THE UPTAKE OF THE COVID-19 VACCINE AND ASSOCIATED FACTORS AMONG PEOPLE LIVING WITH HIV ATTENDING CARE AND TREATMENT CLINIC AT MUHIMBILI NATIONAL HOSPITAL IN TANZANIA

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THE UPTAKE OF THE COVID-19 VACCINE AND ASSOCIATED FACTORS AMONG PEOPLE LIVING WITH HIV ATTENDING CARE AND TREATMENT CLINIC AT MUHIMBILI NATIONAL HOSPITAL IN TANZANIA

By

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A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Public Health at the Muhimbili University of Health and Allied Sciences

October 2024

CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance of the dissertation entitled **"*The uptake of the Covid-19 vaccine and associated factors among people living with HIV attending Care and treatment clinic at Muhimbili National Hospital in Tanzania"*** in fulfilment of the requirements for the degree of Master of Public Health at Muhimbili University of Health and Allied Sciences.

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Huda Jaffar Omari

(Co-supervisor)

Date: _____

DECLARATION AND COPYRIGHT

I, **Robert John Shokolo,** declare that this dissertation is my original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature……..…… Date…….....…….....

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Lastly, my heartfelt gratitude goes out to the study's participants, for their time and willingness to engage in this research. Their valuable input and cooperation made this study possible.

DEDICATION

I dedicate this work to my family, whose unshakable love, support, and encouragement have been the cornerstones of my journey. To my beloved wife, Anjelitha Valentine, your patience, understanding, and belief in my aspirations have been a constant source of motivation and strength.

With heartfelt affection, I also dedicate this research to the pure joy and innocence embodied by my precious little ones, Theodore, and Mirielle, who fill our home with joy and wonder. Their infectious enthusiasm and innocent curiosity inspire me to explore the realms of knowledge.

ABSTRACT

Introduction: In the midst of the COVID-19 pandemic, vaccination has become clear as a vital approach for ending the virus's spread. However, COVID-19 vaccine uptake among specific groups, such as People Living with HIV (PLWH) who face compromised immune systems, remains a critical concern.

Objective of the study: This study aimed to assess COVID-19 vaccination uptake and associated factors among People living with HIV attending the Care and Treatment Clinic at Muhimbili National Hospital in Tanzania.

Methods: The study used a cross-sectional design and applied a quantitative research approach. The study was carried out at Muhimbili National Hospital, from August to September 2023, and utilized a questionnaire with structured questions comprising Likert-scale items. A total of 343 Participants were selected using a systematic random sampling technique. Descriptive, bivariate, and multivariate analysis was conducted to determine participants' characteristics and factors associated with COVID-19 vaccine uptake among PLWH.

Results: A total of 343 respondents participated in this Study. The majority of 200 participants, 58.3% received the COVID-19 vaccine. Among the participants, those aged 36 to 44 and 45 years and above were statistically significantly associated with vaccination uptake ($p<0.001$). Individual factors—trust in vaccine safety ($p< 0.001$), perceived benefits ($p<0.001$), and personal beliefs($p=0.009$)—significantly influenced the uptake. Organizational factors like effective communication ($p<0.001$), transparency ($p< 0.001$), accessibility ($p < 0.001$), and government information ($p< 0.001$) also impacted vaccination uptake.

Conclusion and recommendation: COVID-19 vaccination among PLWH at MNH is still below optimal. Age, trust, perceived benefits, and personal beliefs were key individual determinants. Moreover, organizational factors; transparency, communication, vaccine accessibility, and the effectiveness of information dissemination from health agencies significantly impact vaccine uptake. Tailored interventions, diversified outreach, and strategic collaborations between health agencies are recommended for improved uptake.

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ABBREVIATIONS

AOR	Adjusted Odds ratio.
CI	Confidence interval
COVID 19	Coronavirus disease 2019
CTC	Care and Treatment Clinic
HCW	Health Care Worker
HIV	Human Immunodeficiency Virus
MNH	Muhimbili National Hospital
MOH	Ministry of Health
MUHAS	Muhimbili University of Health and Allied Sciences
PLWH	People Living with HIV
SARS-COV-2	Severe Acute Respiratory Syndrome Coronavirus 2
SEFT	Social Ecological Framework Theory
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization

DEFINITION OF TERMS

Vaccine: A vaccine is a biological treatment that mobilizes the immune system to protect the body from a specific infectious disease. It typically contains a microorganism's weakened, dead, or specific component. When introduced to a person, the immune system recognizes this foreign substance as a potential threat and mounts an attack to get rid of it. This process "primes" the immune system so that it will remember the specific pathogen and be better prepared to defend against subsequent exposures to the real disease-causing substance (1-2).

Uptake of COVID-19 Vaccine: This describes the proportion of people in a given population who decide to have at least one dose of COVID-19 vaccine (3).

Associated factors for the uptake of the COVID-19 vaccine: This refers to a range of attributes that either directly or indirectly motivate or dissuade individuals living with HIV to uptake or reject the vaccine (4).

Social Factors: According to the Social Ecological Framework Theory, this refers to the interpersonal connections, social networks, and cultural norms that affect a person's behavior and decision-making within their society. Social factors, which might include community involvement, peer and family influence, social support, and dominant society values and beliefs, are important in determining health behaviors (5).

Individual Factors: According to the Social Ecological Framework Theory, this refers to the individual traits, convictions, and life events that shape a person's conduct and choices. Individual factors can include, but are not limited to, health state, personal history, knowledge, attitudes, views, and demographics (age, gender, race, and education level). Individual characteristics can influence an individual's response to interventions and health-related decisions, and they are important in forming health behaviors (6).

Organizational Factors: According to the Social Ecological Framework Theory (SEFT), this refers to the traits of establishments, groups, and frameworks that affect a person's conduct and choices. The quality of treatment given, organizational policies and procedures, healthcare workers' attitudes and behaviors, and the availability and accessibility of services are all examples of organizational aspects. By influencing the context in which people engage with healthcare systems and providers, organizational characteristics can have an impact on health behaviors and ultimately influence the decisions and results people make regarding their health (7) .

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

The new coronavirus that sparked the global COVID-19 pandemic has presented healthcare systems with worldwide unprecedented challenges. Authorities and scholars throughout the world are quite concerned about the COVID-19 pandemic and its impact to vulnerable groups (8) including People Living with HIV (PLWH).

When the new coronavirus surfaced in late 2019, it quickly spread across international borders, causing widespread illness, deaths, and unprecedented global economic disruption (9). The rapid transmission and high rate of infection of the virus have compelled governments, public health organizations, and the scientific community to take urgent action. COVID-19 nevertheless poses serious health, social, and economic problems despite the decrease in new infections worldwide (10). Globally, as of May 27, 2022, The severe acute respiratory coronavirus-2 (SARS-CoV-2) has been responsible for about 525 million infections and over 6.2 million recorded deaths. More than 8.9 million cases and 170,471 deaths have been reported in Africa alone (11).

In response, governments all around the world have implemented several strategies in addition to vaccine campaigns to combat the COVID-19 pandemic. To prevent the spread of viruses, one main strategy has been to enforce lockdowns and movement restrictions. This entails closing non-essential enterprises, following social distancing guidelines, and supporting remote work and education (12). Travel restrictions have been implemented to stop the COVID-19 virus from spreading, with countries tightening border controls and requiring new arrivals to undergo quarantine (12). To quickly identify and isolate virus-infected individuals and stop future transmission, governments have also placed a high value on robust testing and contact tracking systems (13). Populations at risk, including those with HIV, have received extra attention because of their increased vulnerability

during the COVID-19 pandemic. According to a recent systematic review and meta-analysis, people living with HIV were no more likely to get COVID-19 and experience severe symptoms than people without HIV infection (14). PLWH with COVID-19, however, were at a greater risk of dying than those without HIV (15).

In the absence of a universal therapy, vaccination remains the most reliable and cost-effective means of preventing COVID-19 and halting its spread. For PLWH, vaccination against COVID-19 found to be both safe and efficacious (16). Significant advancements have been made in the creation of secure and efficient COVID-19 vaccines to counteract the virus's detrimental effects on global health and the economy (17,18). Approximately 13 billion doses of vaccinations had been given globally as of October 26, 2023 (19). The capacity of vaccine uptake to prevent COVID-19 in the general population and in patients living with HIV is considered a significant scientific achievement in the modern era. To safeguard vulnerable groups like PLWH, focused communication efforts to educate and enlighten these communities about the risks posed by COVID-19 and the essential safeguards were conducted. This included disseminating information that was simple to comprehend about good personal hygiene practices, social distancing advice, and the proper use of masks (20). These targeted interventions are intended to reduce viral exposure and safeguard the health and welfare of individuals most at risk for serious COVID-19 consequences.

The World Health Organization has recognized vaccine hesitancy as a serious threat to world health, even though the organization advises COVID-19 vaccination for everyone without a contraindication (21). The goal of reducing the burden of infectious illnesses cannot be achieved just by making vaccinations and immunization programs available. Vaccine hesitancy, defined as the failure to receive vaccination despite easily accessible vaccination services (22), is one of the biggest obstacles to vaccination success. (23).

A narrative study of 114 countries around the world (24), which looked at acceptance rates for the COVID-19 vaccine uptake, found that Iraq had the lowest acceptance percentage

(13%), while Nepal and Vietnam had the highest (97%). The regions with the highest rates of vaccine hesitancy are the Western/Central Africa, Europe and Central Asia, and the Middle East/North Africa. The vaccination acceptance rates ranged between 13% and 59% in 42 countries, while 72 of 114 nations reported acceptance rates of 60% or higher. A survey conducted in Canada found that those living with HIV showed reduced desire to get vaccinated (65.2% compared to 79.6%). when compared to those who were HIV-negative (25). Comparably, China found lower vaccination intentions, with only 57.2% of PLWH indicating a desire to get the COVID-19 vaccine (26). Just 26.6% of the 344 responders in Nigeria had received the COVID-19 vaccination. Just 10.5% of the 256 respondents who had not received a vaccination were willing to do so, compared to 57.8% who were unwilling and 31.7% who were undecided, yielding an overall reluctance rate of 89% (27).

