

**FACTORS ASSOCIATED WITH COVID-19 VACCINATION HESITANCY
AMONG HEALTHCARE WORKERS IN SELECTED FACILITIES IN
TRANS NZOIA COUNTY, KENYA**

BY

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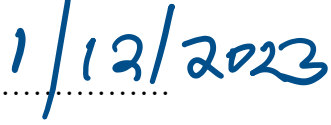
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DECLARATION PAGE

I hereby declare that the above-titled research is my original work and that it has not been presented for any award in any other university or educational institution.

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ABBREVIATIONS AND ACRONYMS

FDA:	U.S Food and Drug Administration
GOK:	Government of Kenya
HCW	Health Care Worker
NACOSTI	National Council for Science Technology and Innovation
WHO	World Health Organization

ABSTRACT

Study Background

The uptake of the COVID-19 vaccine is instrumental in the fight and control of COVID-19 in the world. Nevertheless, vaccination hesitancy is a major concern that dents these efforts and limits the capability of ensuring complete control of the disease.

Broad Objective

To determine factors associated with Covid-19 vaccination hesitancy among healthcare workers in selected facilities in Trans Nzoia County, Kenya.

Methods

An analytical hospital-based cross-sectional approach was used to do the study in Trans Nzoia County.

The study participants consisted of doctors, nurses, clinical officers, laboratory technicians, and technologists as well as public health technicians and officers. On the other hand, from each facility a simple random sampling was used in the selection of respondents proportionate to the size, and data was gathered using interviewer-administered questionnaires. SPSS version 25 was used to enter and analyze data where descriptive were presented in percentages, frequencies, means, and standard deviation, On the other hand, binomial regression models were fitted for analysis of inferential statistics that were presented as odds ratios to determine the effects of independent variables on the dependent variable.

Results

According to the findings males (AOR= 4.080, CI: 1.058-15.733; $p<0.041$), Married HCWs (AOR=4.990, CI: 1.660-15.000; $p<0.004$), HCWs with five years and more experience (AOR= 12.282, CI: 3.357-44.941; $p<0.001$) and HCWS with knowledge of antivaccine (AOR=16.633, CI: 5.434-50.917; $p<0.001$) were more likely to express vaccine hesitancy contrary to their counterparts.

Conclusion and Recommendations

Socio-demographic factors such as gender (male), marital status (married), and work experience (more than five years) were more likely to be hesitant towards the uptake of the COVID-19 vaccine. Contextual factors such as trust in the government and health worker information, knowledge of antivaccine groups, and past vaccination events are related to COVID-19 vaccine hesitancy amongst HCWs. Concerning vaccine-specific factors the HCWs were partly satisfied with professional answers thus resulting in COVID-19 hesitancy. Most of the healthcare workers opted to wait and see what others do before taking up the vaccine. There is a need to implement critical strategies that target socio-demographics factors associated with COVID-19 vaccine uptake, provision of regular and reliable information, and regular assistance for healthcare workers.

CHAPTER ONE: INTRODUCTION

1.1. Background of the Study

According to Africa CDC (2023) the Coronavirus Disease 2019 is a communicable respiratory disease that is caused by SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2). The disease was first discovered in 2019 in Wuhan, China, and rapidly spread to other countries around the world. A vaccine to help in its control was released to help in the management of the disease recently released albeit there has been a high level of hesitancy in relation to its uptake. Therefore, COVID-19 vaccination is highly instrumental in reducing the level of transmission, morbidity, and mortality rates. However, several factors have been linked with the high level of hesitancy especially from healthcare workers such as the media, religion and culture, politics, individual and group-related factors, historical influences, geographic barriers, vaccination experience, and an individual's risk perception (Soares et al., 2021).

Troiano & Nardi (2021) note that the advent of COVID-19 has proved to be one of the enormous global concerns, especially given the challenges associated with its control. However, these vaccines have also prompted discussion concerning the success of the vaccination programs. In this light, people are hesitant to take up the vaccines given the probability of serious side effects (Solís Arce et al., 2021). There are at least 18 vaccines that have been approved by at least one country for the control of the pandemic. Nonetheless, vaccine hesitancy or reluctance and /or refusal of vaccination is a major concern (Machingaidze & Wiysonge, 2021).

A study conducted by Sallam (2021) captured higher acceptance rates in Ecuador, Malaysia, and China with 97%, 94.3%, and 91.3% respectively. Lower vaccine rates were captured in countries such as Kuwait, Jordan, Italy, Russia, Poland, the U.S., and France with 23.6%, 28.4%, 53.7%, 54.9%, 56.3%, 56.9%, and 58.9% respectively. Machingaidze & Wiysonge (2021), the uptake of the COVID-19 vaccine is slightly low in high-income nations (the United States 64.6% and Russia 30.4%) compared to low middle-income countries (Burkina Faso 66.5% Pakistan 66.5%). Irrespective of these reports, this does not entirely translate to vaccine uptake given the high number of issues that contribute hesitancy. This presents a major concern in relation to the control of the pandemic globally (Sallam, 2021).

In Kenya, Orangi et al. (2021) reported that the extent of COVID-19 hesitancy was relatively high with 36.5% being vaccinated. The study also revealed that rural regions are most affected as they get little attention concerning interventions to deal with these issues and adhere to government stipulations. However, there is a limitation of information on the level of COVID-19 hesitancy among Kenyan health workers. Vaccine hesitancy among healthcare workers can also result to a variety of issues such as an increased risk of infection, staffing challenges as a result shortages of healthcare workers who have been compromised, erosion of trust from the public and prolonged pandemic as a result of lack of cooperation from healthcare workers who are at the forefront of healthcare service delivery.

1.2. Statement of the Problem

COVID-19 vaccine uptake is instrumental in the fight and control of the increase of the virus around the world. Conversely, vaccine hesitancy is a major worry that dents these efforts and limits the capability of ensuring complete control of the disease (El-Sokkary et al., 2021; Gadoth et al., 2021; Maraqa et al., 2021). Healthcare workers are instrumental in all interventions directed towards the management of diseases. They not only provide critical information for the patients, but they also provide confidence for health-related interventions. In this light, hesitancy among healthcare workers translates to a significant concern mainly in preventing and treating the virus.

The government prioritized the vaccination of frontline workers (inclusive of health workers) in the COVID-19 vaccination deployment plan in a bid to ensure a limited spread of the disease. Reports from the Ministry of Health stipulate that only 20% of health workers have been vaccinated (GOK, 2021). However, there is minimal information about which counties have achieved better success when it comes to acceptance of the vaccination exercise especially among healthcare workers. Another concern is the availability of COVID-19 vaccines which could be associated which could translate to low uptake. Despite being at the forefront of the pandemic response, healthcare workers still express reluctance towards receiving the COVID-19 vaccine. This hesitancy within the healthcare workforce not only jeopardizes the safety of individual practitioners but also undermines the broader vaccination campaigns that are crucial in the attainment of community immunity (Orangi et al., 2021). Therefore, there is a need to investigate the factors contributing to vaccine hesitancy among healthcare

workers which is vital in the development of interventions to deal with concerns. Addressing vaccine hesitancy among healthcare workers is pivotal for enhancing vaccination coverage, ensuring the resilience of the healthcare system, and fostering public confidence in the efficacy and safety of COVID-19 vaccines. The focus of this study was to examine the Individual, Contextual and Vaccine related factors associated with vaccine hesitancy among healthcare workers.

1.3. Objectives

1.3.1. General Objective

To determine factors associated with Covid-19 Vaccine Hesitancy among Healthcare Workers in Selected Facilities in Trans Nzoia County, Kenya

1.3.2. Specific Objectives

1. To determine the sociodemographic factors associated with COVID-19 Vaccine Hesitancy among Healthcare Workers.
2. To assess the contextual factors associated with COVID-19 Vaccine Hesitancy among Healthcare Workers.
3. To capture the vaccine-related factors associated with COVID-19 Vaccine Hesitancy among Healthcare Workers.

1.4. Research Questions

1. What are the sociodemographic factors associated with COVID-19 Vaccine Hesitancy among Healthcare Workers?
2. What are the contextual factors associated with COVID-19 Vaccine Hesitancy among Healthcare Workers?
3. What are the vaccine-related factors associated with COVID-19 Vaccine Hesitancy among Healthcare Workers?

1.5. Rationale/Justification

Health workers are instrumental in the implementation of disease management approaches that are critical in the control of diseases. Additionally, they also encourage people to take up vaccination not only through their knowledge but also their

confidence in the safety of the vaccine. Therefore, focusing on healthcare workers would be instrumental in capturing the issues associated with vaccine hesitancy to revert them.

1.6. Significance of the Study

Currently, COVID-19 is the most pressing concern both nationally and globally specifically with the high rates of mortality and morbidity. The discovery of the COVID-19 vaccines has been instrumental in managing the disease. However, the hesitancy from healthcare professionals limits that ability to attain the most appropriate results in terms of enabling effective management. As such, this study was instrumental in capturing the factors associated with hesitancy among healthcare providers which could be corrected to enhance COVID-19 vaccine acceptance and rollout.

