender on HIVST uptake (Njau et al., 2014). Additionally, viewing HIV/AIDS as a serious disease was not significantly associated with HIVST uptake (aOR=2.1, 95% CI (0.7-6.3), p=0.196), suggesting that while recognizing the severity of HIV/AIDS is important, it may not directly influence the decision to use HIVST (C. C. Johnson et al., 2017).

Lastly, fear of a partner's reaction, which was a significant factor in the univariate analysis (OR=1.8, 95% CI (1.0-3.4), p=0.067), did not maintain significance in the multivariate analysis (aOR=1.3, 95% CI (0.6-2.5), p=0.519). This indicates that while concerns about partner reactions are relevant, they may be mitigated by the privacy and confidentiality offered by self-testing (Witzel et al., 2020).

5.2 Conclusion

Our findings reveal a complex interplay of demographic, social, and behavioral factors that influence HIVST uptake, providing actionable insights for enhancing HIV prevention strategies in this critical youthful population.

The study identified significant sociodemographic determinants of HIVST uptake, including age, gender, and marital status. Older students, particularly those aged 22-25 years, and females were more likely to use HIVST. Although the association with marital status was not statistically significant, married participants exhibited higher usage rates, underscoring the perceived necessity of HIV testing within marital relationships. These findings concur with previous studies but also highlight unique trends within the university student population, suggesting that tailored interventions targeting specific demographic groups especially young people could enhance HIVST uptake.

Key facilitators identified in the study include awareness of HIV pre-exposure prophylaxis, self-identification as sexually active, and positive attitudes towards HIV treatment and prevention. Participants aware of PrEP were significantly more likely to use HIVST, reflecting the critical role of HIV prevention education in promoting self-testing. Additionally, those who considered themselves sexually active demonstrated a higher likelihood of using HIVST, consistent with the understanding that sexually active individuals are more aware of their HIV risk and more likely to seek testing services.

Despite the positive trends observed, several barriers to HIVST uptake persist. Fear of social stigma, concerns about the accuracy of self-tests, and cost-related issues were identified as significant barriers. While these factors were not always statistically significant in the multivariate analysis, they underscore the importance of addressing these barriers through targeted, demographically sensitive interventions. The study also highlighted the role of media and social campaigns, such as the "Chukua Selfie" initiative, in raising awareness and promoting HIVST. However, the effectiveness of

these campaigns may be enhanced when integrated into broader, multi-faceted strategies that address the identified barriers.

The results of this study suggest that improving HIVST uptake among university students requires a comprehensive approach that includes education, accessibility, and supportive policies. Increasing awareness of PrEP and other HIV prevention methods, addressing stigma, and promoting supportive attitudes towards people living with HIV are essential steps in this process. Additionally, integrating HIVST promotion with broader sexual health education and services on campus can create a supportive environment that encourages regular HIV testing.

In conclusion, this study has provided key insights into the barriers and facilitators of HIVST among undergraduate students at Kenyatta University. By focusing on significant facilitators and addressing the identified barriers, health programs can improve the uptake of HIVST and contribute to better HIV prevention and control within this key population. These findings offer a nuanced understanding of the factors affecting HIVST uptake and underscore the need for targeted interventions that are sensitive to the demographic and social contexts of young adults in Kenya.

5.3 Recommendations

5.3.1 Recommendations from the Study

1. Enhance HIV prevention education through increasing awareness of HIV prevention methods, particularly HIV pre-exposure prophylaxis among youths. These initiatives should emphasize the importance of HIVST as a critical tool in HIV prevention, especially for young sexually active individuals.

2. Address barriers to HIVST uptake by implementing targeted interventions to reduce barriers such as social stigma, concerns about the accuracy of self-tests, and cost-related

issues. Providing free or subsidized HIVST kits and ensuring privacy and confidentiality can significantly enhance the uptake of self-testing among undergraduate university students.

3. Leverage mass media and social media campaigns through expanding and integrating successful media campaigns like "Chukua Selfie" into broader HIV prevention strategies. These campaigns should be complemented with educational and support services that address the specific needs and concerns of different demographic groups within the student population.

4. Integrate HIVST within in-campus health services by strengthening the integration of HIVST promotion with existing sexual health education and counseling services on campus. Ensuring that university health centers are well-equipped with HIVST kits and provide comprehensive pre- and post-test counseling can increase accessibility and encourage regular HIV testing among students.