Tanzania, like many other countries, is not only battling with the HIV/AIDS epidemic but also the COVID-19 pandemic. Understanding the uptake of the COVID-19 vaccine among PLWH is crucial due to their compromised immune systems and potential vulnerability to severe COVID-19 illness. Muhimbili National Hospital is a significant HIV care and treatment clinic in Tanzania that is vital to addressing the medical requirements of individuals living with HIV. Therefore, it is crucial to look into the factors that affect PLWH's COVID-19 vaccine uptake, when they visit the Care and Treatment Clinic at Muhimbili National Hospital.

Given the poor COVID-19 vaccine uptake among individuals from diverse nationalities, this study intends to assess COVID-19 vaccine uptake and related determinants among PLWH attending the Care and Treatment Clinic at Muhimbili National Hospital in Tanzania.

1.2 Problem statement

The COVID-19 pandemic has made things more difficult for PLWH. Due to their weakened immune systems, PLWHs are more likely to experience serious consequences

such as who are at heightened risk of severe illness and death due to their compromised immune systems when coming into contact with COVID-19 (17). Confirmed COVID-19 cases of 42973, were recorded in the United Republic of Tanzania between January 3, 2020, and April 12, 2023. (28). A vital step in stopping the virus's spread and its impact is the COVID-19 vaccine uptake campaign.

More than 1,000 COVID-19 vaccination sites were set up at HIV clinics as part of these activities in order to reach out to PLWH, other people looking for medical attention, and healthcare professionals. Additionally, over a thousand individuals obtained instruction on the safe administration of vaccinations (29,30). The real uptake of COVID-19 vaccinations is unknown, despite the government's efforts to safeguard and promote the health of those living with HIV by guaranteeing their access to the vaccine. Overall official figures indicate a lower uptake of COVID-19 vaccinations. Approximately 39 million vaccination doses had been given nationwide as of March 11, 2023 (30).

Several factors may influence the uptake of COVID-19 vaccines in this population. These include individual beliefs and perceptions about vaccine safety, social influences such as community and peer pressure, and organizational factors like the accessibility of vaccination services (34). However, few studies have explored the determinants of vaccine uptake specifically among PLWH in Tanzania. Understanding these factors is critical for developing targeted interventions to increase vaccination rates among PLWH and protect this vulnerable population from severe COVID-19 outcomes.

This study seeks to fill this gap by examining the factors influencing COVID-19 vaccine uptake among PLWH attending the Care and Treatment Clinic (CTC) at Muhimbili National Hospital. It aims to provide evidence-based insights that can inform public health strategies to improve vaccination rates and reduce the impact of COVID-19 on PLWH in Tanzania.

1.3 Theoretical Framework

A theoretical framework is a collection of connected ideas, presumptions, and expectations that offer a framework for comprehending and explaining relevant relationships or phenomena (31). The theoretical framework serves as a roadmap for academics as they formulate research questions and study hypotheses to address the issue at hand. The Social Ecological Framework Theory served as the study's compass (SEFT).

The socioecological framework theory was first presented by Bronfenbrenner as an ecological systems theory in the 1970s. McLeroy, Bibeau, Steckler, and Glanz have since redefined it as a framework for encouraging behavioral changes connected to health. Five levels of impact are covered by the theory: organizational, environmental, interpersonal, intrapersonal, and policy influences (32,33). This thorough framework highlights the complex relationships that exist between personal characteristics, social interactions, organizational factors, and larger societal impacts, highlighting the necessity of a multifaceted approach to comprehending and resolving health habits.

The socioecological framework theory's comprehensive understanding of the several elements that influence people's personal health habits is one of its key benefits. Researchers and practitioners can develop focused and successful interventions that address various obstacles and improve health outcomes by looking at the links between various levels of impact. But the framework's intricacy can also be seen as a drawback because it could be challenging to separate out the precise effects of each component and how they interact. The socioecological framework hypothesis is nonetheless very useful for researching health-related behaviors, such as the adoption of COVID-19 vaccinations among particular populations, despite these obstacles.

Researchers can develop customized interventions to enhance vaccination uptake and public health by utilizing the SEFT framework to examine the interplay between

individual, social, organizational, environmental, and policy factors. This approach helps researchers better understand the barriers and enablers affecting vaccine uptake.

1.4 Conceptual framework

People living with HIV are influenced by a number of factors, which are explained by the conceptual framework in Figure 1 below regarding the uptake of the COVID-19 vaccine. It is based on the Social Ecological Framework Theory. The paradigm takes into account the individual, societal, and organizational levels as independent factors and shows how they interact to shape the dependent variable of vaccination uptake.

Individual variables include a range of demographics (such as age, gender, education), health literacy, attitudes, and beliefs that significantly impact vaccination uptake.

In PLWH communities, social factors which are ingrained in interpersonal networks and cultural norms include family support, community perceptions, peer influence, and information sources. It Intricately direct and impact vaccination decision-making process, either by encouraging or discouraging vaccine uptake.

The practicality and viability of vaccine uptake are greatly influenced by organizational variables (such as accessibility to healthcare facilities, previous vaccination experiences, logistical challenges, and affordability, which span from organizational policies to healthcare accessibility and availability. These elements also greatly influence individuals' vaccination decisions inside the CTC at Muhimbili National hospital.

All these interrelated elements work together to outline a comprehensive landscape that impacts vaccination uptake with PLWH’s population. It also highlights the complex relationship between people, institutions, and society in the vaccination debate.

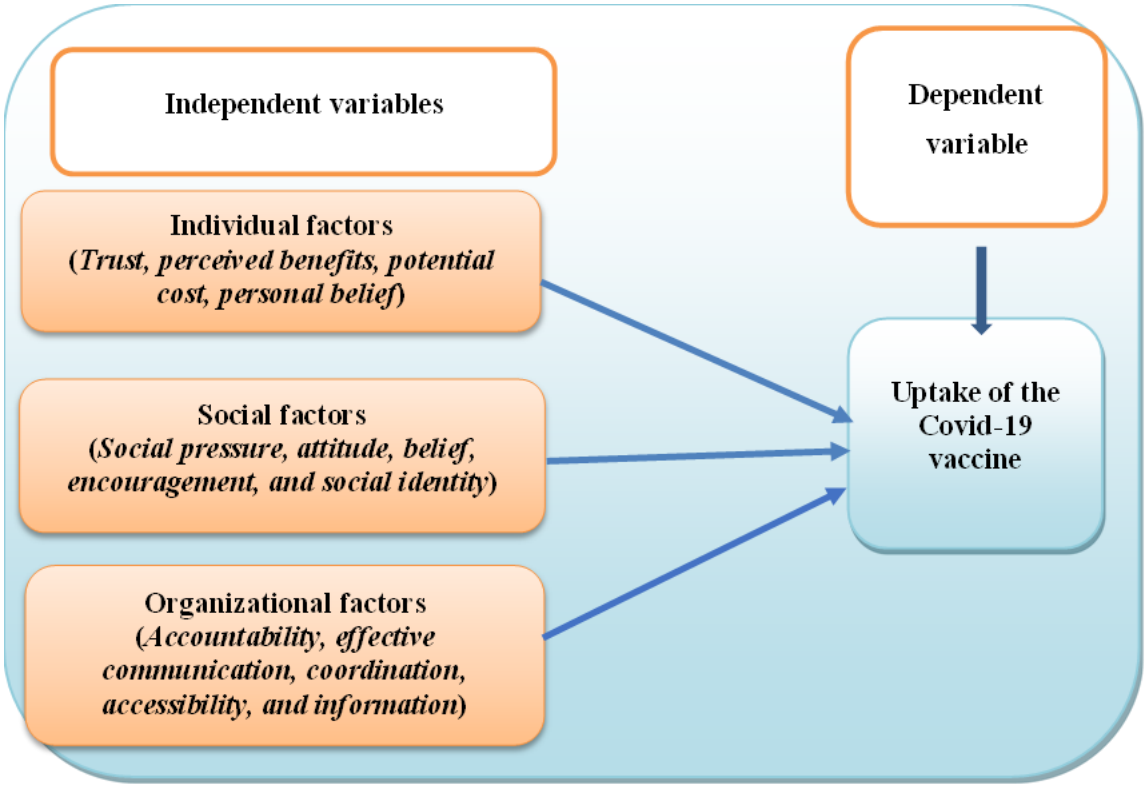


Figure 1: A conceptual framework for comprehending the COVID-19 vaccine uptake and related variables among PLWH. (Source; Bronfenbrenner (1977) and McLeroy et al. (1988)).

1.5 Rationale of the study

The theoretical, practical, policy, and future studies perspectives are crucial for public health policymakers and medical practitioners to develop targeted interventions, regulations, and medical approaches aimed at improving COVID-19 vaccination uptake and reducing health risks for people living with HIV during the pandemic.

Practically, investigating societal, individual, and organizational factors aids in identifying COVID-19 vaccine uptake barriers and provides guidance for focused interventions for this susceptible demographic. From a policy reasoning perspective, Tanzanian policymakers can use the findings to develop evidence-based policies that protect PLWH from COVID-19 by addressing the particular issues they encounter.

Additionally, the study contributes to the interaction of institutional, social, and individual factors influencing health behaviors concerning PLWH and COVID-19 vaccine uptake, which theoretically advances knowledge of the Social Ecological Framework Theory (SEFT). Last but not least, as Tanzania and the rest of the world struggle with the pandemic's long-term effects, this research provides insightful information for upcoming research and planning for public health, ensuring that the needs of PLWH and other vulnerable groups are considered in the continuous battle against COVID-19 and the advancement of overall health and wellness.

1.6 Research questions

The following were the research questions

1.6.1 Main Research question:

What are the factors associated with the uptake of the COVID-19 vaccine among PLWH attending CTC at Muhimbili National Hospital in Tanzania?

1.6.2 Specific Research questions:

i. What is the COVID-19 vaccine uptake among PLWH attending CTC at Muhimbili National Hospital in Tanzania?
ii. What are the individual factors associated with COVID-19 vaccine uptake among PLWH at Muhimbili National Hospital in Tanzania?
iii. What is the influence of social factors on the COVID-19 vaccine uptake among PLWH attending CTC at Muhimbili National Hospital?
iv. What are the organizational factors associated with COVID-19 vaccine uptake among PLWH at Muhimbili National Hospital?