CHAPTER TWO: LITERATURE REVIEW

2.1 Socio-demographic Factors

Leigh et al. (2022) note that healthcare workers who earned less than the country median were highly associated with an increase in hesitancy to take up the COVID-19 vaccine. Additionally, every increase in the healthcare provider age was associated with 0.02 times greater odds of hesitancy. However, gender did not contribute to any level of significance concerning COVID-19 vaccine hesitancy.

A similar study conducted by Hara et al. (2021) captured 6180 participants between the age of 20-69 years. The findings from the study revealed that the participants who were women and younger adults were more likely to be hesitant towards COVID-19 vaccine uptake. In a study that captured 10871 healthcare workers, COVID-19 vaccine hesitancy was higher among Black healthcare workers compared to the other racial groups (Hara et al., 2021). This also relates to a study conducted by McCready et al., (2023) sociodemographic factors such as gender, age, and ethnicity as the most prominent factors that were associated with COVID-19 vaccine hesitancy. Similarly, Kumar et al. (2021) also found out that among the 12.9% of respondents who were hesitant towards the COVID-19 vaccine were more likely to be female who mostly concerned about the safety concerns of the vaccine.

Gbeasor-Komlanvi et al. (2021) also conducted a study in Togo to determine the prevalence and risk factors associated with COVID-19 vaccine hesitancy among healthcare workers. Findings captured from the study revealed that female gender and healthcare workers with an age of ≥ 50 years were highly associated with vaccine hesitancy. Li et al. (2023) also found that demographic factors such as gender (women) and older age were highly associated with vaccine hesitancy.

2.2 Contextual Factors Associated with Covid-19 Vaccine Hesitancy

2.2.1 Communication and Media Environment

Elbarazi et al. (2021) found that, among healthcare workers, the media plays a vital role in the level of vaccine hesitancy. It provides communication that may be understood in different ways and could result in vaccine hesitancy. When it comes to vaccination

hesitancy issues, social media can be a significant source of information. Grech et al. (2020) revealed that social media plays a major concern in misinformation which in turn contributes to high risks of vaccine hesitancy.

New vaccines are relatively difficult to roll out due to low levels of information on the safety of the or perceived fear of the side effects of the vaccines. One of the most critical strategies associated with improved uptake of new vaccines is associated social media usage. Government agencies can resort to using social media to provide critical and correct information to help improve the extent of vaccine hesitancy (Karafillakis et al., 2016). Lucia et al. (2021) did s study that captured high levels of COVID-19 vaccine uptake among the respondents. The study revealed that social media provided unreliable information that would improve the level of vaccine hesitancy.

According to a survey conducted by Kociolek et al. (2021), 7012 were highly likely to be hesitant towards vaccine uptake. However, a majority of the respondents did not value social media to provide reassuring and accurate information about vaccines. Wilson & Wiysonge (2020) also used a large country regression framework to evaluate the effect of social media on vaccine hesitancy and revealed that the respondents had limited trust in social media given the spread of information about the association with vaccinations being unsafe. Foreign disinformation on negative social media was associated with increased distribution of negative social media activity associated with vaccination.

Savoia et al. (2021) note that racial discrimination is the main contributor to the low uptake of vaccines hence a need to introduce new communication and logistical features, especially during the vaccination period that would be sensitive to those exposed to such incidences.

According to Puri et al. (2020), health information provided through the media such as the Internet and social media increases with rapid improvement in technology. Social media allows multiple individuals across the world to share and spread information across multiple platforms. This gives people the ability to misuse the internet and spread misinformation on vaccines. However, social media could also be used to spread correct information that could in turn improve the extent of health literacy and the extent of public trust in vaccination.

2.2.2 Politics

Vaccine hesitancy is characterized by increased levels of complexity that need to be addressed at the population level. The introduction of transparency concerning the policy decision-making process before immunization exercises are implemented would be instrumental in the provision of current information for the public and healthcare providers which would improve the extent of success for the new vaccines (D. Kumar et al., 2016). A study in Hong Kong used a cross-sectional study that explored various factors that contributed to vaccine hesitancy. The findings showed the nurses were highly resistant to completely refusing the vaccine because of skepticism associated with the safety of the vaccine. This was also increased by mistrust of government recommendations and concerns about the affordability of the vaccine (Lau et al., 2020). Troiano & Nardi (2021) also notes that there is a significant correlation between politics and COVID-19 hesitancy. It was established that most of the respondents were less likely to trust the government concerning information on COVID-19 hesitancy.

2.2.3 Knowledge, Awareness, and Beliefs

Soares et al. (2021) reported that low levels of information and the perceptions of government measures in Portugal were significant in encouraging vaccine hesitancy among health workers. Grech et al. (2020) also revealed that knowledge and attitudes associated with the safety of the vaccine were significant in encouraging increased levels of COVID-19 vaccine hesitancy among workers.

Karafillakis et al. (2016) reported that healthcare workers are the chief source of health information which in turn helps to capture trust from the patients. Nevertheless, the extent of vaccine hesitancy among healthcare workers is relatively high and highly related to low levels of vaccine knowledge. The results also showed that healthcare workers showed increased trust in the health authorities but expressed strong mistrust of the pharmaceutical firms. This was associated with limited communication on the side effects and the perceived financial interests associated with the distribution of these vaccines. Paterson et al. (2016) also revealed that the extent of vaccine hesitancy among practicing HCPs was relatively improved through the provision of support, training, and sufficient information which was in turn instrumental in improving the extent of

assurance in the vaccines and the extent of readiness to recommend them to other people.

Barello et al. (2020) explored the attitudes related to COVID-19 vaccination among health students. The students indicated that they were unaware of whether to vaccinate or not given the low level of information. They revealed that they had little information that would guide their actions on vaccination. Maraqa et al. (2021) also captured 1159 HCWs to explore their aim to receive the vaccine. Results revealed that the healthcare workers expressed limited knowledge of vaccines which significantly influenced their acceptance.

According to Kumar et al. (2016), the healthcare providers' attitudes along with their level of knowledge on the vaccines would be highly linked with an increased level of confidence and motivation for them to propose the vaccines to their patients. Another study sought to evaluate the extent of COVID-19 vaccine hesitancy and acceptance among medical school students. Study findings showed that participants had positive attitudes concerning vaccines, but they were unwilling to be vaccinated instantly after approval from the U.S. Food and Drug Administration (FDA). This decision was attributed to concerns over their safety and agreeableness with the vaccine mandates (Lucia et al., 2021). A similar study that utilized a cross-sectional study revealed that COVID-19 vaccination was highly related to limited trust in the governments and pharmaceutical firms believed to be ulterior in the vaccination distribution, especially the generation of profits (Holzmann-Littig et al., 2021).

2.2.4 Experience with Past Vaccinations

Vaccine hesitancy is associated with health workers' past experiences who were more likely to resist taking up vaccines as HCWs with bitter experiences of such interventions (D. Kumar et al., 2016). Another study showed that vaccine hesitancy was highly related to bad experiences with the exercises which eventually led to vaccine hesitancy. The respondents noted issues associated with racial discrimination during the vaccination rollout which contributed to the high level of hesitancy attributed to such experiences (Savoia et al., 2021).

2.3 Vaccine-Specific Factors Associated with Covid-19 Vaccine Hesitancy

2.3.1 Risks and Benefits

Nurses were recruited in a study in Hong Kong to explore the factors that contributed to vaccine hesitancy. The findings showed the nurses were highly resistant to completely refusing the vaccine as a result of skepticism associated with the safety of the vaccine (Lau et al., 2020). Dinga et al. (2021) utilized a deductive approach to capture the extent of vaccine hesitancy among adults. The respondents noted that they would prefer the vaccinations to be conducted in other countries before they could be confident about the efficacy, safety, and benefits of the vaccine. Another study conducted in Egypt captured 2133 students at medical school in a cross-sectional study. It was reported that 46% of the respondents had vaccination hesitancy while 6% completely refused to take vaccination. This was attributed to reasons such as insufficient information on the vaccine, and concerns over its safety and efficacy (Saied et al., 2021).

2.3.2 New Vaccine

The introduction of new vaccines is a major concern due to increased levels of mistrust which in turn is associated with high levels of hesitancy when it comes to the uptake of the vaccines. This is attributed to the increased fear of the perceived vaccine side effects (Karafillakis et al., 2016). A U.S. study revealed that people were most likely to experience vaccine hesitancy given the fact that the new COVID-19 vaccine is relatively new and has not been properly tested. People are highly doubtful of the benefits associated with the new vaccine especially if it is yet to be approved. The skepticism associated with the implementation of new vaccines is highly likely to be compounded by political influences that many advise people to stay away from vaccination (Coustasse et al., 2021).

2.3.3 Mode of Administration

Vaccine administration can be a major contributor to vaccine hesitancy among the intended target group. Irrespective of the benefits associated with vaccinations people are highly conscious of the mode of administration of a particular vaccine (Dinga et al., 2021). This study is related to the one that reported that people are not only worried

about the risks associated with vaccines but also about the mode of administration especially if it would result in significant pain (Oduwole et al., 2021). Another study conducted in Australia sought to determine the vaccine characteristics that mattered most to the people. the study utilized a preferences experiment among 2136 individuals who revealed that vaccines with mild adverse effects, preferable mode of administration (location), and price played a key role in uptake (Boriello et al., 2021).