5. Tailor HIV prevention interventions to demographic groups by developing and implementing tailored interventions that consider the unique characteristics of different demographic groups, such as age, gender, and marital status. These interventions should aim to increase HIVST uptake by addressing the specific needs and motivators of these groups, thereby contributing to more effective HIV prevention and control efforts.

5.3.2 Recommendations for Further Research

1. Investigate the Long-Term Effects of HIV Self-Testing on HIV Prevention and Treatment: Conduct research to evaluate the long-term outcomes of HIV self-testing, focusing on its impact on prevention, early diagnosis, linkage to healthcare services, and adherence to treatment among undergraduate students. This research should assess

whether increased self-testing leads to improved health outcomes, such as lower transmission rates and enhanced quality of life for individuals living with HIV.

2. Examine the Influence of Cultural, Social, and Economic Factors on HIV Self-Testing Uptake: Conduct comprehensive qualitative and quantitative research to delve into how various cultural, social, and economic factors impact the adoption of HIV self-testing services among undergraduate students. Understanding these influences will be crucial for identifying areas that require attention and for designing more effective interventions aimed at enhancing self-testing utilization.

3. Evaluate the Impact of Targeted Interventions on HIV Self-Testing Uptake: Design and assess interventions specifically aimed at overcoming the barriers and leveraging the facilitators of HIV self-testing among undergraduate students in Kenyan universities. These interventions might include customized awareness campaigns, gender-focused support networks, and peer-driven initiatives. The effectiveness of these interventions should be measured in terms of their impact on HIV self-testing uptake, linkage to care, and treatment adherence within the target demographic.

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APPENDICES

APPENDIX I: INFORMED CONSENT

Participant Information Sheet (To be kept by participant)

Research Title: Barriers and facilitators to human immunodeficiency virus self-testing among undergraduate students in Kenyatta University.

Dear Participant,

My name is Dr. Nicholas Kyalo Muendo. I am a postgraduate student from Kenyatta University, school of medicine currently pursuing a Master of Medicine in Family Medicine. I am working with my faculty supervisors Dr. Joseph Thigiti and Dr. Osborn Tembu both from Department of Family Medicine, Community Health and Epidemiology, School of Medicine, Kenyatta University. I am conducting a research study titled, " Barriers and facilitators to human immunodeficiency virus self-testing among undergraduate students in Kenyatta University", which I invite you to take part in. This study aims to identify the factors that facilitate or hinder the use of HIV self-testing kits. Upon you consenting to this, I will be required to ask you some questions about knowledge of HIV and HIV self-testing.

Voluntarism

Participation in this study is wholly voluntary. You have the right to decline participation or to withdraw your participation at any point you deem necessary. Your studies or academic program will not be interfered with should you agree to participate in this study. In case of any questions related to the study, you are at liberty to ask at any time.

Discomforts and Risks

If there are any questions that make you uncomfortable, you are at liberty to decline answering them. There are no risks involved as we shall not be testing or taking any samples from you. However, some questions might be slightly uncomfortable, you will be at liberty of answering them or not.

Benefits

There is no direct benefit to you if you participate in this study. However, the information you provide will help us develop and share policies in respect to HIV self-testing to increase uptake of self-testing kits among the youths for improved awareness among the untested population and to facilitate linkage to counselling and appropriate care.

Reward

There will be no rewards or payment offered if you agree to participate in this study.

Confidentiality

Your personal information will be handled with the utmost confidentiality and will be used for research purposes only. Your names will not be recorded on the questionnaires. To prevent breach of confidentiality, you will be randomly assigned study identification

numbers. The link between your name and the study identification numbers will be safely kept by the investigator and research team and may be used to enable communication in the case of any clarification needed.

Contact Information

If you have questions about the study, call the principal investigator Dr. Nicholas Kyalo Muendo 0721140370 and you can also contact him nikomuendo@yahoo.com. However, if you have questions about your rights as a study participant, you may contact Kenyatta University Ethical Review Committee Secretariat on chairman.kuerc@ku.ac.ke or secretary.kuerc@ku.ac.ke.

Participant's statement

I confirm that the above information regarding my participation in the study is clearly understood by me. That my participation in this study is voluntary and I can withdraw my participation at any time without penalty. That my information will be kept confidential. I agree to participate in this study.