1.7 Objectives:

1.7.1 Main Objective:

To assess the COVID-19 vaccine uptake and related factors among PLWH receiving CTC at Muhimbili National Hospital in Tanzania.

1.7.2 Specific Objectives:

1. To determine the uptake of the COVID-19 vaccine among PLWH attending CTC at Muhimbili National Hospital.
2. To assess the individual factors associated with the COVID-19 vaccine uptake among PLWH attending CTC at Muhimbili National Hospital.
3. To determine the social factors associated with the COVID-19 vaccine uptake among PLWH attending CTC at Muhimbili National Hospital.

4. To assess the organizational factors associated with the COVID-19 vaccine uptake among PLWH attending CTC at Muhimbili National Hospital.

2.0 CHAPTER TWO

LITERATURE REVIEW

2.1 Individual factors and the COVID-19 Vaccine uptake

Global research studies highlight a variety of individual characteristics that impact PLWH's uptake of the COVID-19 vaccination. Factors such as, age, gender and education level, all have shown impact on vaccination uptake, which makes demographics important. Moreover, the ability to make informed decisions is greatly influenced by health literacy, knowledge of the safety and effectiveness of vaccines, and favorable views on vaccination. For instance, an investigation into COVID-19 vaccination uptake and related determinants among individuals living with HIV was conducted in Oregon, United States of America. It was discovered that 61.6% of Oregon's PLWH had gotten at least one dose of the COVID-19 vaccine. Numerous factors that affect this community's vaccination uptake were shown to be significant by the study. According to the study, vaccination uptake was lower among younger PLWH (18–29 years old) than in older people (50 years and older). White PLWH had higher vaccination rates than Hispanic/Latinx PLWH. The COVID-19 vaccine uptake of PLWH in rural areas were lower than those in urban areas. Also, individuals who were part of the care community in 2020 and had a CD4 count, or viral load assessment were more likely to have received a vaccination than those who did not (34).

In regional contexts, particularly East Africa, gender plays a significant individual element in influencing the uptake of COVID-19 vaccination. Research highlights the significance of customized health communication strategies that take into account local languages and cultural quirks. For instance, a cross-sectional study on COVID-19 vaccination acceptability and uptake among people living with HIV in Uganda was carried out. According to that survey, women were more likely than males to have had a vaccination (73% vs 63%), with 69.6% of respondents reporting having received at least one dose. The

acceptability of vaccinations was positively correlated with increased vaccine confidence and favorable perceptions of vaccine accessibility (35).

Tanzania has distinct socio-cultural dynamics, much like other countries in East Africa. Age, literacy levels, and prior exposure to public health campaigns are among the demographic factors that influence vaccine uptake and perceptions in general. Research emphasizes the necessity of focused interventions that address personal issues including ignorance and mistrust. For instance, age is a significant determinant in COVID-19 vaccination uptake, as evidenced by a study conducted aimed to determine the COVID-19 vaccination uptake and hesitancy and its associated factors among HCWs in Tanzania. The survey also discovered that 53.4% of the participants had received the COVID-19 vaccine (36). While existing literature provides valuable insights, there is a need for more localized studies in Tanzania to understand individual determinants.

2.2 Social factors and the COVID-19 Vaccine uptake

At global level, there are a variety of sociocultural factors influencing PLWH's uptake of the COVID-19 vaccine. Reluctance to receive vaccinations is still influenced by the stigma and discrimination around HIV/AIDS. Support networks, such as attitudes in the family and community, play a crucial role. Public health campaigns that emphasize community engagement and social cohesiveness have been successful in increasing vaccination rates. According to the study on COVID-19 vaccination uptake among drug injectors (PWID) in Australia, 51% of respondents were not vaccinated, 19% said they had only one dosage, and 30% said they had received two doses. The remaining 25% did not respond to the question or were unclear about the vaccination they had gotten. With the exception of New South Wales and the Northern Territory, all states and territories had much lower rates of COVID-19 vaccination uptake among PLID than among the overall population. The following variables were highly correlated with PWID vaccination uptake: enhanced

support for peers to serve as vaccine champions is expected to diminish obstacles and enhance the uptake of COVID-19 vaccines (37).

In the African context, including East Africa, social factors intersect with cultural norms and community dynamics. Trust in community leaders and influencers can significantly impact vaccine uptake. Community-driven initiatives that emphasize the collective responsibility for public health have been successful. Nonetheless, issues with false information and mistrust of healthcare systems continue to exist. Addressing the socioeconomic factors of vaccination uptake requires interacting with local leaders and institutions. In Nigeria, a study looked at PLWHs undergoing clinical-outpatient follow-up at State Specialist Hospital Maiduguri (SSHM) who were hesitant to have the COVID-19 vaccine. To determine the level of COVID-19 vaccination reluctance among 344 PLWH undergoing antiretroviral therapy (ART) at the PEPFAR clinic in SSHM, a cross-sectional study design centred in a hospital was employed. Only 88 (26.6%) of the 344 respondents to the survey had got the COVID-19 vaccination. A reluctance rate of 89.45% was found among the 256 respondents who had not gotten the vaccine: just 10.5% were willing to get vaccinated, while the majority, 57.8%, did not want to be vaccinated and 31.7% were unsure (38).

In Tanzania's context, the role of community elders, and religious leaders is particularly noticeable. Social gatherings and communal decision-making may influence vaccine uptake. Tailored interventions that tackle local belief systems, involvement of respected community figures and community dialogues are essential. A successful COVID-19 vaccine uptake campaign depends on the participants' ability to comprehend and use social networks. Further investigation is necessary to completely comprehend the distinct sociocultural elements and regional belief systems influencing PLWH vaccination uptake.

2.3 Organization factors and the COVID-19 vaccine uptake

Globally, organizational influences that impact the COVID-19 vaccination uptake amid PLWH include the capabilities of the healthcare system, policies, and the accessibility of vaccine uptake programs. The vaccine uptake is positively impacted by an effective healthcare infrastructure and simplified vaccination delivery routes. The uptake of vaccines is greatly influenced by public health policies, which include thorough vaccination guidelines and unambiguous communication. Key practical organizational initiatives include ensuring equitable access, reducing barriers, and putting in place effective delivery methods. According to a Chinese study, there was a significant association between the possibility of PLWH not receiving the COVID-19 vaccine and its unavailability or scarcity (39).

In Africa, healthcare policies and infrastructure connect with organizational variables. Access to vaccines is greatly impacted by the availability and accessibility of vaccination centers, supply chain management and logistics. Customized health care plans that target underserved communities and remote locations can increase vaccination rates. Enhancing organizational support for vaccination delivery requires addressing supply chain issues, building relationships between health institutions and communities, and strengthening healthcare systems. Accessibility to the COVID-19 vaccination was significantly linked in the Uganda study to increased chances of vaccine uptake among PLWH (35).

Tanzania's healthcare organizational factors influencing vaccine uptake among PLWH are multifaceted. Access is impacted by the location of vaccination facilities, the availability of healthcare workers, and logistical issues. Community health workers, legislators, and healthcare practitioners must coordinate efficiently. Organizational methods that are crucial include creating strong monitoring systems, guaranteeing vaccine availability, and strengthening the infrastructure for vaccination. Understanding local healthcare infrastructure gaps, supply chain vulnerabilities, and policy implementation barriers is critical for addressing organizational hurdles in vaccine uptake. Although there have been

few studies on the uptake of the COVID-19 vaccine, context-specific factors unique to a particular nation or setting are required to inform public strategies aimed at promoting vaccine uptake (40).

3.0 CHAPTER THREE

MATERIALS AND METHODS

3.1 Study design

A cross-sectional design based on a health facility was employed, and a quantitative research approach was applied. was applied.

3.2 Study area

The study was carried out at Muhimbili National Hospital, situated in the Ilala District of Dar es Salaam region, Tanzania. The choice of this study area is grounded in several strategic reasons. Firstly, MNH functions as a nationwide referral hospital providing care to a wide range of patients from different parts of Tanzania. This diversity within the patient population ensures a more comprehensive representation of individuals living with HIV, thereby enhancing the applicability and generalizability of research findings to larger settings.

Second, MNH provides a favorable and encouraging environment for carrying out rigorous research because of its long history of cooperation with prestigious research institutes. Leveraging on the current set-up and expertise available at MNH is expected to facilitate the seamless execution of the study, ensuring access to essential resources, valuable data, and professional guidance essential for its success.

Furthermore, as a prominent healthcare institution, The MNH is essential to the execution of national directives and policies, particularly those concerning vaccine uptake campaigns. Examining the COVID-19 vaccination uptake among the HIV-positive population at MNH presents an opportunity to gain valuable insights into the efficacy of these policies and guidelines. Moreover, it can shed light on potential areas necessitating improvement, thereby contributing to the formulation of strategies aimed at enhancing vaccine uptake among individuals living with HIV nationwide.

Additionally, the clinic attendance at MNH is substantial, with approximately 40 to 60 individuals visiting daily. This high patient volume contributes to the feasibility and ease of data collection activities, ensuring a more comprehensive and representative dataset for the study.

3.3 Study population

This research focused on HIV-positive patients who attended the Muhimbili National Hospital's CTC between August and September of 2023.

3.4 Inclusion and exclusion criteria

3.4.1 Inclusion criteria

If an individual agreed to participate, the following were the main requirements for inclusion in the study.

- Individuals who were at least eighteen years of age when the COVID-19 vaccine was first distributed in August 2021, meaning those who were 20 years of age or older at the time of data collection.
- PLWH who had been consistently attending the CTC at MNH for the preceding three years, and
- Capability to comprehend and communicate in either Kiswahili or English languages.

3.4.2 Exclusion criteria

Individuals with severe illnesses, bed ridden or specific disabilities such as severe mental disabilities, speech impairments or profound deafness were excluded from participation in this study.

3.5 Sampling size and sampling technique

3.5.1 Sample size

By applying Kish Leslie's formula (35), the sample size for the study was computed to be 343 respondents. The computation was as follows

$$n = \frac{Z^2 \times p\,(1 - p)}{d^2}$$

Where n= Minimum needed sample size.

p = estimated proportion of uptake of COVID-19 vaccination among PLWH.