2.4 Theoretical Framework

2.4.1 Health Belief Model

The health belief model is often credited to the works of Irwin Rosenstock however Godfrey Hochbaum and Stephen Kegels were also engaged in its development. This model was developed in the 1950s as an approach to increasing the extent of TB screening in America. The health belief model is built upon three major core assumptions which include:

- 1) The belief of a negative health state is averted.
- 2) Having positive expectations and taking proper actions towards eradicating the negative health state.
- 3) The belief that a person at risk can take positive action.

The theory spells out that health behavior is dependent on a person's perception and beliefs about a particular health condition. The perceptions are characterized by their seriousness, susceptibility, benefits, and barriers. In essence, these perceptions can act in combination and individually in explaining their health behavior. This is explained below.

Perceived Seriousness

It is described as the level to which a certain health risk is viewed as being serious or severe. It is however significant to note that it is dependent on a person's knowledge of the health concern. In principle, an individual with knowledge of the benefits of screening for prostate cancer is more likely to seek screening services contrary to those

without knowledge of the risks of the disease. They will also seek more insight into the control of the disease.

Perceive Susceptibility

The perceived risk of a particular disease can prompt an individual to seek better interventions and seek healthy interventions. Prostate cancer is perceived as being a major cause of death and suffering for individuals at risk and their families.

Perceived Benefits

Value creation in health-seeking behavior is mainly achieved when the individuals at risk are aware of the benefits associated with health-seeking behavior. When men see the benefits of seeking screening services for prostate cancer, then more men will increase their participation in prostate cancer screening services.

Perceived Barriers

Perceived barriers are an individual's evaluation of the factors and other hindrances to seeking proper health behavior. Several barriers act as hindrances in health behavior seeking which include socio-demographic and socio-economic factors, knowledge, and cultural factors. It is however critical to ensure that the benefits are perceived to be much greater than the barriers. The health belief model also states that health behaviors are influenced by several cues to action. These are mainly composed of the people, things, and events which prompt them to take certain actions. Little attention is however paid to the involvement of men in screening services this is as depicted in Figure 2.1

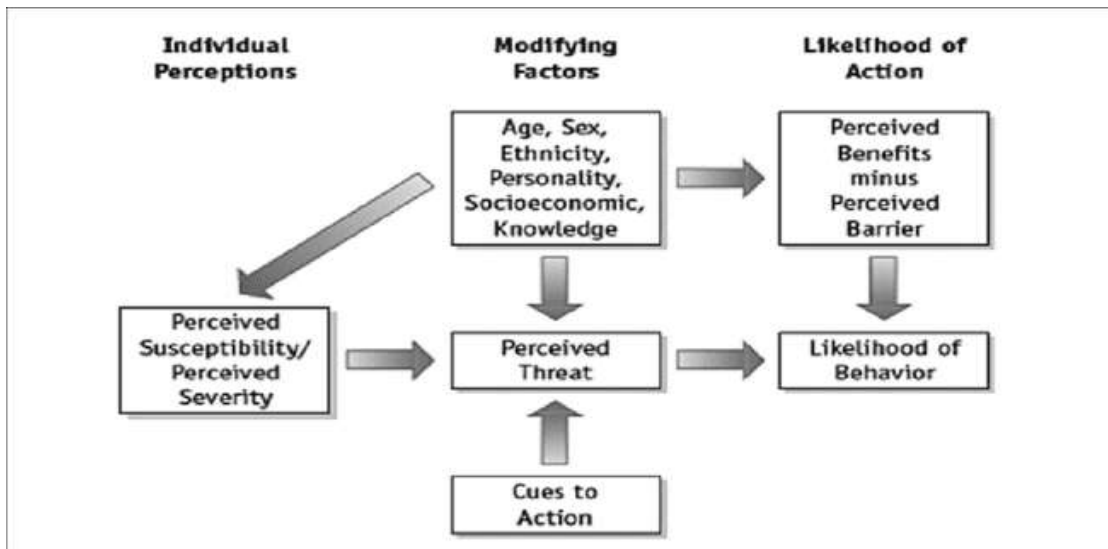


Figure 2.1 The Health Belief Model

Relevance to the Study

This theory stipulates that there are a variety of factors that would prompt an individual to seek health actions. The healthcare worker might be aware of the associated risks of COVID-19 due to their exposure which will force them to seek vaccination as they weigh in on the benefits of seeking this intervention. In relation to the study, healthcare workers who perceive COVID-19 as a serious concern will seek to be screened and seek more knowledge on its control and prevention

2.5 Conceptual Framework

The independent variables in the study include socio-demographic factors, contextual factors, individual and group factors, and vaccine-specific factors all of which are related to COVID-19 vaccine hesitancy (Dependent variable) among the health workers as shown in Figure 2.2. The sociodemographic factors such as Gender may influence the levels of vaccine hesitancy such as men being more resistant towards the uptake of the vaccine. Contextual factors such as communication and politics also influence the decisions that people make in terms of the available information. Similarly, vaccine-specific factors such as the risks or benefits of the vaccine also encourage or discourage the level of hesitancy.

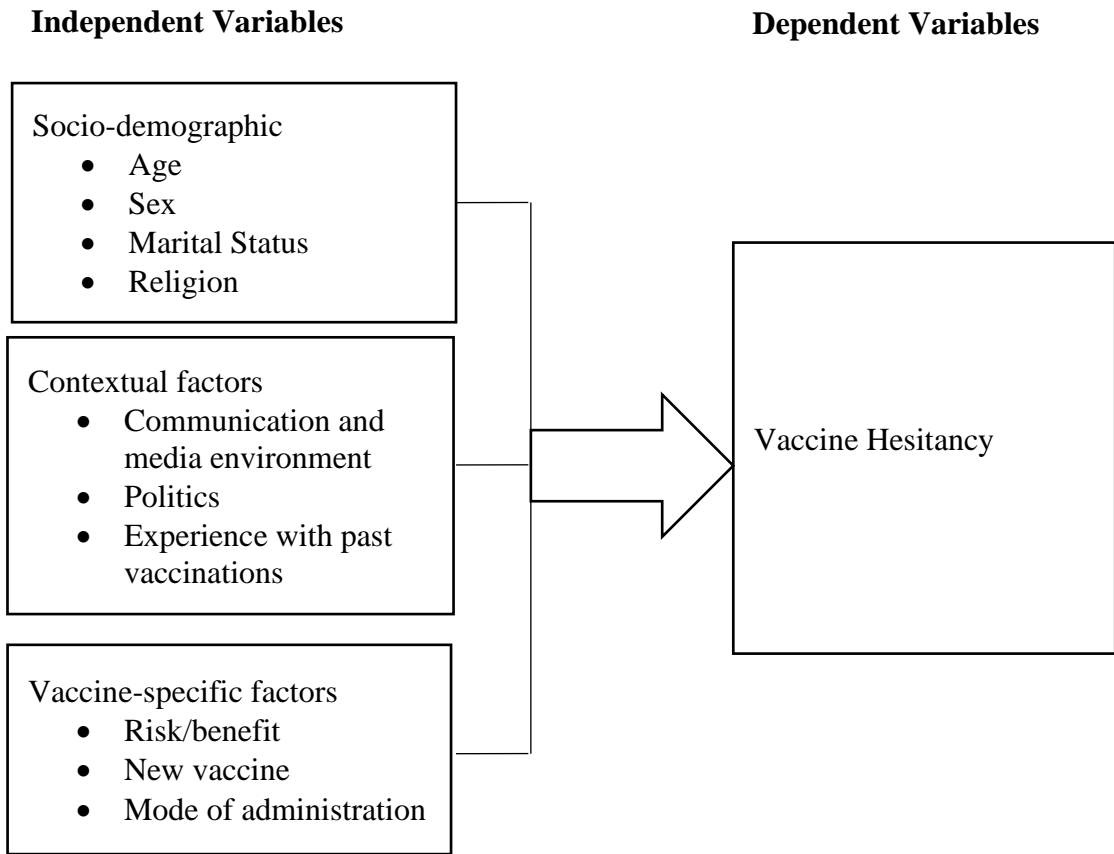


Figure 2.2: Conceptual Framework

2.5.1 Study Variables and Their assessment

Variable	Sub-variable	Assessment
Socio-demographic factors	Gender	Male and female
	Marital status	Single, married, widowed/separated
	Experience	No. of years
	Religion	Type of religion
	Cadre	Nurse, lab tech, doctor, Clinical officer
	Vaccinated	Yes or no
Contextual factors	What is the most common information source you turn to for information on vaccines?	Social media, internet, news, others
	When you hear a negative comment about the vaccine(s), do you:	Ask a friend what they think, Ask a fellow health worker, Rely on the government, Go to the internet and other

	Who do you trust the most for information?	Friend, Fellow health worker, Government
	Who do you trust the least?	Friend, Fellow health worker, Government
	Some groups or leaders do not agree to vaccination for different reasons. Do you know of any of these groups or individuals?	Yes or no
	Do you remember any events in the past that would have discouraged you from getting a vaccine(s)?	Yes or no
	Have you ever decided to not get a vaccination for yourself?	Yes or no
	What was the reason?	Mistrust of the vaccine, Fear of the side effects, Lack of information
	Do you know anyone who has had a bad reaction to a vaccine?	Yes or no
	Do you think the COVID-19 vaccine is still needed?	Yes or no
	Are you satisfied with your professional answers to your questions related to immunization?	Yes or no
	Do you trust the vaccine advice your healthcare provider gives you?	Yes or no
Vaccine specific factors	Do you believe COVID-19 vaccines are safe for you? For those in your community?	Yes, partly, and no
	Do you feel you get enough information about COVID-19 vaccines and their safety?	Yes or no
	What is the first thing you want to know when a new vaccine is introduced or announced?	Side effects and other risks, Benefits, Efficacy
	When a new COVID-19 vaccine is introduced, would you be the first to get it?	Yes or no
	Would you rather wait and see what other people do?	Yes or no

CHAPTER THREE: METHODOLOGY

3.1 Study Design

The study used an analytical cross-sectional approach to provide a snapshot of the situation of COVID-19 vaccination hesitancy among selected healthcare workers in Trans Nzoia County.