Name: ……

Signature or Thumbprint: …….

Date: ……

Investigators Statement

I confirm that I have explained the information fully to the participant in a language he/she understands, the procedures to be followed in the study and the benefits and risks involved.

Name of Interviewer: ……

Signature …….

Date ……

QUESTIONNAIRE AND CONFIDENTIAL CONTACT INFORMATION SHEET

Confidential contact information sheet

This form is for purposes of collecting a participant's contact information purely for purposes of contacting the participant in case of need for clarification of information given during the interview. Information here will only be used by the principal investigator. Information filled will not be included in the research data and will be treated with utmost confidentiality and kept safely under lock and key.

NAME_____

PHONE NUMBER _____

QUESTIONNAIRE SERIAL NUMBER _____

APPENDIX II: QUESTIONNAIRE

A. SOCIO-DEMOGRAPHIC DATA

1. Identification code of the participant…….
2. Age of your last birthday……
3. What is your gender?

   Male ☐ Female ☐ Other ☐……

4. What is your marital status?

   Single ☐ Married ☐ Divorced ☐

   Other ☐……...

5. What is your religion?

   Christian ☐ Muslim ☐ Hindu ☐

   Other ☐……

B. INSTITUITION FACTORS

1. What is your mode of study?

   Full-time ☐ Part-time ☐

2. Which is your faculty of study…….
3. Which is your School / Department of study…….
4. What is your residency status?

   In-School ☐ Out of School ☐

C. SOCIO-ECONOMIC FACTORS

1. What is the source of funds for catering for your day to day expenses?

Formal employment ☐ Self-employment ☐ Government-HELB ☐ Parents/Guardians/Caregivers Stipend ☐ Others ☐ …….

D. KNOWLEDGE ABOUT HIV

1. Do you think HIV/AIDS is a serious disease?

   Yes ☐ No ☐ Unsure ☐

2. How is HIV spread? (Choose all that are applicable)

   Sexually ☐Mother to Child ☐Blood Transfusion ☐Intravenous Drug Abuse ☐ Others ☐ (Specify)…….

3. How do you prevent acquiring HIV infection? (Choose all that are applicable)

   Sexual abstinence ☐ Being Faithful to one partner ☐ Protected Sex ☐

   Not sharing needles ☐ Handling any blood / contaminated products gloved ☐

   Others ☐ (Specify)…….

4. Are you aware of HIV Pre-exposure prophylaxis?

   Yes ☐ No ☐ Unsure ☐

5. Does HIV have a cure?

   Yes ☐ No ☐ Unsure ☐

6. If you get infected with HIV can you live a normal life if on treatment with Highly active antiretroviral therapy [HAART]?

   Yes ☐ No ☐ Unsure ☐

E. HIV TESTING ACCEPTANCE

1. Have you ever tested for HIV?

   Yes ☐ No ☐ Unsure ☐

2. Have you ever used a HIV self-test kit?
   Yes ☐ No ☐ Unsure ☐
3. If Yes from (1) above when did you do the test?
   Last 3 months ☐ Last 6 months ☐ More than 1 year ago ☐
4. What type of HIV test did you do?
   Facility Test (VCT) ☐ HIV Self –Testing ☐
5. If you did HIV Self –Testing or answered 'Yes' to (2) above which self-test kit did you use? (Choose all that are applicable)
   INSTI® ☐ OraQuick® ☐ Atomo® HIV Self-Test ☐ Other ☐
6. How did you get to know about the HIV self-test kit? (Choose all that are applicable)
   Print media ☐ Social Media ☐ Outdoor advertising ☐ Hearsay ☐
   Referral from friend ☐Health education from a health worker ☐ Internet ☐
   TV/Radio ☐ Journal/article/manuscripts ☐
   Others ☐…….
7. Do you prefer the blood or oral based HIV self-testing kit?
   Blood ☐ Oral ☐ Unsure ☐ None ☐
8. Did you find the instructions in the test kit easy to understand?
   Yes ☐ No ☐ Unsure ☐
9. Do you know the difference between Facility Testing (VCT) and HIV Self – Testing Services?
   Yes ☐ No ☐ Unsure ☐
10. Where do you prefer getting tested for HIV from?
    Health facility ☐ Privately at home ☐
11. Was it easy to access the HIV self-test kits?
    Yes ☐ No ☐ Unsure ☐
12. Was the self-test kit affordable?
    Yes ☐ No ☐ Unsure ☐
13. How much was the self-test kit?
    More than 1000 Kshs ☐Less than 1000Kshs ☐ Free of charge ☐
14. Do you feel confident testing and interpreting your HIV status at home?
    Yes ☐ No ☐ Unsure ☐
15. Is privacy a major concern for you when doing an HIV test?
    Yes ☐ No ☐ Unsure ☐
16. Why is it important to know HIV status? (Choose all that are applicable)
    Testing saves lives ☐ Protecting loved ones ☐ Enables early treatment ☐
    Stopping transmission to unborn baby ☐ Empowerment knowing HIV status ☐
    Staying alive and well ☐ Helps make informed choices about future ☐
    Others ☐ (Specify)…….
17. What were your reasons for doing the HIV test? (Choose all that are applicable)
    Routine Testing ☐ Specific risk incident ☐ Partner's request ☐
    End/beginning of a relationship ☐Partner diagnosed as HIV positive ☐
    Symptom of STD ☐ Part of ANC routine tests ☐Multiple sex partners ☐
    Other ☐ (Specify)……