Z = 1.96 (the Z score corresponding to a 95% confidence interval)

d = maximum error the researcher is willing to allow = 0.05

p =Uptake of COVID-19 vaccine in Ugandan study (35) =66.3%

Sample size using the percentage of uptake:

$$\mathbf{n} = \frac{1.962 \times 0.663\,(1 - 0.663)}{0.05^2}$$

n = 343

Therefore, the total sample size was estimated to be, 343 PLWH.

3.5.2 Sampling technique

To ensure representative participation from people living with HIV attending the CTC at Muhimbili National Hospital in August and September 2023, this study used a systematic simple random sampling technique. Participants were selected at each clinic visit until the desired sample size was reached. This method was chosen because it provides an unbiased representation of the larger population, as each eligible individual had an equal chance of selection. A comprehensive list of all eligible PLWHs present on each clinic day was compiled to form a sampling frame. Each eligible participant was given a card with a unique serial number. To implement the systematic simple random sampling technique, the first participant was randomly selected by choosing a number between 1 and 10. After the selection of the first participant, every third individual on the list was chosen until the data collection for that day was complete. ensuring a fair and systematic sampling process.

3.6 Variables

3.6.1 Dependent variables

This study's dependent variable is the COVID-19 vaccination uptake, assessed through a binary scale. A value of "1" indicates that the participant has received the vaccination against COVID-19, while a value of "0" indicates that the individual has not undergone the vaccination process.

3.6.2 Independent variables

The independent variables were categorized into three main factors, each assessed using a five-point Likert scale based on specific associated indicators.

In the first set of independent variables, four items were used to measure individual factors: perceived benefits of vaccination, potential costs associated with vaccination, personal beliefs and values regarding vaccinations, and trust in the safety and efficacy of vaccines.

Five items made up the second set of social factors: social pressure; attitudes and beliefs within the social network; degree of encouragement from the social network; perceived expectations of the community; and alignment of vaccine uptake with social identity.

The effectiveness of communication and outreach efforts made by governmental and health agencies, the accessibility of COVID-19 vaccines, the level of information and education provided by the government, collaboration and coordination among various government and health agencies, and transparency and accountability displayed by these entities comprised the third set of independent variables, which related to organizational factors.

3.7 Data collection procedures

The primary data collection process involved the utilization of a pretested digital questionnaire administered via KOBO software. The questionnaire, designed by the author in English, was administered in Swahili, the local language, ensuring clarity and ease of

comprehension among participants. The digital format facilitated convenient and efficient data collection, ensuring uniformity and reducing errors in responses.

To ascertain respondents' COVID-19 vaccination status, confirmation was sought by referencing the individuals' vaccination cards. In cases where vaccination cards were unavailable, the official vaccination records were used to confirm vaccination status. This meticulous process was undertaken to ensure the accuracy and reliability of the collected data, fostering robustness in the analysis and findings of the study.

3.7.1 Recruitment of research assistants

Three qualified research assistants were selected, each possessing a health-related educational background and substantial prior experience in proficiently executing data collection activities. Their selection criteria focused on acquiring individuals well-versed in the intricacies of health research methodologies.

To ensure uniformity and consistency in data collection, the selected research assistants participated in a rigorous and comprehensive three-day training. This training session was specifically designed to impart a comprehensive understanding of the study's objectives, research methodologies, and ethical guidelines for conducting data collection. This training program was aimed at equipping the team with the necessary skills and knowledge to execute their roles effectively and maintain the highest ethical standards throughout the data collection process.

3.7.2 Data collection tools

The study employed electronic questionnaires with structured questions featuring closed-ended questions and utilized a five-point Likert scale (ranging from Strongly Agree to Strongly Disagree, with a Neutral midpoint) adapted from WHO, Behavioral and social drivers of vaccination Tools and practical guidance for achieving high uptake (42). This scale choice offers several research advantages. Firstly, it enables a comprehensive spectrum of responses, capturing participants' responses. The inclusion of a Neutral option

accommodates individuals who may not strongly align with a particular statement or question. Secondly, the Likert scale's simplicity enhances participant understanding and ease of completion, potentially boosting response rates while minimizing data omissions. Lastly, its widespread use in research facilitates comparative analysis across various studies and disciplines, enriching the interpretation of findings.

The questionnaire's development adhered to the study's objectives and was guided by insights from the literature review. Primary data collection via questionnaires was chosen due to its reliability, ensuring greater confidence in decision-making based on directly obtained and analyzed information. This method was favored for its cost-effectiveness and efficiency, allowing for swift administration within a concise timeframe. Moreover, the standardized quantitative approach in evaluating primary data simplifies result assessment. Regarding reliability, the study evaluated the respondents' responses' internal consistency using the Cronbach's alpha test. As a general rule, internal consistency reliability of the construct was determined by an alpha of 0.7 or higher using the SPSS program.

3.7.3 Pre-testing data collection tools

The data collection tool was pre-tested to assess its effectiveness and suitability for the research study. This essential step aimed to ensure the questions were consistent, comprehensible and logical to the respondents, facilitating the acquisition of accurate and pertinent information.

During the pre-testing phase, the research team administered the data collection tool to 20 people living with HIV. This allowed for an assessment of the tool's effectiveness in eliciting the study objectives. Emphasis was placed on evaluating the clarity, coherence, and appropriateness of the questions to ensure they could be easily understood and answered by the participants.

The data collected from the pre-testing phase was analyzed to identify any inconsistencies, ambiguities, or issues with question comprehension. Despite these initial findings, no refinements were necessary, and the tool was effective. Consequently, the data collection

tools were used in the main study without further adjustments, ensuring that the necessary data was accurately captured.

3.7.4 Data management

Throughout the data collection phase, daily reflections were conducted with the research team to assess and validate the collected data, ensuring. This step provided an opportunity for immediate identification and resolution of any discrepancies or irregularities in the collected data.

Once the data collection process was finished, the collected data sets underwent a data cleaning process. This involved identifying any inconsistencies, errors, or missing information. Such discrepancies were rectified or addressed through verification with the sources to ensure data accuracy. In addition, Password protection was used to secure the dataset, and participant confidentiality was sustained.

Subsequently, the cleaned datasets were organized and formatted in preparation for analysis. Data management procedures encompassed organizing, labelling, and documenting the datasets in a manner conducive to statistical analysis. This methodical approach was to make sure the data were prepared for statistical analysis so that the research findings could be used to derive insightful conclusions.

3.8 Data analysis

In this study, SPSS version 22 was utilized for a thorough analysis involving both inferential and descriptive techniques. Initially, descriptive statistics were employed to summarize the demographic characteristics of the participants, including age, gender, education level, and vaccination status, using frequencies and percentages. For inferential analysis, the chi-square test was utilized to examine associations between categorical variables, such as the relationship between demographic factors and COVID-19 vaccine uptake.

To explore the relationships between independent variables (individual, social, and organizational factors) and the dependent variable (COVID-19 vaccine uptake), multivariable logistic regression was conducted. This analysis calculated both crude odds ratios (OR) and adjusted odds ratios (AOR) to determine the strength and significance of these associations. Key independent variables included trust in vaccine safety, perceived benefits, and social support, while the dependent variable was measured as a binary outcome (vaccinated vs. not vaccinated). All analyses were performed with a confidence level of 95%, and a p-value of less than 0.05 was considered statistically significant. This approach ensured, analysis of the factors influencing vaccine uptake among People Living with HIV attending the Care and Treatment Clinic at Muhimbili National Hospital.

3.9 Ethical considerations

To ensure adherence to ethical standards, ethical approval for this study was granted by the Research and Ethics Committee of Muhimbili University of Health and Allied Sciences (Institutional Review Board). Authorization was also obtained from the relevant authorities at Muhimbili National Hospital (MNH) before the research. All participants were provided with comprehensive information about the study's purpose, procedures, and potential risks before obtaining their informed consent. This process ensured that participants understood their rights to withdraw from the study at any time without any impact on their healthcare. Data collection was conducted in a private space to ensure participants' comfort and confidentiality. Personal identifiers such as names were removed and replaced with unique codes in the dataset, accessible only to authorized personnel. These measures were implemented to protect data confidentiality, including password protection for electronic datasets. Personal identifying information was not collected to maintain privacy. Upon completion of data collection, secure disposal methods were used to prevent any potential privacy breaches.

4.0 CHAPTER FOUR

RESULTS

4.1 Demographic characteristics of study participants

A total of 343 PLWH participated in this study. The majority of respondents were female (64%). Regarding age, the largest proportion consisted of adults aged 45 years and above (46%). Self-employment was noted among 47% of the respondents, and 44% identified themselves as married.

In terms of educational attainment, 39% had completed primary education, while a smaller proportion (4%) reported having no formal education. The participant characteristics are presented in Table 1 below.

Table 1: Demographic characteristics of sampled participants (N=343)

Variable	Category	Frequency (n)	Percent (%)
Sex	Female	220	64
	Male	123	36
Age group (years)	20 -35	86	25
	36-44	99	29
	45 >	158	46
Education Level	No education	15	4
	Primary education	133	39
	Secondary education	110	32
	College/University and above	85	25
Marital Status	Married	152	44
	Single	117	34
	Widow	74	22
Occupation	Employed	78	23
	Self employed	162	47
	Student	27	8
	Unemployed	76	22

4.2 COVID-19 vaccine uptake among PLWH receiving CTC at MNH

Out of the 343 total respondents, 200 individuals (58.3%) had received the COVID-19 vaccine. Among the vaccinated study participants, the majority of those vaccinated were female, constituting 67%. Regarding the types of vaccination of COVID-19 received, 119 vaccinated individuals (60%) received the Jensen & Jensen vaccine, 40% received the Pfizer vaccine, and only 1% received the Sinopharm vaccine. Remarkably, 86% of the vaccinated respondents were able to present their COVID-19 vaccination certificate during the study, affirming their vaccination status.

4.3.Factors associated with the uptake of COVID-19 vaccine among PLWH receiving CTC at MNH

In this study, females exhibited a higher vaccination uptake compared to males, however it was not statistically significant. Age emerged as a significant determinant of vaccination uptake. Participants aged 45 years and above demonstrated the highest vaccination uptake of 56%, followed by those aged between 36-44 years at 27.5%. Conversely, the age group between 20-35 years exhibited the lowest vaccination uptake of 16.5%.