3.2 Study Area

The Rift Valley region, where Mt. Elgon is located, is where Trans Nzoia County is situated. Moreover, it is situated west of Bungoma, south of Uasin Gishu and Kakamega, east of Elgeyo Marakwet, and north of West Pokot. The county covers 2495.5 square kilometers. The county is also divided into five regions including Saboti, Cherangany, Endeless, Kinini, and Kwanza. It has a population of 818757 people and most of the people depend on farming (Dairy and horticultural farming). The county also has a total of 78 health institutions inclusive of 33 dispensaries, 28 medical clinics, 6 nursing homes, 7 health centers, and 2 sub-district and district hospitals (County Government of Trans Nzoia, 2021).

3.3 Study Population

This study focused on healthcare workers including Doctors, Nurses, Clinical Officers, pharmacists, Lab Technicians, Public Health Officer

3.3.1 Inclusion criteria

1. All health care workers who agree to be part of the study.
2. All health care workers who are currently working in the health facilities.

3.3.2 Exclusion criteria

1. All health care workers who do not agree to be part of the study.

3.4 Sample Size

Since the population size is less than 10,000 the final sample estimate (nf) was calculated using the following formula.

$$nf = \frac{n}{1 + \left(\frac{n}{N}\right)}$$

Where:

(nf) = anticipated sample size (when the population is less than 10,000)

(n) = required sample size (when the population is more than 10,000)

N = population of health care workers (164)

Hence:

$$nf = \frac{385}{1 + \left(\frac{385}{185}\right)} = 115$$

NB: a 10% attrition rate was included hence $125+12=137$ respondents.

3.5 Sampling Frame

After a target sample size was captured for each health facility, the respondents were carefully and randomly selected until a desired sample size was captured. The sample values were obtained by following the formula

$$\frac{\text{capacity of facility}}{\text{Total of all facilities}} \times 137$$

Health facility	Capacity	Sample
Saboti	49	36
Kitale County Referral Hospital	90	67
Endebess Sub-County Hospital	46	34
Total	185	137

3.6 Sampling

Purposive sampling was used in the selection of the study area (Health facilities) that was captured in the study. Stratified sampling was later used to account for the target number of respondents in each facility. Subsequently, a simple random sampling method was used to select respondents. This was achieved through the selection of the respondents based on their availability within the health facilities. In essence, a target sample was selected for each and the respondents were randomly selected from each of the hospital departments until a desired number of respondents was collected from each of the facilities.

3.7 Data Collection

A semi-structured questionnaire was used to collect data. Sociodemographic factors, COVID-19 uptake, contextual factors, individual and group factors, and vaccine-specific factors were included in the questionnaire.

3.8 Pre-testing/Piloting Study

3.8.1 Validity and Reliability of data

To ascertain whether the set of questionnaire items accurately reflected the ideas of the study, expert opinion was sought. The Cronbach Alpha, designed by Lee Cronbach, was used to assess any internal discrepancies or scale. To guarantee the authenticity of the data, internal discrepancies should be identified before a test is implemented for research or examination. To ensure that the data in this study is reliable, a Cronbach alpha value of 0.7 or higher was targeted.

3.9 Data Analysis

Incomplete questionnaires were omitted from entering data in the SPSS. SPSS 25 was used for the entry and analysis of data. Descriptive analysis using frequencies, percentages, and standard deviation was used to interpret the findings, while inferential analysis was done using binomial logistic regression analysis. The statistical level of significance was set at $P < 0.05$. Data was presented using frequency distribution tables, graphs, and pie charts.

3.10 Ethical Considerations

Protocol review, clearance, and consent were sought from the Institutional Research and Ethics Committee and approval was obtained from the National Council for Science Technology and Innovation (NACOSTI) (Ref no. 875617). Moreover, permission was also sought from Trans Nzoia County to ensure that no ethical issues were breached. Additionally, permission was also acquired from the county government of Trans Nzoia, before collecting data from the hospitals (Ref no. CGTN/HS/RH/02 VOL 2/2020). Similarly, the participants will not be required to provide their identification other than a signed consent before participation, and they were informed about the research benefits and risks. The identity of respondents was secured, and codes were used for their identification.

CHAPTER FOUR: RESULTS

4.1 Descriptive Statistics

4.1.1 Socio-Demographic Information

Most respondents were from Kitale Referral and Teaching Hospital (n=84, 62.7%) with a majority of the respondent being male (n=97, 72.4%) and between the age of 29-38 (n=78, 58.2%). Most of the clinicians (n=126, 94%) were married (n=69, 51.5%) with 5 years and above in experience and a majority were Christians (n=133, 99.3%) as shown in Table 4.1

Table 4.1: Socio-Demographic Factors

Characteristic	Category	n	%
Health facility	Endebess sub-county hospital	24	17.9%
	Kitale referral and teaching hospital	84	62.7%
	Saboti sub-county hospital	26	19.4%
Gender	Female	37	27.6%
	Male	97	72.4%
Age	18-28	21	15.7
	29-38	78	58.2
	39-48	23	17.2
	49-58	12	9.0
Cadre	Clinician	126	94.0%
	Non-clinician	8	6.0%
Marital status	Married	69	51.5%
	Single	65	48.5%
Level of experience	0-4 years	38	28.4%
	5 years and above	96	71.6%
Religion	Christian	133	99.3%
	Muslim	1	0.7%

4.1.2 Contextual Factors

In relation to Table 4.2, the commonest source of information was from the government (n=117, 87.3%) and a majority of the respondents relied on the government (n=126, 94%) when reacting to negative vaccine comments. Nearly three-quarters of the respondents also relied on the government or media (n=95, 70.9%) as the most trusted information source and social media (n=88, 65.7%) as the least trusted source of information. More than half of the respondents also had knowledge of the antivaccine

groups (n=71, 53%), had experienced discouraging past vaccination events (n=77, 57.5%).

Table 4.2: Contextual Factors

Characteristic	Category	n	%
Commonest information source	Social media or web	17	12.7
	Government/Facility	117	87.3
Reaction to negative vaccine comments	Ask a fellow health worker.	8	6.0
	Rely on the government?	126	94.0
Most Trusted	Fellow Health worker	39	29.1
	Government or Media	95	70.9
Least trusted	Fellow health worker	24	17.9
	Others	22	16.4
	Social media	88	65.7
Knowledge of antivaccine groups or individuals	No	71	53.0
	Yes	63	47.0
Discouraging past vaccination events	No	57	42.5
	Yes	77	57.5

The most common source of hesitancy among the respondents was 29.9%

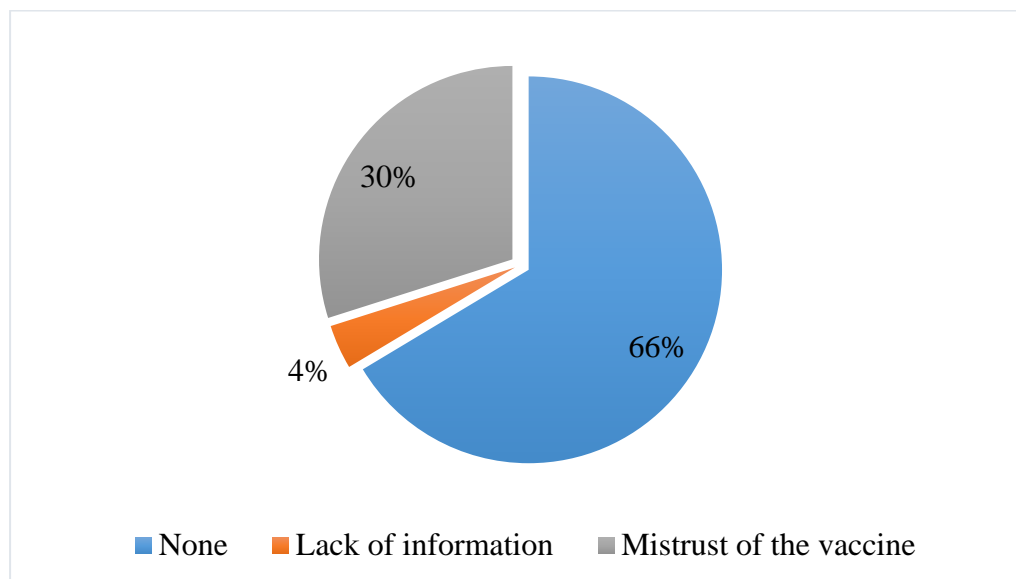


Figure 4.1: Hesitancy Reason

A majority of the respondents reported that they knew (82.1%) of individuals with bad reactions to the vaccine