18. Have you ever tested the self-test kit with your sexual partner?
    Yes ☐ No ☐ Unsure ☐
19. Did you share the results with your sexual partner(s)?
    Yes ☐ No ☐ Unsure ☐
20. What would make you not perform a HIV test? (Choose all that are applicable)

Low perceived risk ☐Fearing a positive test result ☐Fear of partner's reaction ☐
Need for partner consent ☐Fear of stigmatization ☐Trusting your sexual partner ☐
Recently tested (within past 6 months) ☐ Religious belief ☐Lack of Confidence ☐
Others ☐…….

21. What challenge(s) do you encounter when using Facility based HIV testing (VCT)? (Choose all applicable)

Fear of stigmatization ☐ Religious belief ☐ Mistrust of results ☐
Fear of being seen attending VCT clinic ☐ Lack of privacy ☐
Too much time taken in counselling and testing ☐ Inadequate counselling at VCT ☐
Difficulty accessing VCT (e.g. distance) ☐ Others(Specify)……...

22. What challenge(s) do you encounter using HIV Self –Testing services? (Choose all applicable)

Difficulty accessing kit ☐Unaffordability of kit ☐
Difficulty understanding how to use kit ☐ Difficulty interpreting results ☐
Difficult medical jargon in instruction material in kit☐
Difficulty accessing linkage to care & counselling after testing ☐
Others ☐ ……

23. After HIV self-testing did you seek a second opinion or counselling from a qualified health professional regarding your results?

Yes ☐ No ☐ Unsure ☐

24. After contacting a qualified healthcare professional did you access the following services; (Choose all that are applicable)

Linkage to HIV care☐ HIV Prevention education☐
Assisted partner notification services☐ Voluntary medical male circumcision☐ Pre/post exposure prophylaxis services☐
Others ☐…….

25. How much do you agree or disagree with this statement: "HIV self-test kits should be free in all public health facilities".

Strongly agree☐ Agree☐ Neutral ☐ Disagree☐ Strongly Disagree ☐

F. SEXUAL BEHAVIOUR FACTORS

1. Have you ever had sex?
   Yes ☐ No ☐ Unsure ☐
2. Would you consider yourself sexually active?
   Yes ☐ No ☐ Unsure ☐
3. Do you always use protection when having sexual intercourse?
   Yes ☐ No ☐ Unsure ☐
4. Do you have multiple sexual partners?
   Yes ☐ No ☐ Unsure ☐
5. Have you ever had a sexually transmitted disease such as syphilis, herpes, gonorrhea?

Yes ☐ No ☐ Unsure ☐

6. What factors would you consider propagate risky sexual behaviors? (Choose all that are applicable)

   Early age of sexual debut ☐Pre-marital sex ☐

   HIV/AIDS transmission misinformation ☐" Sponsor" mentality☐

   Unemployment ☐Lack of religious guidance ☐ Alcoholism & drug abuse ☐

   Stress & mental anguish ☐Social media ☐ Online dating applications☐

   Misinformation about contraceptives ☐ Pornography ☐

   Lack of parental guidance & mentorship ☐ Peer-pressure ☐

   Other ☐……

G. STIGMA

1. Do you fear that you could contract HIV if you come into contact with the saliva of a person living with HIV?

   Yes ☐ No ☐ Unsure ☐

2. Do you agree or disagree with the following statement: "I would be ashamed if someone in my family had HIV"?

   Strongly agree☐ Agree☐ Neutral ☐ Disagree☐ Strongly Disagree ☐

3. In your opinion, are people hesitant to take an HIV test due to fear of people's /partners' reaction if the test result is positive for HIV?