The education level and COVID-19 vaccine uptake were found to be correlated. Respondents with no education displayed the lowest vaccination uptake of 5.5%. interestingly primary education showed the highest vaccination uptake with 41.5%, followed by those with college/university-level education or above (27%) and secondary education (26%). Self-employed individuals exhibited a higher vaccination uptake of 48.5% compared to other occupational categories. Student individuals showed the lowest vaccination uptake of 5%.

While marital status did not show a significant difference in vaccination uptake, married individuals demonstrated a higher vaccination uptake of 45.5% compared to other marital status categories.

Table 2: Distribution of COVID-19 vaccine uptake by Demographic characteristics of PLWH attending CTC at MNH (N=343)

Characteristics	Variable	Vaccine uptake -(n)	Vaccine uptake (%)
Sex	Female	134	**67**
	Male	86	33
Age (in years)	20 - 35	33	16.5
	36 - 44	55	27.5
	45≥	112	**56**
Education level	No education	11	**5.5**
	Primary education	83	41.5
	Secondary education	52	26
	College/University and above	54	27
Occupation	Employed	53	26.5
	Self employed	97	**48.5**
	Student	10	5
	Unemployed	40	20
Marital status	Married	91	**45.5**
	Single	59	29.5
	Widow/Widower	50	25

The univariate logistic regression analysis aimed to explore the relationship between various independent factors and the uptake of COVID-19 vaccination. The analysis run using the SPSS software, revealed a statistically significant association in the age group 45 years and above with vaccine uptake ($p < 0.001$). Participants in this age category were significantly more inclined to get vaccinated compared to younger age groups. Other factors which were also significantly associated with COVID-19 vaccine uptake were primary education, college/university and above participants with educational level, self-employed individuals, students, and participants who were widowed.

Table 3: Socio-demographic characteristics associated with COVID-19 Vaccine Uptake among PLWH at MNH

Variable	COR (95%CI)	P-Value	AOR (95%CI)	P-Value
Age (years)				
20 - 35	1		1	
36 - 44	1.250 (0.841,1.858)	0.270	2.451(1.249,4.812)	**0.009**
45≥	2.435 (1.727,3.432)	**<0.001**	5.183(2.622,10.245)	**<0.001**
Sex				
Male	1		1	
Female	1.158(0.812, 1.650)	0.192	0.723(0.439,1.190)	0.202
Education level				
No education	1		1	
Primary education	1.660(1.169,2.358)	**0.005**	0.792(0.360,1.743)	0.563
Secondary education	0.897(0.617,1.304)	0.567	0.562(0.267,1.184)	0.130
College/University and above	1.742(1.120,2.709)	**0.014**	1.209(0.562,2.601)	0.627
Occupation				
Employed	1		1	
Self employed	2.120(1.318,3.411)	**0.002**	0.652(0.356,1.192)	0.164
Student	1.492(1.090,2.043)	**0.013**	0.539(0.195,1.491)	0.234
Unemployed	0.588(0.269,1.285)	0.183	0.422(0.206,0.866)	**0.019**
Marital Status				
Married	1		1	
Single	1.017(0.708,1.462)	0.926	1.423(0.780,2.596)	0.250
Widow/widower	2.083(1.281,3.390)	**0.003**	1.112(0.563,2.196)	0.760

Key: COR; Crude Odds Ratio, AOR; Adjusted Odds Ratio; CI; Confident Intervals,

PLHW; People living with HIV, MNH; Muhimbili National Hospital.

The multivariable analysis, we adjusted for age, sex, education level, occupation and marital status. The analysis demonstrated a significant association between several independent factors and COVID-19 vaccination uptake among PLWH as indicated in Table 3. Age exhibited a statistically significant association with vaccine uptake. Participants in higher age groups, 36 – 44 years ($p < 0.05$) and 45 years and above ($p <0.001$) were more likely to receive the COVID-19 vaccine compared to younger individuals, suggesting that age is a contributing factor to vaccine uptake among this population. Also, by adjusting for other factors, unemployed participants were statistically significantly associated with the vaccine uptake($p<0.05$). There was no evidence of sex, education level, or marital status factors to be statistically significantly associated with COVID-19 vaccine uptake among PLWH.

4.3.1 Individual factors associated with the COVID-19 vaccine uptake among PLWH attending CTC at MNH

The investigation of individual factors associated with the uptake of the COVID-19 vaccine reveals significant findings (Table 4). The analysis shows a significant association between participants' level of trust in vaccine safety and efficacy and their uptake of the COVID-19 vaccine ($p < 0.001$). Of those individuals who strongly agreed, 56% with the vaccine's safety and efficacy were significantly more likely to uptake the vaccine, followed by those who agreed by 31.5% compared to the others who had doubts or disagreed.

Among vaccinated individuals, participants who agreed (55.5%) with the perceived benefits of vaccination, such as its effectiveness and protective benefits, showed a significantly higher rate of vaccination uptake ($p < 0.001$). This indicates that individuals who perceived more benefits were more motivated to get vaccinated.

While the potential costs associated with vaccination did not show a statistically significant association with vaccine uptake ($p = 0.358$), there was a notable trend indicating that

individuals who strongly disagreed (65%) or with potentially high costs showed higher vaccination uptake.

Moreover, the analysis demonstrated a significant association between personal beliefs and values regarding vaccines and COVID-19 vaccine uptake (p = 0.009). Participants who agreed with their personal beliefs and values had higher vaccination uptake (47.5%) compared to those in the middle range of neutrality.

Table 4: Distribution COVID-19 vaccine uptake by Individual factors among PLWH attending CTC at MNH (N=343)

Variable	Category	Vaccine non - Uptake		Vaccine Uptake		P-Value
		Count (n)	Percentage (%)	Count (n)	Percentage (%)	
Trust in vaccine safety and efficacy	Strongly disagree	30	21	3	1.5	
	Disagree	15	10.5	11	5.5	
	Neutral	12	8.4	11	5.5	
	Agree	31	21.7	63	31.5	
	Strongly agree	55	38.5	112	**56**	**<0.001**
Perceived benefits of vaccination	Strongly disagree	38	26.6	3	1.5	
	Disagree	29	20.3	7	3.5	
	Neutral	22	15.4	10	5	
	Agree	48	33.6	96	**48**	
	Strongly agree	6	4.2	84	42	**<0.001**
Potential costs associated with vaccination	Strongly disagree	93	65	130	65	
	Disagree	29	20.3	34	17	
	Neutral	8	5.6	6	3	
	Agree	10	7	21	10.5	
	Strongly agree	3	2.1	9	4.5	0.358
Personal beliefs and values regarding vaccines	Strongly disagree	41	28.7	50	25	
	Disagree	33	23.1	27	13.5	
	Neutral	8	5.6	16	8	
	Agree	44	30.8	95	**47.5**	
	Strongly agree	16	11.2	12	6	**0.009**

Key: PLHW; People living with HIV, MNH; Muhimbili National Hospital.

4.3.2 Social factors associated with the COVID-19 vaccine uptake among PLWH attending CTC at MNH

Notably, those who agreed or strongly agreed that social pressure influenced their decision to be vaccinated, displayed a higher tendency to get vaccinated against COVID-19 disease with a total of 51% versus the rest groups (Table 5)

Although no significant association was observed between attitudes and beliefs within the social network and vaccine uptake ($p = 0.638$), there were apparent trends. Participants expressing stronger disagreement or agreement within their social network showed varying vaccine uptake.

There was a notable association between the level of encouragement from the social network and vaccine uptake, approaching statistical significance ($p = 0.052$). Those who strongly disagreed with the encouragement received were more likely to get vaccinated compared to the other responses.

Although the association between perceived community pressure and vaccine uptake was not statistically significant ($p = 0.076$), participants who strongly agreed or strongly disagreed with the expectation to get vaccinated were more likely to have received the vaccine compared to those who were neutral.

Furthermore, a statistically significant association was observed between the alignment of vaccine uptake with social identity and COVID-19 vaccine uptake ($p = 0.017$). Participants who strongly disagreed (35%) with their social identity aligning with vaccine uptake showed higher vaccination uptake in the group.

Table 5: Distribution of COVID-19 vaccine uptake by social factors among PLWH attending CTC at MNH (N=343)

Variable	Category	Vaccine non – Uptake		Vaccine Uptake		P-Value
		Count (n)	Percentage (%)	Count (n)	Percentage (%)	
Social pressure	Strongly disagree	82	57.3	57	28.5	
	Disagree	25	17.5	33	16.5	
	Neutral	2	1.4	8	4	
	Agree	22	15.4	55	27.5	
	Strongly agree	10	7	47	23.5	**<0.001**
Attitudes and beliefs within the social network	Strongly disagree	71	49.7	85	42.5	
	Disagree	32	22.4	46	23	
	Neutral	6	4.2	12	6	
	Agree	23	16.1	42	21	
	Strongly agree	11	7.7	15	7.5	0.638
Level of encouragement from the social network	Strongly disagree	64	44.8	82	41	
	Disagree	47	31.5	52	26	
	Neutral	6	4.2	11	5.5	
	Agree	20	14	51	25.5	
	Strongly agree	6	4.2	4	5.5	0.052
Perceived community expectations	Strongly disagree	39	27.3	48	24	
	Disagree	59	41.3	76	38	
	Neutral	10	7	19	9.5	
	Agree	31	21	52	26	
	Strongly agree	4	2.8	5	2.5	0.623
Alignment of vaccine uptake with social identity	Strongly disagree	41	28.7	70	**35**	
	Disagree	60	42	56	28	
	Neutral	21	14.7	26	13	
	Agree	18	12.6	47	22.5	
	Strongly agree	3	2.1	1	0.5	**0.017**

4.3.3 Organizational factors associated with the COVID-19 vaccine uptake among PLWH attending CTC at MNH

The significant association between the level of accountability and transparency shown by governmental and health agencies and COVID-19 vaccine uptake ($p < 0.001$). Participants who strongly disagreed (6.5%) or disagreed (9.5%) with transparency and accountability displayed a notably lower vaccination uptake compared to most individuals who agreed (46.5%).