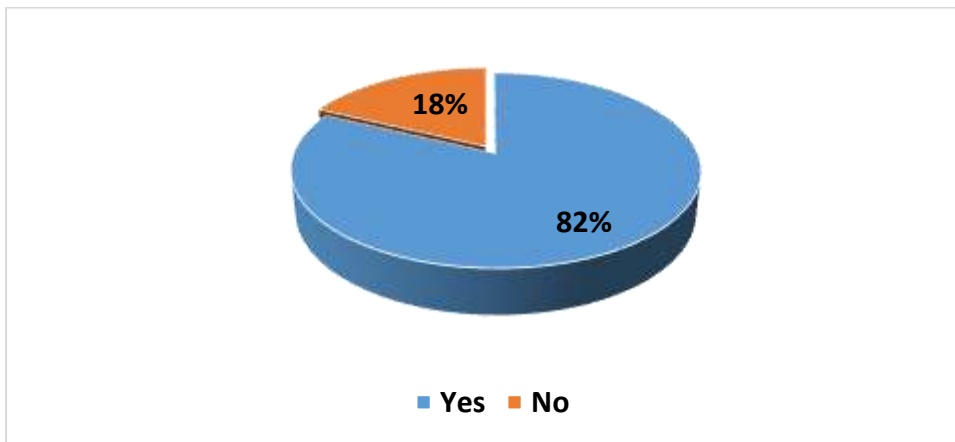


Figure 4.2: Knowledge on Bad Reaction to Vaccine

More than three-quarters of the respondents (94.8%) believe that COVID-19 is still required

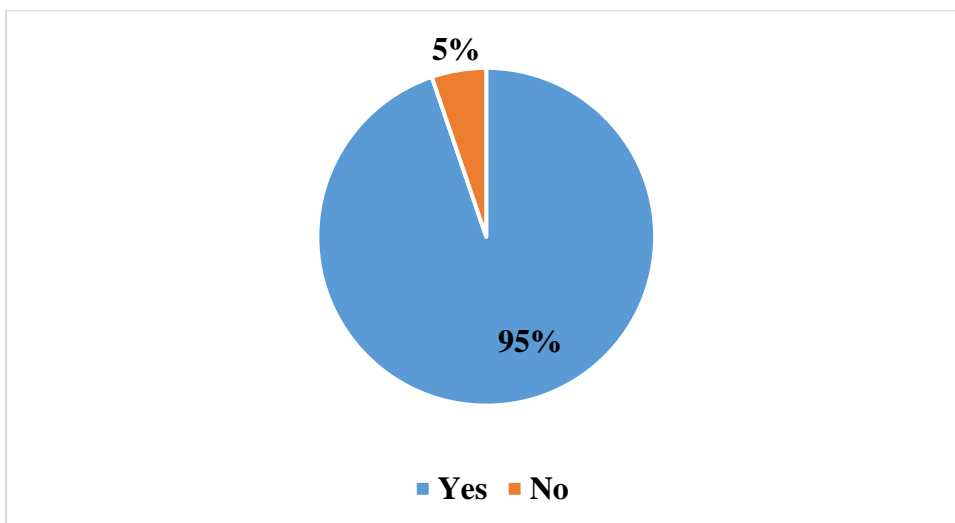


Figure 4.3: Think COVID-19 is still Needed

At least half (53%) of the respondents were satisfied with their professional answers on questions related to immunization

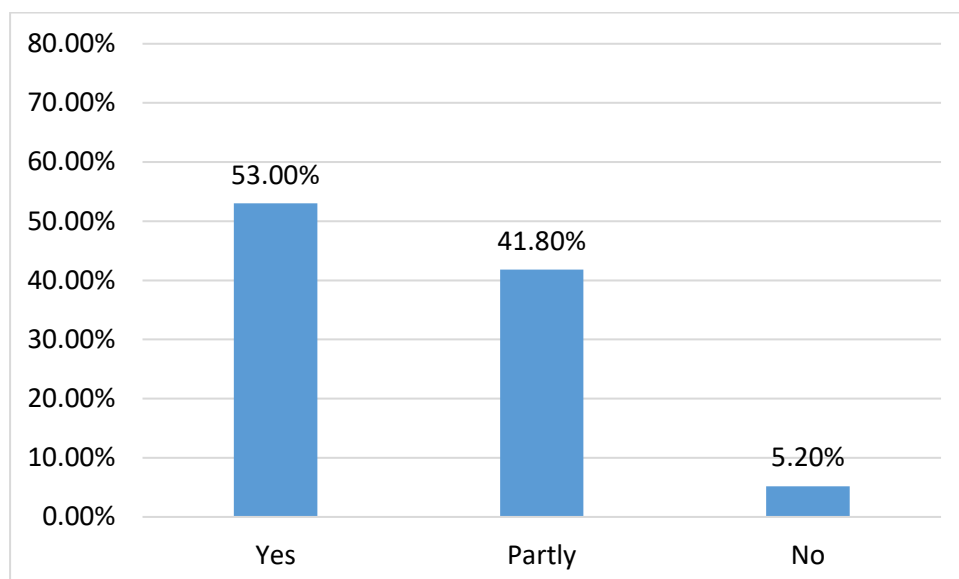


Figure 4.4: Satisfaction with Professional Answers

4.1.3 Vaccine-Specific Factors

In relation to Table 4.3, the healthcare providers noted trusted the advice they acquired from other healthcare providers (n=82, 61.2%) and they believed that the COVID-19 vaccine is safe for themselves (n=127, 94.8%). The healthcare providers also noted that they acquired enough information on the COVID-19 vaccine (n=119, 88.8%). The healthcare providers also noted that the first thing they wanted to know about the new vaccines is the side effects and other risks (n=103, 76.9%) and they would be the first to get the vaccine (n=118, 88.1%). However, a majority of the respondents would like to wait and see what other people do (n=84, 62.7%).

Table 4.3: Vaccine-specific Factors

Characteristics		n	%
Do you trust the vaccine advice your healthcare provider gives you?	No	7	5.2
	Partly	45	33.6
	Yes	82	61.2
Do you believe COVID-19 vaccines are safe for you? For those in your community?	Partly	7	5.2
	Yes	127	94.8
Do you feel you get enough information about COVID-19 vaccines and their safety?	No	15	11.2
	Yes	119	88.8
	Benefits	17	12.7

What is the first thing you want to know when a new vaccine is introduced or announced?	Death of expiry	7	7.2
	Exp date	7	7.2
	Side effects and other risks	103	76.9
When a new COVID-19 vaccine is introduced, would you be the first to get it?	No	16	11.9
	Yes	118	88.1
Would you rather wait and see what other people do?	No	50	37.3
	Yes	84	62.7

4.2 Inferential Statistics

4.2.1 Bivariable Analysis

This analysis was crucial in determining the factors that had a significant associated before they were subjected to the multivariate analysis

4.2.1.1 Sociodemographic Factors Associated with Hesitancy

The bivariate analysis indicated that various factors were related to vaccine hesitancy. This includes sex (OR=4.559, CI: 1.828-11.372; p=0.001) where male HCWs were likely to be hesitant regarding the vaccine compared to their colleagues. Similarly, married HCWs (OR=9.818, CI: 4.328-22.272; p<0.001) were likely to be hesitant compared to single workers. Additionally, HCWs with five or more years of work experience (OR= 4.814, CI: 1.932-11.991; p=0.001) were more likely to be vaccine-hesitant compared to those with four years and less experience as shown in Table 4.4.

Table 4.4: Socio-demographic Factors Associated with Hesitancy

Characteristic	Category	Hesitancy				OR	Unadjusted CI	p-value
		No		Yes				
		n	%	n	%			
Health facility	Endebess	14	58.3	10	41.7	0.974	0.316-2.998	.963
	Kitale	48	57.1	36	42.9	1.023	0.420-2.490	.961
	Saboti	15	57.7	11	42.3	REF		
Sex	Female	30	81.1	7	18.9	REF		
	Male	47	48.5	50	51.5	4.559	1.828-11.372	.001
Cadre	Clinician	73	57.9	53	42.1	1.377	0.330-5.757	.661
	Non-clinician	4	50.0	4	50.0	REF		
Marital status	Married	23	33.3	46	66.7	9.818	4.328-22.272	<.001
	Single	54	83.1	11	16.9	REF		
Level of experience	0-4 years	31	81.6	7	18.4	REF		
	5+	46	47.9	50	52.1	4.814	1.932-11.991	.001
Religion	Christian	77	57.9	56	42.1	nc		
	Muslim	0	0.0	1	100.0			

nc=not computed as it violates assumptions

4.2.1.2 Contextual factors associated with Covid-19 Vaccine Hesitancy

The HCWs were mostly likely to trust information from the government or media (OR= 5.079, CI: 2.041-12.639; p<0.001) compared to that from fellow health workers and least likely to trust information from fellow health workers (OR= 10.133, CI: 3.403-30.173; p<0.001) and others (OR= 4.607, CI: 1.739-12.525; p=0.002) compared to the social media. Individuals with knowledge of antivaccine (OR= 22.044, CI: 8.889-54.670; p<0.001) were highly likely to express hesitancy towards the vaccine compared to their counterparts. Similarly, HCWs with discouraging past vaccinations (OR= 13.228, CI: 5.276-33.161; p<0.001) were likely to encounter express hesitancy compared to their counterparts. HCWs who were partly satisfied with professional answers (OR= 7.329, CI: 3.292-16.316; p=0.001) were likely to express vaccine hesitancy compared to those who were satisfied or not as shown in Table 4.5.