   Yes ☐ No ☐ Unsure ☐

4. Do people talk badly about people living with or thought to be living with HIV to others?

   Yes ☐ No ☐ Unsure ☐

5. Would you buy fresh meat from a butcher if you knew that this person had HIV?

   Yes ☐ No ☐ Unsure ☐

6. Do you think a person living with HIV should be in a relationship or get married to a partner who is HIV negative?

   Yes ☐ No ☐ Unsure ☐

7. Do you think a person living with HIV can safely get a child with a HIV negative person without transmitting the virus as long as he/she is on HIV care?

   Yes ☐ No ☐ Unsure ☐

H. ACCESSIBILTY TO HEALTHCARE FACILITIES

1. Have you ever accessed HIV self-testing services in a health care facility?

   Yes ☐ No ☐ Unsure ☐

2. If Yes, where was it located?

   Within campus☐ Out of campus☐

3. What kind of healthcare facility did you get your HIV self-testing kit from? (Choose all that are applicable)

   University clinic/Hospital ☐ Government clinic/Hospital ☐

   Private clinic/Hospital ☐ NGO clinic ☐ Mobile clinic ☐

   Stand-alone testing center ☐ Pharmacy/chemist ☐

   Other ☐…….

4. Were you counselled before and after the test?

   Yes ☐ No ☐ Unsure ☐

5. Were you charged for the testing service or the self-test kit?
   Yes ☐ No ☐ Unsure ☐
6. If yes was the cost reasonable or prohibitive?
   Reasonable ☐ Prohibitive☐ Unsure☐
7. Do you prefer using HIV self-testing services to avoid going to healthcare facilities for HIV testing?
   Yes ☐ No ☐ Unsure ☐

I. MEDIA EXPOSURE

1. Do you know about the campaign dubbed *"Chukua Selfie"*?
   Yes ☐ No ☐ Unsure ☐
2. If yes to (1) above how did you hear about it? (Choose all that are applicable)

Print media ☐ Social Media ☐ Outdoor advertising ☐ Hearsay ☐

From a friend ☐ From a health worker ☐Internet ☐ TV/Radio☐

Others☐……

3. Which tool of media do you prefer to use to gather and expand your knowledge about HIV self-testing? (Choose all that are applicable)