There was a statistically significant association found between the effectiveness of communication and outreach efforts and COVID-19 vaccine uptake ($p < 0.001$). Those who strongly disagreed or disagreed with the effectiveness showed lower vaccination uptake compared to the majority who agreed (55.5%).

A significant association was observed between the level of collaboration and coordination among various government and health agencies and vaccine uptake ($p < 0.001$). Participants who strongly disagreed or disagreed with the collaboration exhibited notably lower vaccination uptake compared to those who agreed or strongly agreed.

A statistically significant association was also found between the accessibility of COVID-19 vaccines and vaccine uptake ($p < 0.001$). Respondents who strongly disagreed or disagreed with accessibility exhibited lower vaccination uptake compared to those who agreed being the most with 56.5%.

The analysis revealed a significant association between the extent of information and education provided by the government and vaccine uptake ($p < 0.001$). Participants who strongly disagreed or disagreed with the information and education provided displayed notably lower vaccination uptake compared to those were who agreed (the majority in the group with 60.5%). The distribution as shown in Table 6.

Table 6: Distribution of COVID-19 vaccine uptake by organizational factors among PLWH attending CTC at MNH (N=343)

Variable	Category	Vaccine non – Uptake		Vaccine Uptake		P-Value
		Count (n)	Percentage (%)	Count (n)	Percentage (%)	
Transparency and accountability exhibited by governmental and health agencies.	Strongly disagree	31	21.7	13	6.5	
	Disagree	34	23.8	19	9.5	
	Neutral	15	10.5	4	2	
	Agree	45	31.5	93	**46.5**	
	Strongly agree	16	12.6	71	35.5	**<0.001**
Effectiveness of communication and outreach efforts	Strongly disagree	33	23.1	13	6.5	
	Disagree	50	35	14	7	
	Neutral	11	7.7	6	3	
	Agree	37	25.9	111	**55.5**	
	Strongly agree	12	8.4	56	28	**<0.001**
Collaboration and coordination among various government and health agencies	Strongly disagree	44	30.8	11	5.5	
	Disagree	49	34.3	15	7.5	
	Neutral	18	12.6	15	7.5	
	Agree	27	18.9	121	**60.5**	
	Strongly agree	3	2.1	37	18.5	**<0.001**
Accessibility of COVID-19 vaccines	Strongly disagree	52	36.4	14	7	
	Disagree	48	33.6	16	8	
	Neutral	12	8.4	3	1.5	
	Agree	25	17.5	113	**56.5**	
	Strongly agree	6	4.2	54	27	**<0.001**
The extent of information and education provided by the government	Strongly disagree	44	30.8	12	6	
	Disagree	45	31.5	14	7	
	Neutral	16	11.2	5	2.5	
	Agree	29	20.3	121	**60.5**	
	Strongly agree	9	6.3	48	24	**<0.001**

Key: PLHW; People living with HIV, MNH; Muhimbili National Hospital.

CHAPTER FIVE

DISCUSSION

5.1 The uptake of the COVID-19 vaccine and associated factors influencing the uptake among PLWH attending CTC at MNH

In this study, PLWH attending care and treatment, and clinic (CTC) at Muhimbili National Hospital (MNH) were assessed for their uptake of the COVID-19 vaccine and associated factors. The findings revealed several notable insights that contribute significantly to understanding vaccination uptake behaviors within this demographic.

Notably, the study uncovered a COVID-19 vaccination uptake of 58.3% among the participants, reflecting a substantial portion of the PLWH population at MNH who have received the vaccine. These findings were comparable with the study done in China (16), where among 378 PLWH, 57.9% received at least one dose of a vaccine. In a similar trend, as it was highlighted in the Oregon study (34), the uptake of the COVID-19 vaccine was 61.6%. However, slightly low than compared to the study conducted in Uganda (35). In the study, the majority (60%) of those vaccinated received the Jensen & Jensen vaccine. This might be due to various reasons, such as accessibility and availability, which should be explored further in subsequent studies.

Age emerged as a fundamental determinant of vaccination uptake. Individuals aged, 36-44 and 45 years and above exhibited a higher likelihood of receiving the COVID-19 vaccine compared to younger cohorts. This finding suggests that older age groups may perceive greater susceptibility to the virus or higher severity of its effects, prompting their proactive approach toward vaccination. The study conducted in the USA (34), suggested comparable the same as it showed people aged 50 and more were more likely to be vaccinated while the lowest among the younger adults.

A strong association surfaced between perceptions of organizational aspects and increased COVID-19 vaccination uptake. This outcome implies that participants who perceived governmental and health agencies positively in terms of transparency, communication, collaboration, accessibility, and information provision were more inclined to get vaccinated.

The study also revealed a significant association between individual perceptions or beliefs and COVID-19 vaccination uptake. Participants who held positive views regarding vaccine safety, efficacy, benefits, and personal beliefs regarding vaccines were notably more likely to have received the COVID-19 vaccine. This illustrates the pivotal role of individual attitudes and beliefs in vaccine decision-making among PLWH.

These findings are congruent with studies conducted by Menza, T et al (34), which highlighted similar trends in their research. Their investigations reported comparable associations between age, organizational factors, individual perceptions, and COVID-19 vaccination uptake among specific demographic cohorts.

5.2 Individual factors associated with the COVID-19 vaccine uptake among PLWH attending CTC at MNH

This study discovers a significant association between the participants' level of trust in vaccine efficacy and safety, and their uptake of the COVID-19 vaccine ($p < 0.001$). This finding highlights the critical role of trust in shaping vaccination behaviors. Individuals who had higher levels of trust in the efficacy and safety of the vaccine were notably more likely to get vaccinated. Building and maintaining trust in vaccine safety through transparent and credible communication may significantly influence vaccination uptake among PLWH. This was not a new finding, as it was observed in the studies done in Nigeria (27) and China (39).

Another crucial finding was the significance association between participants perceiving benefits and their motivation to get vaccination against COVID-19 ($p<0.001$). This

association signifies the importance of effective communication about the benefits of vaccination in encouraging uptake. This finding was similar observed in the study done in Nigeria (38) in which individuals who recognized the potential benefits of the COVID-19 vaccine, such as its ability to protect against severe illness, were more motivated to receive it. Tailoring information campaigns to emphasize these benefits could be pivotal in encouraging vaccine uptake among this population.

Surprisingly, the study did not find a statistically significant association between potential costs associated with vaccination for COVID-19. This might suggest that, within the context of our study population, cost considerations might not be the primary determinant influencing vaccination decisions. Further exploration into the factors driving this finding is warranted for a more comprehensive understanding.

Moreover, a noteworthy finding was the significant association between personal beliefs and values regarding vaccines and COVID-19 vaccine uptake ($p = 0.009$). This emphasizes the role of individual beliefs in influencing vaccination decisions. Individuals with certain beliefs aligned with vaccine uptake were more likely to get vaccinated. Understanding and addressing these specific beliefs and values are crucial in designing targeted interventions aimed at increasing vaccine uptake among PLWH as observed in the study in China (39).

5.3 Social factors associated with the COVID-19 vaccine uptake among PLWH attending CTC at MNH

Study findings revealed a statistically significant association between the level of social pressure and COVID-19 vaccine uptake among PLWH attending CTC at MNH. Individuals who strongly disagreed with feeling pressured to take the COVID-19 vaccine demonstrated a higher likelihood of vaccine uptake. This finding suggests that reduced perceived social pressure might contribute positively to individual decisions to get vaccinated. Strategies aimed at alleviating undue pressure or addressing concerns related to social influence might positively impact vaccine uptake.

While not reaching statistical significance, study findings also showed a notable association between the level of encouragement from the social network and COVID-19 vaccine uptake as in the study done in Uganda (35). Individuals reporting higher levels of encouragement displayed a trend towards increased vaccine uptake. Although the association did not achieve statistical significance, this trend underscores the potential impact of social support systems in influencing vaccination decisions. Strengthening supportive environments and promoting positive discussions within social networks could contribute to a more favorable attitude towards COVID-19 vaccination.

A statistically significant association was observed between the alignment of vaccine uptake with social identity and COVID-19 vaccine uptake. Participants who strongly disagreed that vaccine uptake aligns with their social identity were notably more likely to get vaccinated. This finding resonates with results in Uganda (35) and China (41) and emphasizes the influence of social identity in shaping vaccination behavior. Tailoring vaccination campaigns to resonate with diverse social identities and values within the community may positively impact vaccine uptake among PLWH.

5.4 Organizational factors associated with the COVID-19 vaccine uptake among PLWH attending CTC at MNH

Study findings demonstrated a significant association between the level of accountability and transparency exhibited by governmental and health agencies and the COVID-19 vaccination uptake among PLWH who come to MNH for CTC. Participants who perceived higher levels of transparency and accountability were more likely to uptake the COVID-19 vaccine. This finding underscores the pivotal role of transparent and accountable information dissemination in positively influencing vaccination decisions.

A statistically significant association was found between the effectiveness of communication and outreach efforts and vaccine uptake. Participants who reported more effective communication strategies and outreach efforts were notably more likely to get

vaccinated. Effective communication channels and robust outreach strategies play a crucial role in disseminating accurate information and addressing concerns, thereby positively impacting vaccine uptake. Exposure to information have been shown to enhance the vaccination as in the study done in China (26)

Significant associations were observed between the level of coordination and collaboration among various health agencies and government and health agencies and COVID-19 vaccine uptake. This is one of the key steps in increasing the vaccine uptake as it was comparable observed in a Nigerian study (38). Participants who perceived higher collaboration and coordination among these entities showed increased vaccine uptake. This emphasizes the importance of streamlined collaboration in ensuring efficient vaccine distribution and delivery, ultimately fostering higher vaccination rates.

Study findings also show a significant association between the accessibility of COVID-19 vaccines and its uptake. Participants reporting easier access to vaccines demonstrated higher vaccination uptake. Ensuring convenient and widespread access to vaccines through diverse channels and locations is crucial in facilitating vaccine uptake among PLWH. This resonates with the study done in Uganda (35), in which availability played a key role in increasing the uptake of the vaccine.

A significant association was noted between the extent of information and education provided by the government and COVID-19 vaccine uptake. Participants who claimed to receive comprehensive information and education from government sources exhibited higher vaccine uptake. Well-informed individuals are more likely to make informed decisions regarding vaccination, highlighting the necessity of informative campaigns. These results were also reported in the study done in China (39).