Table 4.5: Contextual Factors Associated with COVID-19 Vaccine Hesitancy

Characteristic	Category	Hesitancy				OR	CI	p-value			
		No		Yes							
		n	%	n	%						
Commonest information source	Social media or web	17	100.0	0	0.0	nc					
	Government/Facility	60	51.3	57	48.7						
Reaction to negative vaccine comments	Ask a fellow health worker.	8	100.0	0	0.0	nc					
	Rely on the government?	69	54.8	57	45.2						
Most Trusted	Fellow Health worker	32	82.1	7	17.9	REF					
	Government or Media	45	47.4	50	52.6				5.079	2.041-12.639	<.001
Least trusted	Fellow health worker	5	20.8	19	79.2	10.133	3.403-30.173	<.001			
	Others	8	36.4	14	63.6				4.607	1.739-12.525	.002
	Social media	64	72.7	24	27.3				REF		
Knowledge of antivaccine groups or individuals	No	62	87.3	9	12.7	REF					
	Yes	15	23.8	48	76.2				22.044	8.889-54.670	<.001
Discouraging past vaccination events	No	50	87.7	7	12.3	REF					
	Yes	27	35.1	50	64.9				13.228	5.276-33.161	<.001
Hesitancy reason	None	71	79.8	18	20.2	nc					
	Lack of information	0	0.0	5	100.0						
	Mistrust of the vaccine	6	15.0	34	85.0						
Do you know anyone who has had a bad reaction to a vaccine?	No	24	100.0	0	0.0	nc					
	Yes	53	48.2	57	51.8						
Do you think the COVID-19 vaccine is still needed?	No	0	0.0	7	100.0	nc					
	Yes	77	60.6	50	39.4						
Are you satisfied with your professional answers to your questions related to immunization?	No	0	0.0	7	100.0	6.58X10 ⁹	0.000	.999			
	Partly	20	35.7	36	64.3				7.329	3.292-16.316	.001
	Yes	57	80.3	14	19.7				REF		

4.2.1.3 Vaccine-specific factors associated with Covid-19 Vaccine Hesitancy

The HCWs who opted to wait and see what other people do (OR=9.034, CI: 3.637-22.440; p<0.001) were high to express vaccine hesitancy compared to those who would not wait as shown in Table 4.6

Table 4.6: Vaccine-specific factors associated with Covid-19 Vaccine Hesitancy

Characteristics		Hesitancy				OR	CI	p-value
		No		Yes				
		N	%	N	%			
Do you trust the vaccine advice your healthcare provider gives you?	No	0	0.0	7	100.0	nc		
	Partly	29	64.4	16	35.6			
	Yes	48	58.5	34	41.5			
Do you believe COVID-19 vaccines are safe for you? For those in your community?	Partly	0	0.0	7	100.0	nc		
	Yes	77	60.6	50	39.4			
Do you feel you get enough information about COVID-19 vaccines and their safety?	No	8	53.3	7	46.7	1.207	0.411-3.548	.732
	Yes	69	58.0	50	42.0	REF		
What is the first thing you want to know when a new vaccine is introduced or announced?	Benefits	10	58.8	7	41.2	nc		
	Death of expiry	0	0.0	7	100.0			
	Exp date	0	0.0	7	100.0			
	Side effects and other risks	67	65.0	36	35.0			
When a new COVID-19 vaccine is introduced, would you be the first to get it?	No	0	0.0	16	100.0	nc		
	Yes	77	65.3	41	34.7			
Would you rather wait and see what other people do?	No	43	86.0	7	14.0	REF	3.637-22.440	<.001
	Yes	34	40.5	50	59.5	9.034		

4.3 Multivariate – backward stepwise

Significant variables with a $p < 0.05$ from the bivariable analysis were subjected to the multivariate analysis. The multivariate analysis revealed that males (AOR= 4.080, CI: 1.058-15.733; $p < 0.041$) were more likely to express vaccine hesitancy contrary to their counterparts. Married HCWs (AOR=4.990, CI: 1.660-15.000; $p < 0.004$) were more likely to express vaccine hesitancy contrary to their counterparts. HCWs with five years and more experience (AOR= 12.282, CI: 3.357-44.941; $p < 0.001$) were more likely to express vaccine hesitancy contrary to their counterparts and HCWS with knowledge of antivaccine (AOR=16.633, CI: 5.434-50.917; $p < 0.001$) were more likely to express vaccine hesitancy contrary to their counterparts.

Table 4.7: Multivariate Analysis

Characteristic	Category	Hesitancy				AOR	Unadjusted CI	p-value
		No		Yes				
		n	%	n	%			
Sex	Female	30	81.1	7	18.9	REF	1.058- 15.733	.041
	Male	47	48.5	50	51.5	4.080		
Marital status	Married	23	33.3	46	66.7	4.990	1.660- 15.000	.004
	Single	54	83.1	11	16.9	REF		
Level of experience	0-4 years	31	81.6	7	18.4	REF	3.357- 44.941	<.001
	5+	46	47.9	50	52.1	12.282		
Knowledge of antivaccine groups or individuals	No	62	87.3	9	12.7	REF	5.434- 50.917	<.001
	Yes	15	23.8	48	76.2	16.633		

CHAPTER FIVE:

DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Discussion

The first objective sought to determine the sociodemographic factors associated with COVID-19 Vaccine Hesitancy among Healthcare Workers. Findings from the study revealed that healthcare workers who were male, married, and had more than five years of experience were more likely to be hesitant towards the uptake of COVID-19 vaccine. Additionally, the respondents were partly satisfied with professional answers that were highly related to COVID-19 hesitancy. These findings also relate to a study conducted by Amuzie et al. (2021) which revealed that COVID-19 vaccine hesitancy was mostly associated with younger age, an individual's marital status (Single), income, and the cadre (doctor or nurse). Leigh et al. (2022) also noted that healthcare workers who earned less than the country median were highly associated with an increase in hesitancy to take up the COVID-19 vaccine. Additionally, every increase in the healthcare provider age was associated with 0.02 times greater odds of hesitancy. However, gender did not contribute to any level of significance concerning COVID-19 vaccine hesitancy.

Gbeasor-Komlanvi et al. (2021) also conducted a study in Togo to determine the prevalence and risk factors associated with COVID-19 vaccine hesitancy among healthcare workers. Findings captured from the study revealed that female gender and healthcare workers with an age of ≥ 50 years were highly associated with vaccine hesitancy. Li et al. (2023) also found that demographic factors such as gender (women) and older age were highly associated with vaccine hesitancy.

A similar study conducted by Hara et al. (2021) captured 6180 participants between the age of 20-69 years. The findings from the study revealed that the participants who were women and younger adults were more likely to be hesitant towards COVID-19 vaccine uptake. In a study that captured 10871 healthcare workers, COVID-19 vaccine hesitancy was higher among Black healthcare workers compared to the other racial groups (Hara et al., 2021). This also relates to a study conducted by McCready et al., (2023) sociodemographic factors such as gender, age, and ethnicity as the most prominent factors that were associated with COVID-19 vaccine hesitancy. Similarly,

Kumar et al. (2021) also found out that among the 12.9% of respondents who were hesitant towards the COVID-19 vaccine were more likely to be female who mostly concerned about the safety concerns of the vaccine.

The second objective sought to assess the contextual factors associated with COVID-19 Vaccine Hesitancy among Healthcare Workers. Findings from the study revealed that government trust and fellow health workers' past vaccination events and knowledge of antivaccine groups significantly influenced the extent of hesitancy among the HCWs. Knowledge of different vaccines is a critical factor that encourages the uptake of COVID-19 among different people. The media is a critical source of information that provides a wide array of information on vaccines. However, social media can also act as a major source of information which in turn contributes to hesitancy among healthcare workers (Elbarazi et al., 2021). A Saudi Arabian study assessed the extent of vaccine uptake among HCWs when it was made available in the first month using a national cross-sectional approach. The study used self-administered surveys to collect data. A sum of 1058 respondents, mostly nurses were included, and it was established that social media reliance to provide information was highly related to COVID-19 vaccine hesitancy (Barry et al., 2021). Information provision on the new vaccines is relatively challenging, especially given the nature and extent of occurrence. Such situations make it relatively challenging for physicians to provide the appropriate information because of insufficient knowledge. Usually, 10-15% of physicians provide information on newly recommended vaccinations (Feemster, 2020).

Paris et al. (2021) sought to identify factors related to the acceptance of the COVID-19 vaccine and revealed that vaccine tolerability was mostly associated with media communication on the side effects. Khubchandani et al. (2021) did a comprehensive study that focused on vaccine hesitancy. A sum of 1878 respondents was captured which revealed that factors such as education, employment, income, and political association were related to vaccine hesitancy. The respondents also noted that the sociopolitical factors and pressure are highly linked with rushed approval for the vaccine in turn resulting in hesitancy.