TV/Radio☐ Mobile Phone☐ Print media☐ Personal computer☐

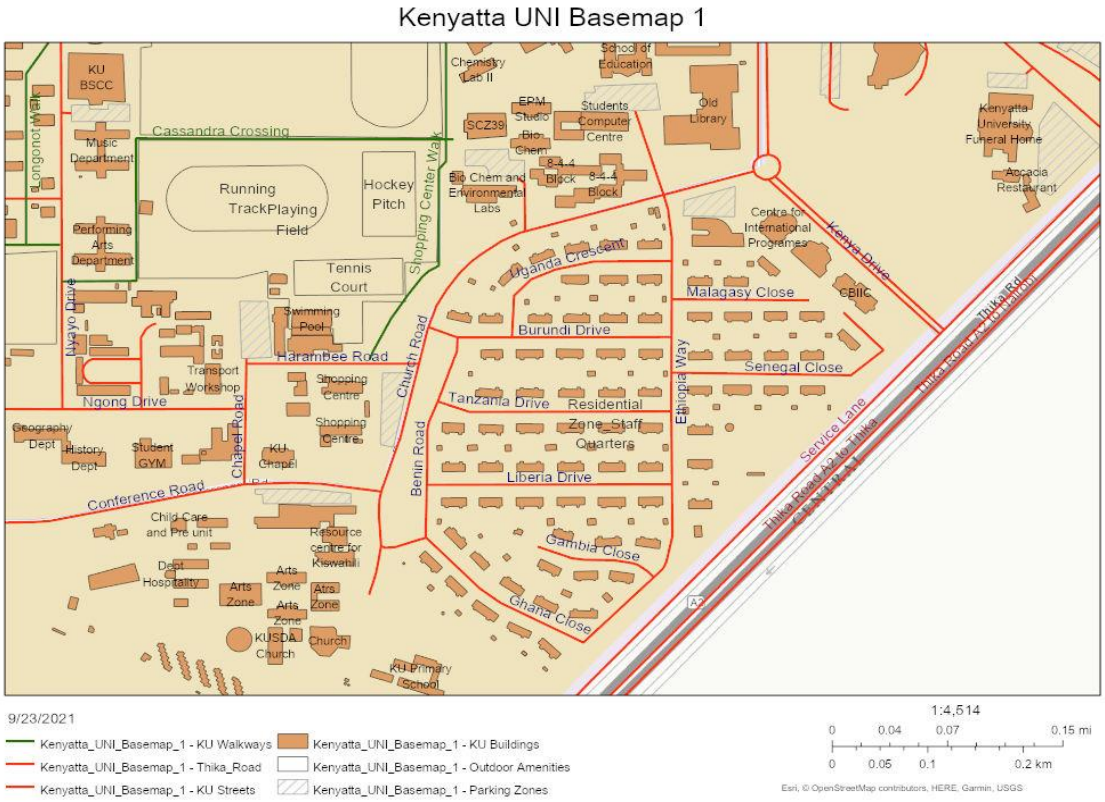
Outdoor advertising☐ Other☐……

4. Which tool of media would you prefer to be used to spread information about HIV self-testing especially among the youth? (Choose all that are applicable)
   TV/Radio☐ Mobile Phone☐ Print media☐ Personal computer☐
   Outdoor-advertising☐
   Other☐……
5. If you have used the HIV self-testing kits, did you utilize the toll free phone number or social media link given at the back of packages regardless of your test result?
   Yes ☐ No ☐ Unsure ☐
6. If yes, were you successfully linked to a health care provider or counselor?
   Yes ☐ No ☐ Unsure ☐
7. Would you recommend the HIV self-testing to other people?
   Yes ☐ No ☐ Unsure ☐

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE

****

APPENDIX V: MAP OF KENYATTA UNIVERSITY MAIN CAMPUS



APPENDIX VI: KENYATTA UNIVERSITY RESEARCH APPROVALS

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 020-8704150

Internal Memo

FROM: Dean, Graduate School DATE: 22nd August, 2022

TO: Mr. Nicholas Kyalo Muendo REF: P151/26525/2019
Department of Obstetrics & Gynaecology,

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that Graduate School Board, at its meeting on 17th August, 2022, approved your Research Proposal for the M.Sc. Degree entitled, **"Barriers and Facilitators to Human Immunodeficiency Virus Self Testing among Undergraduate Students in Kenyatta University."**

You may now proceed with your Data collection, subject to clearance with the Director General, National Commission for Science, Technology & Innovation and Ethics Review Committee, Kenyatta University.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking and Progress Report Forms per semester. The forms are available at the University's Website under Graduate School webpage downloads.

Also, please ensure that you publish article(s) from your thesis before submitting it to Graduate School for examination as per the Commission for University Education and Kenyatta University guidelines.

Thank you.

KENYATTA UNIVERSITY OFFICE OF DEAN 24 AUG 2022 GRADUATE SCHOOL P.O. Box 43844-00100, NAIROBI

DR. HARRIET ISABOKE
FOR: DEAN, GRADUATE SCHOOL

CC. Chairman, Obstetrics & Gynaecology Department

Supervisors:

1. Dr. Joseph Thigiti
   C/o Department of Obstetrics & Gynaecology
   Kenyatta University

2. Dr. Osborn Tembu
   C/o Department of Obstetrics & Gynaecology
   Kenyatta University

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 020-8704150

Our Ref: P151/26525/2019

DATE: 22nd August, 2022

Director General,
National Commission for Science, Technology
and Innovation
P.O. Box 30623-00100
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR MR. NICHOLAS KYALO MUENDO REG. NO. P151/26525/19

I write to introduce Mr. Nicholas Kyalo Muendo who is a Postgraduate Student of this University. He is registered for M.Sc. degree programme in the **Department of Obstetrics & Gynaecology.**

Mr. Muendo intends to conduct research for a M.Sc. thesis Proposal entitled, **"Barriers and Facilitators to Human Immunodeficiency Virus Self Testing among Undergraduate Students in Kenyatta University."**

Any assistance given will be highly appreciated.