5.5 Study limitations and mitigation measures

Although the goal of this study was to shed light on the COVID-19 vaccine uptake among PLWH attending CTC at MNH, it's crucial to recognize that it only included data from one

healthcare facility. One of the primary reasons for the limitation of including only Muhimbili National Hospital (MNH) was the constraints in financial resources and time. Conducting a multi-site study involving several health facilities would have required a more extensive budget and an extended timeline.

Limiting the study to a single health facility might affect the generalizability or the extent to which our findings can be applied to a broader population. The experiences and perspectives of PLWH attending CTC at MNH might differ from those in other health facilities within Tanzania or beyond. Therefore, the findings might not fully represent the diversity of factors influencing COVID-19 vaccine uptake among PLWH in various settings.

While the study focused on MNH, future research endeavors could benefit from expanding the scope to include multiple health facilities across different regions or districts. A multi-site approach would offer a more comprehensive understanding of the factors influencing vaccine uptake among PLWH, considering the potential variations in healthcare access, community dynamics, and institutional policies across diverse settings.

Despite being constrained by the limitations in resources and time, the findings of this study provide valuable insights into COVID-19 vaccine uptake among PLWH attending CTC at MNH. However, acknowledging the limitation arising from the single health facility inclusion is essential in interpreting and applying the study's findings within a broader context.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The study underscores the multifaceted nature of factors influencing COVID-19 vaccine uptake among PLWH attending CTC at MNH. These findings highlight that vaccination uptake among PLWH is suboptimal. The findings also reveal the significance of tailored interventions that address individual beliefs, and perceptions, and enhance organizational approaches to encourage COVID-19 vaccination in this population.

Trust in vaccine safety, perceived benefits, and personal beliefs emerged as significant individual factors and determinants of vaccination uptake. Strengthening trust, emphasizing benefits, and addressing specific beliefs and concerns through targeted communication strategies could significantly enhance vaccine uptake among this vulnerable population.

Social factors, including social pressure, encouragement from the social network, and alignment of vaccine uptake with social identity, play pivotal roles in influencing COVID-19 vaccine uptake among PLWH attending CTC at MNH. Addressing social pressures, fostering supportive networks, and aligning vaccination messaging with diverse social identities could contribute significantly to enhancing vaccine uptake in this population.

Organizational factors, including transparency, effective communication, collaboration among agencies, accessibility of vaccines, and comprehensive information provision, significantly influence COVID-19 vaccine uptake among PLWH attending CTC at MNH. Strengthening these organizational aspects can foster trust, facilitate informed decision-making, and improve vaccine uptake in this population.

Enhancing transparency, effective communication strategies, fostering collaborative efforts, ensuring vaccine accessibility, and providing comprehensive information and education will contribute significantly to increasing COVID-19 vaccine uptake among PLWH.

6.2 Recommendations

Based on the study's findings and conclusion, the recommendations listed below, if implemented, have the potential to optimize COVID-19 vaccine uptake among PLWH attending CTC at MNH and contribute to broader efforts in achieving community-wide vaccination.

1. **Diversification of vaccination outreach programs**

Health authorities need to improve community involvement programs by customizing vaccination outreach efforts to target particular community obstacles social network attitudes, and community expectations. This strategy could promote a vaccination atmosphere that is more welcoming and encouraging.

2. **Individualized information campaigns**

Understanding the significant impact of individual factors on vaccine uptake, there is a need for targeted informational campaigns. Providing detailed information about the safety and efficacy of the COVID-19 vaccines, emphasizing their benefits, and addressing potential concerns can contribute to building trust and increasing vaccine uptake.

3. **Incorporation of age-centric strategies**

Health agencies should use age-centric methods in recognition of the important role that age plays in determinants. PLWH vaccination uptake could be maximized by age-appropriate outreach programs, immunization schedules, and customized messages.

4. **Strengthening organizational communication**

The study underscores the importance of organizational factors in vaccine uptake. Enhancing transparency and accountability in governmental and health agencies, improving communication and outreach effectiveness, and ensuring accessibility of vaccines could significantly contribute to increasing vaccine uptake.

5. **Continuous evaluation and monitoring**

Healthcare providers, monitoring and evaluation teams, and public health researchers should establish robust systems for continuous monitoring and evaluation of vaccination programs. Regular assessments of the impact of implemented strategies, coupled with feedback mechanisms from PLWH, will enable adaptive approaches and timely interventions to address emerging challenges.

6. **Strategic collaboration and coordination**

Ministry of Health, international health organizations (e.g., WHO), and non-governmental organizations (NGOs) should strengthen strategic partnerships at various levels. Improved collaboration and coordination can enhance the overall effectiveness of vaccination programs by ensuring efficient resource allocation and cohesive public health messaging.

7. **Expanded research scope.**

Academic institutions and public health researchers should broaden the scope of future research to include multi-site studies across different regions. This will provide a comprehensive understanding of the diverse factors influencing COVID-19 vaccine uptake among PLWH and inform future public health policies and interventions.

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APPENDICES

APPENDIX I: INFORMED CONSENT FORM (ENGLISH VERSION)

INTRODUCTION

ID no……...

Dear Sir/Madam,

My name is Robert John Shokolo a student at the Muhimbili University of Health and Allied Sciences pursuing a Master of Public Health, I'm currently conducting a study on the Uptake of the COVID-19 vaccine among people living with HIV attending CTC at Muhimbili National Hospital Care and Treatment Centre.

You are entirely voluntarily invited to participate in this study, and you have the right to refuse to consent at any stage.

The information obtained from this study may help to improve COVID-19 vaccine uptake in Tanzania.

No risks will be experienced the participants in the study.

The study will cost only your time and no compensation will be given.I would also want to stress that all efforts to protect your identity will be taken. Your responses will not be identified by any person other than you and the researcher. If you have any questions or concerns about completing the questionnaire or about participating in this study, you may contact me through 0752883 883.

I hope that you will accept this invitation to participate in this study. I'm looking forward to receiving your responses within the coming four weeks.

Thank you in advance for your cooperation.

Regards,

Robert John Shokolo

CONSENT FORM: I confirm that I have read carefully, and understood the information provided and consent to participate in the study.

I, …… have read the contents of this consent form and my questions have been adequately answered. I therefore agree to participate and provide consent for my child to participate in this study.

Signature of the participant ……... Date …….

Signature of the interviewer ……..... Date …….

APPENDIX II: INFORMED CONSENT FORM – SWAHILI VERSION

ID no……...

Habari,

Naitwa Robert John Shokolo, mwanafunzi wa Chuo Kikuu cha Afya na Sayansi Shirikishi Muhimbili. Nasoma Shahada ya sayansi ya uzamili katika afya ya jamii, Nafanya utafiti wa "Uchomaji wa chanjo ya UVIKO-19 na sababu zake zinazoweza kuhathiri kwa watu wanaoishi na virusi vya UKIMWI wanaohudhuria kliniki katika hospitali ya Muhimbili.

Kushiriki katika utafiti nihiari kabisa. Una haki ya kukataa kushiriki au kujiondoa wakati wowote katika utafiti huu utakapojisikia kufanya hivyo.

Taarifa zitakazopatikana kutoka kwenye utafiti zitasaidia kutambua mikakati katika utolewaji wa chanjo ya UVIKO-19.

Hakuna athari zinazoweza kujitokeza wakati unashiriki utafiti.

Taarifa zako zitakuwa siri. Ikiwa matokeo ya utafiti huu yatachapishwa au yatawasilishwa, majina na maelezo mengine binafsi hayatatumiwa.

Ikiwa una maswali yoyote au wasiwasi juu ya utafiti huu, unaweza kuwasiliana na wasiliana na mimi kupitia namba 0752883 883.

Ahsante na karibu sana.

Wako mtiifu,

Robert John Shokolo

FOMU YA RIDHAA: Nakiri kwamba nimesoma maelezo yote kwa umakini na nimeelewa kila kilichoandikwa katika fomu hii.Ninaelewa kwamba ninaweza kujitoa muda wowote nitakaotaka kujitoa katika tafiti hii.

Mimi, …… Nimesoma maelezo yote katika fomu hii na maswali yangu yameweza kujibiwa. Nakubali kushiriki na natoa ridhaa kwa mtoto wangu kushiriki kwenye utafiti huu.

Sahihi ya Mshiriki..... Tarehe ……

Sahihi ya Msahili ……..... Tarehe ……

APPENDIX III: QUESTIONNAIRE (ENGLISH – VERSION)



PART A: RESPONDENT'S PROFILE

A 1. Sex (Tick where appropriate)

A1	Male	Female

A 2. Age in years (Tick where appropriate)

A2	20 -35	36-44	45 and above.