Ochieng et al. (2021) captured several considerable factors related to vaccine hesitancy among the respondents and revealed that there are a variety of visible themes, especially in minority populations. One considerable concern is mistrust which can be categorized

in multiple ways. These include mistrust of the government, mistrust for pharmaceutical companies, and medical mistrust all of which are correlated to vaccine hesitancy. Lucia et al. (2021) also note that communication platforms such as social media are a major source of vaccine hesitancy as they are associated with misinformation. Lau et al. (2020) revealed that mistrust of the government and concerns about the safety and affordability of the vaccine were highly associated with skepticism and vaccine hesitancy among HCWs. This also relates to a study conducted by Troiano & Nardi (2021) which captured a positive correlation between politics and COVID-19 hesitancy among the HCWs. The HCWs also showed less likelihood of trusting the government with the COVID-19 vaccine.

Barello et al. (2020) investigated the factors related to COVID-19 vaccination among HCWs. The results revealed that the HCWs were unable to provide critical advice or recommendations to their patients due to limited information that would help guide their actions. According to Grech et al. (2020), vaccine hesitancy among HCWs is highly correlated with the extent of knowledge and attitudes toward the vaccine which would in turn encourage HCWs to take up the vaccine while also recommending it to their patients. In general, limited knowledge of the new vaccine makes it relatively challenging to influence other individuals to accept the uptake of the vaccines.

A study was conducted in Germany to establish the extent of COVID-19 vaccine hesitancy and acceptance among HCWs. The researchers relied on an exploratory cross-sectional study approach that was adopted, and an online survey was used to collect data. It was reported that most HCWs expressed poor attitudes towards the vaccination given their mistrust of pharmaceutical companies and authorities. Additionally, the HCWs underperformed in knowledge tests as they received information on the vaccine from online video and messenger platforms (Holzmann-Littig et al., 2021). Butter et al. (2022) also sought to assess the influence of factors such as social, situational, and psychological factors associated with the COVID-19 vaccine uptake among key and non-key workers. The study employed a cross-sectional approach that captured 584 key workers and 1021 non-key workers. Factors such as being female and the perception of being low risk were related to vaccine hesitancy amongst healthcare workers.

Biswas et al. (2021) did a worldwide comprehensive study through an assessment of studies that focused on the hesitancy of the COVID-19 vaccine among healthcare workers. A total of 35 studies with a sample size of 2185 participants per study were covered. The study revealed that being male, having a doctoral degree, and old age were related to acceptance of the vaccine. Additionally, the perceived risk of COVID-19, providing direct care for patients with COVID-19, and a history of infection with influenza were also likely to result in hesitancy.

A study was conducted in Hong Kong and China to investigate the effect of the COVID-19 vaccine, the extent of vaccine acceptance, and the identification of factors correlated to acceptance. The study employed a cross-sectional approach that mostly focused on nurses in turn capturing 806 participants. Refusal to take up the vaccine was associated with suspicions of drug efficacy, and the belief that the vaccines are unnecessary with limited time to be vaccinated (Wang et al., 2020). Soares et al. (2021) did a study in Portugal and revealed that low levels of information and perceptions of government measures were associated with vaccine hesitancy amongst HCWs. Savoia et al. (2021) also revealed that bad experiences with vaccines were highly related to vaccine hesitancy. Other concerns like racial discrimination during the vaccination rollout also led to high hesitancy levels.

The third objective sought to capture the vaccine-related factors associated with COVID-19 Vaccine Hesitancy among Healthcare Workers. The results revealed that most of the healthcare workers opted to wait and see what others do before taking up the vaccine. This can be associated with limited information on the new vaccine and concerns over its efficacy. This is in line with Saied et al. (2021) who reported that most HCWs were highly reluctant towards vaccination due to inadequate vaccine information and significant safety and efficacy issues. Aw et al. (2021) sought to determine critical barriers that limit the uptake of the COVID-19 vaccine, especially in high-income nations. The study relied on the analysis of similar studies captured from different databases from Medline®, Embase®, and Scopus®. The study revealed vaccine-specific factors like the fast development of the COVID-19 vaccine and fear over its effectiveness and safety.

Lau et al. (2020) revealed that most nurses in China were highly resistant to the vaccines which was associated with hesitancy over the safety due to its scepticism. Coustasse et

al. (2021) reported that vaccine hesitancy among workers is largely related to the nature of the vaccine. The HCWs perceived the new vaccines as being poorly tested. In essence, the benefits of the vaccines are difficult to ascertain with limited information on the vaccine. Skepticism over the vaccines is also attributed to increased politicization over the effects and impact of the vaccine among the public. Another study implemented deductive approach to capture factors associated with vaccination hesitancy among HCWs. Study findings showed that a majority of the HCWs opted to have the vaccinations implemented in other countries as opposed to build their confidence over safety and efficacy. The HCWs were also highly skeptic over the mode of administration of the vaccine (Dinga et al., 2021).

Borriello et al. (2021) sought to determine major factors related to vaccine hesitancy among HCWs. A variety of vaccine-specific factors such as the mode of the administration, location of administration, and safety and effectiveness of the vaccine are associated with vaccine hesitancy. Most of the respondents revealed an increased preference for oral over intravenous forms of administration. This is like a study that found that people were concerned about the mode of vaccine delivery as well as the hazards linked with vaccines, especially if it would cause excruciating pain (Oduwole et al., 2021). A Southeast Asia study sought to evaluate the willingness of COVID-19 vaccine uptake amongst HCWs using a cross-sectional survey approach that captured 3396 doctors and nurses from Nepal, Hong Kong, and Vietnam. The results showed that the choice of vaccination brand is a major contributor to the occurrence of vaccine hesitancy.

5.2 Conclusion

- 1) Healthcare workers who were male, married, and had more than five years of experience were more likely to be hesitant towards the uptake of the COVID-19 vaccine.
- 2) Trust in the government and health worker information, knowledge of antivaccine groups, and past vaccination events are related to COVID-19 vaccine hesitancy amongst HCWs. The HCWs were partly satisfied with professional answers thus resulting in COVID-19 hesitancy.
- 3) Most of the healthcare workers opted to wait and see what others do before taking up the vaccine.

5.3 Recommendations

- 1) There is a need to implement critical strategies that target socio-demographics factors associated with COVID-19 vaccine uptake.
- 2) There is a need to implement critical intervention strategies such as the provision of regular and reliable information on vaccines to improve their acceptance.
- 3) Information sources that provide information on the COVID-19 vaccine should be regulated to provide quality and reliable information.
- 4) HCWs should receive the required assistance and information to improve their confidence in the vaccines and encourage increased acceptance and uptake.
- 5) The government should implement proper policies that ensure that the vaccines made available are of quality.

5.4 Recommendations for further studies

There is a need to explore these factors individually to provide more in-depth information to ensure further understanding of their occurrences. Similarly, the study can be conducted in other locations to provide new information on vaccine acceptance and hesitancy in Kenya.

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APPENDICES


Appendix I: NACOSTI


REPUBLIC OF KENYA


NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY & INNOVATION

Ref No: 875617 Date of Issue: 12/April/2022

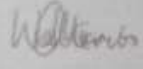
RESEARCH LICENSE



This is to Certify that Dr. BILL ROBERT NGABO of University of Nairobi, has been licensed to conduct research in Transnzoia on the topic: **FACTORS ASSOCIATED WITH COVID-19 VACCINE HESITANCY AMONG HEALTHCARE WORKERS IN SELECTED FACILITIES IN TRANS NZOIA COUNTY** for the period ending : 12/April/2023.

License No: NACOSTI/P/22/16905

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Appendix II: Research Authorization

REPUBLIC OF KENYA
COUNTY GOVERNMENT OF TRANS NZOIA

TEL: 054 – 30301
054 – 30302



From the director's office
P.O. BOX 4211 – 30200
KITALE

Email:
researchunit@transzoia.go.ke

DEPARTMENT OF HEALTH SERVICES

Our Ref: CGTN/HS/RH/02.VOL.1/2020 Date: *Tuesday, May 17, 2022*

To
Bill Robert Ngabo
H70/87883/2016

RE: RESEARCH AUTHORIZATION


Following your application for authority to carry out research on the topic “*factor associated with COVID -19 vaccinate hesitancy among healthcare workers in selected facilities in Trans Nzoia County*”, I am pleased to inform you that the authority is hereby granted.