Yours faithfully,

PROF. ELISHIBA KIMANI
DEAN, GRADUATE SCHOOL

KENYATTA UNIVERSITY
OFFICE OF DEAN
24 AUG 2022
GRADUATE SCHOOL
P.O. Box 43844-00100, NAIROBI

HI/cww

KENYATTA UNIVERSITY
CENTRE FOR RESEARCH ETHICS AND SAFETY

Fax: 8711242/8711575 **P. O. Box 43844,**
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Website: www.ku.ac.ke
Our Ref: **KU/ERC/APPROVAL/VOL.1** Date: 28th /09/2022

Nicholas M. Kyalo
P.O Box 43844, 00100
Nairobi.

Dear Mr. Kyalo,

APPLICATION NUMBER: PKU/2598/I1723- BARRIERS AND FACILITATORS TO HUMAN IMMUNODEFICIENCY VIRUS SELF-TESTING AMONG UNDER GRADUATE STUDENTS IN KENYATTA UNIVERSITY

This is to inform you that ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE*** has reviewed and approved your above research proposal. Your application approval number is **PKU/2598/I1723.** The approval period is **28th /09/2022 to 28th /09/2023**

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 ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE***
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 ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE*** 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 ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE*** 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 ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE***

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

To serve you better, researchers are kindly requested to access and complete a customer feedback form and sent it back online as you continue with research and upon completion of data collection found on the following website link; ;(https://docs.google.com/forms/d/1ytWefDwvyz5h1oz_VIn0xbxg3uGdlDzMXFWNDsMrRPQ/edit?usp=sharing

Yours sincerely

Prof. Judith Kimiywe

Director: Centre for Research Ethics and Safety

KENYATTA UNIVERSITY

CE OF THE DEPUTY VICE-CHANCELLOR RESEARCH, INNOVATION AND OUTREACH

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Ref: KU/DVCR/RCR/VOL.3/352 **Date:** 19th December, 2022

Nicholas Kyalo Muendo
Department of Obstetrics and Gynaecology
School of Health Sciences
Kenyatta University

Dear Mr. Kyalo,

RE: COLLECTION OF RESEARCH DATA AT KENYATTA UNIVERSITY

This is in reference to your letter dated 5th December 2022 requesting for authorization to collect research data at Kenyatta University on the topic ***"Barriers and facilitators to human immunodeficiency virus self-testing among undergraduate students in Kenyatta University"*** towards the award of a Masters of Medicine (Family Medicine) degree.

I am pleased to inform you that your request to collect data has been approved. It is noted that your data will be collected from undergraduate students. It is further noted that the data will solely be used for academic purposes and will be treated with utmost confidentiality.

Yours sincerely,

C Thoruwa.

Prof. Caroline Thoruwa Ph.D.
Ag. Deputy Vice-Chancellor Research, Innovation and Outreach

cc: Vice-Chancellor
DVC, Academic

KENYATTA UNIVERSITY

OFFICE OF THE (REGISTRAR ACADEMIC)

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Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel: 020-8703223/0780830830

Our Ref: P151/26525/2019 **Date**: 15th February, 2023

Nicholas Kyalo Muendo
Email: nikomuendo@yahoo.com
Tel. 0721140370

Dear Mr. Kyalo,

RE: PERMISSION TO CONDUCT STUDY ON KENYATTA UNIVERSITY UNDERGRADUATE STUDENTS.

This is in reference to your letter dated 10th February 2023..

Please be informed that your request was considered and therefore you are required to provide us with the format of the data you need and what the data should contain.

Thank you.

MR. NOAH O. AJOUGAH,
FOR : REGISTRAR (ACADEMIC)
NOA/ln

APPENDIX VII: NACOSTI RESEARCH PERMIT

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **119013**

Date of Issue: **05/December/2022**

RESEARCH LICENSE

This is to Certify that Dr.. NICHOLAS KYALO MUENDO of Kenyatta University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: Barriers and facilitators to Human Immunodeficiency Virus Self Testing among Undergraduate Students in Kenyatta University for the period ending : 05/December/2023.

License No: **NACOSTI/P/22/21909**

119013

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.

See overleaf for conditions