A 3. Education Level (Tick where appropriate)

A3	No Education	Primary	Secondary and	College/University and above

A 4. Marital Status (Tick where appropriate)

A4	Single	Married	Widow/Widower

PART B: THE STATUS OF COVID-19 VACINE UPTAKE

Kindly indicate the extent to which you agree or disagree with each of the following statements by circling only one number to rate the status of VACCINE UPTAKE

	Indicative Statement	Yes		No
B1	Have you received at least one dose of the COVID-19 vaccine?			
B2	Which type of Vaccine have you received?	A) Jensen & Jensen	B) Pfizer	C)Sinopharm

PART C: ASSOCIATED FACTORS

Kindly indicate the extent to which you agree or disagree with each of the following statements by circling only one number as specified below

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	strongly agree

C1: SOCIAL FACTORS

No	Characteristics	Options
1	The social pressure to take the COVID-19 vaccine from family, friends, and colleagues influences my decision.	1 2 3 4 5
2	The attitudes and beliefs of my social network towards COVID-19 vaccines impacted my decision to take the vaccine.	1 2 3 4 5
3	The level of encouragement I receive from my social network to take the COVID-19 vaccine influences my decision.	1 2 3 4 5
4	The perceived expectations of my community to take the COVID-19 vaccine affect my decision.	1 2 3 4 5
5	The degree to which I believe taking the COVID-19 vaccine is consistent with my social identity affects my decision.	1 2 3 4 5

C2: INDIVIDUAL FACTORS

No	Characteristics	Options
1	My level of trust in the safety and efficacy of the COVID-19 vaccine is an important factor in my decision to take the vaccine	1 2 3 4 5
2	The perceived benefits of taking the COVID-19 vaccine, including its effectiveness and ability to protect against severe illness, influence my decision.	1 2 3 4 5
3	The potential costs associated with taking the COVID-19 vaccine, such as transportation costs, affect my decision to take the vaccine.	1 2 3 4 5

4	My personal beliefs and values regarding vaccines, public health, and individual responsibility affect my decision to take the COVID-19 vaccine.	1 2 3 4 5

C3; ORGANIZATION FACTORS

No	Characteristics	Options
1	The level of transparency and accountability demonstrated by the government and health agencies in COVID-19 vaccine distribution and administration influences my decision.	1 2 3 4 5
2	The effectiveness of the government and health agencies' communication and outreach efforts in educating the public about the COVID-19 vaccine influences my decision.	1 2 3 4 5
3	The level of collaboration and coordination among different levels of government and health agencies in COVID-19 vaccine distribution and administration affects my decision.	1 2 3 4 5
4	The accessibility of COVID-19 vaccines, including their availability and location, impacts my decision to take the vaccine.	1 2 3 4 5
5	The level of information and education provided by the government about the COVID-19 vaccine impacts my decision.	1 2 3 4 5

APPENDIX IV : QUESTIONNAIRE (SWAHILI – VERSION)

SEHEMU A: TAARIFA BINAFSI

A 1. Jinsia (Weka tiki)

A1	Mwanaume	Mwanamke

A 2. Umri (Weka tiki) kati ya miaka

A2	20 -35	36-44	45 na zaidi

A 3. Kiwango cha Elimu (Weka tiki)

A3	**Sijasoma**	**Elimu ya Msingi**	**Sekondari**	**Chuo**

A 4. Hali ya mahusiano (Weka tiki)

A4	**Sijaoa/Sijaolewa**	**Nimeoa/nimeolewa**	**Mjane/Mgane**

SEHEMU B: Hali ya Uchomaji wa chanjo ya UVIKO-19

Chagua kama unakubaliana au kukataa katika machaguo haya kulingana na uchomaji wa chanjo ya UVIKO-19

	Kauli	Ndio		Hapana
B1	Umepata angalau dozi moja ya chanjo ya UVIKO-19			
B2	Ulipata chanjo ipi?	A) Jensen & Jensen	B) Pfizer	C)Sinopharm

SEHEMU C: SABABU ZINAZOHUSIANA

Chagua kwa kiasi gani unakubaliana au kukataa katika machaguo haya

1	2	3	4	5
Nakataa sana	Nakataa	Neutral	Nakubali	Nakubali sana

C1: SABABU ZA KIJAMII

Na	**Sifa**	**Chagua**
1	Shinikizo la kijamii la kuchukua chanjo ya UVIKO-19 kutoka kwa familia, marafiki, na wenzangu linaathiri uamuzi wangu	1 2 3 4 5
2	Mitazamo na imani za mtandao wangu wa kijamii kuhusu chanjo za UVIKO-19 zinaathiri uamuzi wangu wa kuchukua chanjo.	1 2 3 4 5
3	Kiwango cha kutiwa moyo ninachopokea kutoka kwa mtandao wangu wa kijamii kuchukua chanjo ya UVIKO-19 kinaathiri uamuzi wangu.	1 2 3 4 5
4	Matarajio ninayoyahisi kutoka kwa jamii yangu kuchukua chanjo ya UVIKO-19 yanaiathiri uamuzi wangu.	1 2 3 4 5
5	Kiasi ambacho naamini kuchukua chanjo ya UVIKO-19 kinaendana na jamii na kinaathiri uamuzi wangu.	1 2 3 4 5

C2: SABABU ZA KIBINAFSI

Na	Sifa	Chagua
1	Usalama na ufanisi wa chanjo ya UVIKO-19 ni kigezo muhimu katika uamuzi wangu wa kuchukua chanjo	1 2 3 4 5
2	Manufaa yaliyoonekana ya kuchukua chanjo ya UVIKO-19, ikiwa ni pamoja na ufanisi wake na uwezo wa kulinda dhidi ya hali mbaya, yanaathiri uamuzi wangu.	1 2 3 4 5
3	Gharama za uwezekano zinazohusiana na kuchukua chanjo ya UVIKO-19, kama vile gharama za usafiri, zinaathiri uamuzi wangu wa kuchukua chanjo.	1 2 3 4 5
4	Imani yangu binafsi kuhusu chanjo, afya ya jamii, na jukumu binafsi linaathiri uamuzi wangu wa kuchukua chanjo ya UVIKO-19.	1 2 3 4 5

C3; SABABU ZA KITAASISI

Na	Sifa	Chagua
1	Kiwango cha uwazi na uwajibikaji kinachoonyeshwa na serikali na taasisi za afya katika usambazaji na usimamizi wa chanjo ya UVIKO-19 kinaathiri uamuzi wangu.	1 2 3 4 5
2	Ufanisi wa juhudi za mawasiliano na kuelimisha umma kuhusu chanjo ya UVIKO-19 zinazofanywa na serikali na taasisi za afya zinaathiri uamuzi wangu.	1 2 3 4 5
3	Kiwango cha ushirikiano na uratibu kati ya serikali na taasisi za afya katika usambazaji na usimamizi wa chanjo ya UVIKO-19 kinaathiri uamuzi wangu.	1 2 3 4 5
4	Upatikanaji wa chanjo ya UVIKO-19, ikiwa ni pamoja na upatikanaji na mahali pa kuchukulia, unaathiri uamuzi wangu wa kuchukua chanjo.	1 2 3 4 5
5	Kiwango cha habari na elimu inayotolewa na serikali kuhusu chanjo ya UVIKO-19 kinaathiri uamuzi wangu	1 2 3 4 5

APPENDIX IV: ETHICAL CLEARANCE LETER

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

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Ref. No.DA.282/298/01.C/ Date: 06/08/2023

MUHAS-REC-08-2023-1852
Robert John Shokolo
Shool of Public Health and Social Sciences
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: THE UPTAKE OF THE COVID-19 VACCINE AND ASSOCIATED FACTORS AMONG PEOPLE LIVING WITH HIV (PLWH) ATTENDING CTC AT MUHIMBILI NATIONAL HOSPITAL IN TANZANIA

Reference is made to the above heading.

I am pleased to inform you that the Chairman has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 06/08/2023
EXPIRATION DATE OF APPROVAL: 06/08/2024

STUDY DESCRIPTION:

Purpose:
The purpose of this study will be to assess the uptake of the COVID-19 vaccine and associated factors among PLWH attending CTC at Muhimbili national hospital in Tanzania.

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided:

The PI is required to:

1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain data transfer agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain material transfer agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country,
8. Any researcher, who contravenes or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
9. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
10. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://drp.muhas.ac.tz/.

Dr. Nahya Salim Masoud,
Chairperson, MUHAS Research and Ethics Committee



APPENDIX V: INTRODUCTION LETTER

UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR – POSTGRADUATE STUDIES

In reply quote;
Ref. No. HD/MUH/T.519/2021

11th August, 2023

MUHIMBILI NATIONAL HOSPITAL
RECEIVED
11 AUG 2023
REGISTRY
File No:.....

The Executive Director,
Muhimbili National Hospital,
P.O. Box 65000,
DAR ES SALAAM

Re: INTRODUCTION LETTER

We would like to inform you that the bearer of this letter is **Robert John Shokolo** with Reg. No. **HD/MUH/T.519/2021** is a student at Muhimbili University of Health and Allied Sciences (MUHAS) "pursuing **MPH-Executive Track.**

As part of his studies, he will be doing an elective research titled: **"Uptake of the Covid-19 Vaccine and Associated Factors Among People Liviving with HIV (PLWH) Attening CTC at Muhimbili National Hospital in Tanzania."** he is being supervised by Dr. Mariam Amour from MUHAS and Dr. Elisha Osati from MNH.

The research has been approved by the Chairman of University Senate.

Kindly provide him the necessary assistance to facilitate the conduct of his research.

We thank you for your cooperation.

Ms. Victoria Mwanilwa
For: DIRECTOR, POSTGRADUATE STUDIES
c.c Robert John Shokolo

9 United Nations Road; Upanga West; P.O. Box 65001, Dar Es Salaam: Tel. G/Line: +255-22-2150302/6; Ext. 1015; Direct Line:+255-22-2151378;Telefax:+255-22-2150465;E-mail:dpgs@muhas.ac.tz;Web:https://www.muhas.ac.tz

APPENDIX VI: PERMISSION LETTER

THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF HEALTH

MUHIMBILI NATIONAL HOSPITAL

In reply please quote;

Ref. No.: MNH/CRTCU/Perm/2023/459 **Date: 14th August, 2023**

Head of Department,
Outpatient,
Muhimbili National Hospital

Received 21/8/2023

RE: PERMISSION TO COLLECT DATA AT MNH.

Name of Student	**Robert John Shokolo**
Title	**"Uptake of the Covid-19 Vaccine and Associated Factors Among People Living with HIV (PLEH) Attending at MNH in Tanzania".**
Institution	Muhimbili University of Health and Allied Sciences
Supervisors	Dr. Mariam Amour (MUHAS)
Co - Supervisor	Dr. Elisha Osati (MNH)
Period	14th August, 2023 to 14th September, 2023

Approval has been granted to the above mentioned student to collect data at MNH. **A final study report should be lodged with Clinical Research, Training and Consultancy Unit.** Dissemination of study findings to MNH stakeholders shall be overseen by Dr.. Elisha Osati (MNH) Co – supervisor.

Kindly ensure that the student abide to the ethical principles and other conditions of the research approval.

Sincerely,

HEAD, TEACHING, RESEARCH & CONSULTANCY UNIT
P. O. Box 65000
DAR-ES-SALAAM
MUHIMBILI NATIONAL HOSPITAL

Dr. Jessie Mbwambo
Head of Clinical Research, Training and Consultancy Unit

c.c DMS
c.c Dr. Elisha Osati
c.c Robert J. Shokolo

Upanga West, Kalenga Street, Plot No. 10480/3, P.O. BOX 65000, Dar es Salaam, Tanzania.
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