Please note that the authority granted is only administrative and is subject to the validity of the following:

1. Approval from a competent institution ethics review committee

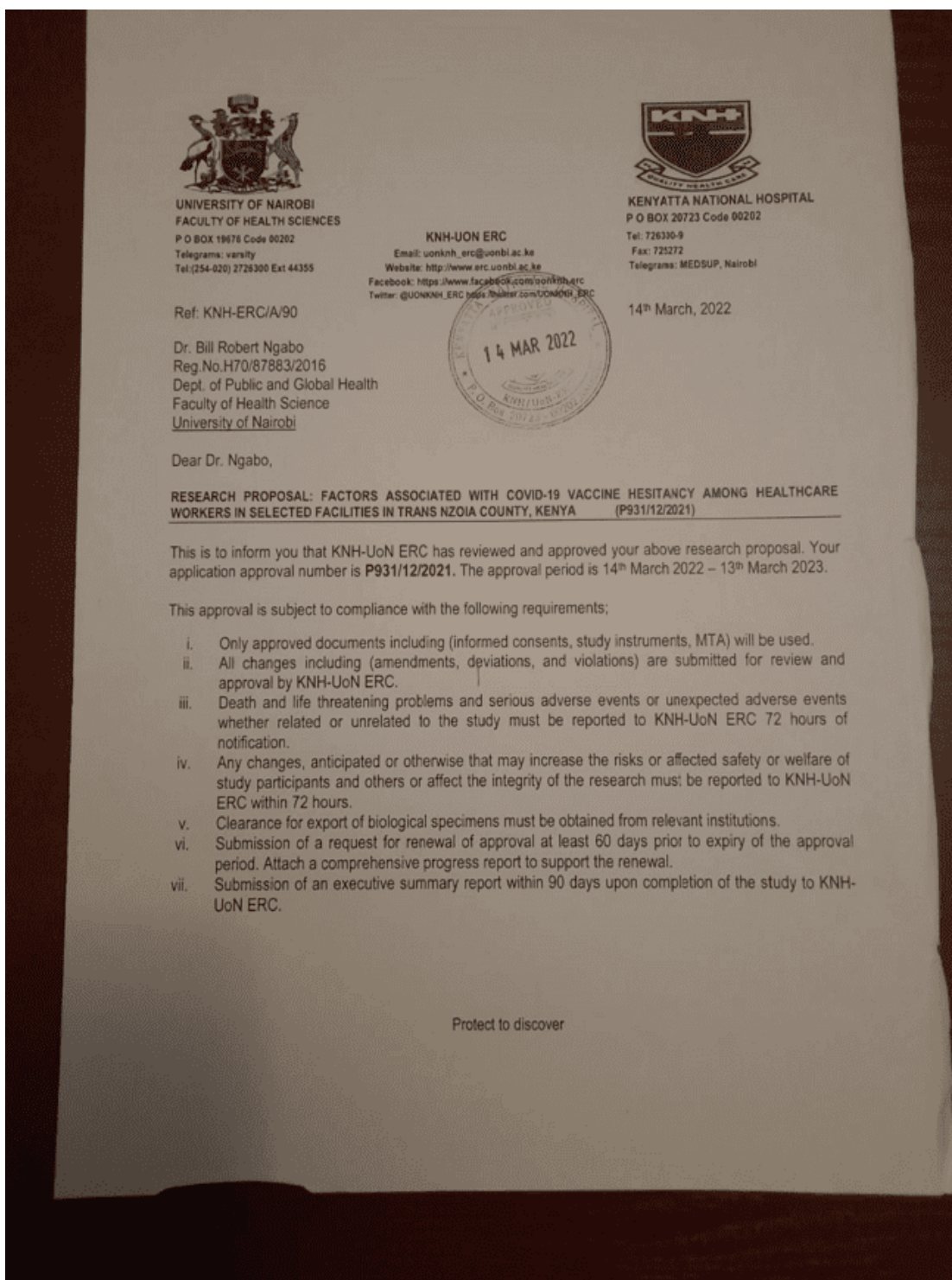
Please ensure that your research is conducted within the time stipulated in your application. Any extension shall require fresh endorsement.

Sincerely


Dr. Wamalwa Anthony
For: Medical Superintendent
KITALE COUNTY HOSPITAL


P. O. Box 98 - 30200, KITALE.

Appendix III: KNH-UON Ethics Review Committee



Appendix IV: Consent Form

PARTICIPANT'S INFORMATION AND CONSENT FORM

TITLE OF STUDY: Factors associated with COVID-19 vaccine hesitancy among healthcare workers in selected facilities in Trans Nzoia County, Kenya

PRINCIPAL INVESTIGATOR: Bill Ngabo

PURPOSE OF THE STUDY

To assess the factors associated with Covid-19 Vaccine Hesitancy among Healthcare Workers in Selected Facilities in Trans Nzoia County, Kenya. Your assistance will be appreciated if you accept to participate in the study.

Supportive aid will be provided if you experience difficulties in responding to the questions. Confidentiality will be highly respected throughout the study.

WHAT WILL HAPPEN IF YOU DECIDE TO BE IN THIS RESEARCH STUDY?

Individuals who agree to take part in the study will be interviewed in an area where they feel most comfortable. This interview will last approximately 10-15 minutes. All information collected will then be stored in a safe and secure location and will not be shared by any individual who is not part of the study

RISKS OF THE STUDY

There are no risks associated with participation in the study. Every information you provide in the study will be handled as private and confidential. Only code numbers will be used for the identification of study participants.

BENEFITS OF THE STUDY

This study will be critical in capturing the extent of COVID-19 vaccine hesitancy and the factors associated with these trends in Trans Nzoia. The information will then be used to improve the success of the COVID-19 vaccination intervention strategies. No form of incentive will be offered for participation in the study and you can withdraw from the study at any stage.

WHAT IF YOU HAVE QUESTIONS IN THE FUTURE?

For future questions and concerns, you may contact the researcher through email, calls, or texts in the contacts provided below

Telephone number: +254732662372

PARTICIPANTS' STATEMENT OF CONSENT

Confidentiality

All information provided in the study will be kept confidential and the information will not be shared with any other individual who is not part of the study. Please sign below to give consent for your participation.

By signing this consent form, I freely agree to participate in the study after reading and understanding the purpose.

Sign **Date**

RESEARCHER'S STATEMENT

I, the undersigned, have fully explained the relevant details of this research study to the participant and believe that the participant has understood and has willingly and freely given his/her consent.

Researcher's Name: Bill Ngabo

Date: _____ Signature _____

Appendix V: Questionnaire

Gender, age, Marital status, experience, religion and cadre

SECTION A: SOCIO-DEMOGRAPHIC FACTORS		
Gender	Male	
	Female	
Age		
Marital status	Single	
	Married	
	Separated/Divorced	
Experience	Less than 1 year	
	1-2 year	
	3-4 years	
	5 years and above	
Religion	Christian	
	Muslim	
	Hindu	
	Other	
Cadre of Health worker		
SECTION B: UPTAKE OF COVID-19 VACCINE		
Have you been vaccinated for COVID-19?	Yes	
	No	
If no, please state the reason why		

SECTION B: CONTEXTUAL FACTORS

SECTION B: CONTEXTUAL FACTORS		
What is the most common information source you turn to for information on vaccines?	Social media	
	Internet	
	News	
	Other	
When you hear a negative comment about the vaccine(s), do you:	Ask a friend what they think.	
	Ask a fellow health worker.	
	Rely on the government?	
	Go to the internet?	
	Other	
Who do you trust the most for information?	Friend	
	Fellow health worker	
	Government	
	Other	
Who do you trust the least?	Friend	
	Fellow health worker	
	Government	
	Other	
Some groups or leaders do not agree to vaccination for different reasons. Do you know of any of these groups or individuals?	Yes	
	No	
Do you remember any events in the past that would have discouraged you from getting a vaccine(s)?	Yes	
	No	
If yes, please describe the event(s)		

SECTION C: INDIVIDUAL AND GROUP FACTORS		
Have you ever decided to not get a vaccination for yourself?	Yes	
	No	
What was the reason?	Mistrust of the vaccine	
	Fear of the side effects	
	Lack of information	
	Others	
Do you know anyone who has had a bad reaction to a vaccine?	Yes	
	No	
Do you think the COVID-19 vaccine is still needed?	Yes	
	No	
Are you satisfied with your professional answers to your questions related to immunization?	Yes	
	Partly	
	No	
Do you trust the vaccine advice your healthcare provider gives you?	Yes	
	Partly	
	No	
SECTION D: VACCINE-SPECIFIC FACTORS		
Do you believe COVID-19 vaccines are safe for you? For those in your community?	Yes	
	Partly	
	No	
Do you feel you get enough information about COVID-19 vaccines and their safety?	Yes	
	No	
What is the first thing you want to know when a new vaccine is introduced or announced?	Side effects and other risks	
	Benefits	
	Efficacy	
	Other	
When a new COVID-19 vaccine is introduced, would you be the first to get it?	Yes	
	No	
Would you rather wait and see what other people do?	Yes	
	No	
Are there any things that could be done to encourage you to get vaccinated? Please list them below		

Appendix VI: Workplan

Activity	Months	Sept -Oct 202 1	Nov 202 1	Dec 202 1	Jan 202 2	Feb 202 2	Mar -Jun 202 2	July 202 2
Proposal development								
Chapter one								
Chapters Two and Three								
Research Defense								
Ethics approval								
Correction								
Data collection & entry								
Data Analysis								
Thesis Development								
Final Defense								

Appendix VII: Budget

Item	Number (Quantity)	Number of Days	Unit Cost (in KSH)	Total
Research Assistants	4	30	20,000	80,000
Statistician	1	5	10,000	50,000
Transport	4	30	4,000	16,000
Communication (airtime, internet)	4	30	2,000	8,000
Consumables (paper reams, notebooks, pens, etc)	4	30	300	1200
Total				155,600

Budget justification

Four research assistants will be required to aid in the collection of data from the four selected health facilities in Trans Nzoia. On the other hand, the principal investigator will coordinate with the four research assistants by ensuring that the data is properly collected, filled, and stored correctly for entry and analysis.

Appendix VIII: Map of Tran Nzoia County

