

**COVID-19 VACCINE ACCEPTANCE AND ITS ASSOCIATED FACTORS
AMONG HEALTH CARE PROVIDERS IN BUSIA COUNTY, KENYA**

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the Degree of Masters of Science in Advanced Nursing Practice (Community
Health and Primary Care) of Masinde Muliro University of Science and
Technology**

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DECLARATION

This thesis is my original work prepared with no other than the indicated sources and support and has not been presented elsewhere for a degree or any other award.

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CERTIFICATION

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DEDICATION

This work is dedicated to my late parents Mr. and Mrs. Edward Ilahalwa, my siblings Christine Ilahalwa, Kavuzi, Bulimu, Masaya and the late Allan Ruga. You were a great blessing and inspiration.

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ABSTRACT

The novel coronavirus was announced a global rampant disease in March 2020. Non-pharmaceutical Interventions were imposed globally to assist in controlling the spread of the disease, which a lot of damage that impacted the health of individuals and contributed to a significant decline in the global economy. Through rigorous research, the world realized the development of effective and safe vaccines. The general public acceptance for vaccination against COVID-19 disease still remains undetermined. Health care providers have the highest susceptibility to the Corona Virus disease as they manage multiple patients on their day-to-day activities. They are integral in the acceptance of any vaccine as they instill confidence to the public in any vaccination activity. The study aimed to assess the COVID-19 vaccine acceptance and its associated factors among health care providers in Busia County, Kenya. A sample size of 423 health care providers was determined using the fisher's formula, facts were gathered using an online questionnaire whose questions were both closed and open ended. Collected data was then transferred into Microsoft Excel Spreadsheet, uploaded and was put into codes into the SPSS version 26 software for analysis and final evaluation. Simple descriptive analyses, like frequencies, mean, standard deviation, and percentages, graphs and figures were formulated for Socio-demographic aspects, the knowledge scores concerning COVID-19 vaccine, and the perceived susceptibility, benefits and barriers to the COVID-19 vaccine. Bivariate correlation was used to ascertain interdependence between variables. Where the P-value of <0.05 was used determined if it was statistically significant or not. The study found that 93.4% of all sampled health care providers accepted the to the COVID -19 vaccine. Independent variables including age, marital status living arrangements, type of employer and cadre were significantly associated with vaccine acceptance ($p \leq 0.05$). Health care providers who had been in contact with COVID-19 patients had higher odds of accepting the Vaccine (OR: 4.4; 95% CI: 2.3 – 8.4; $p < 0.0001$). Although not statistically significant, those with chronic medical conditions (86.4%) were less likely to accept the vaccine than those without (95.2%). There was significant association between healthcare providers who affirmed radio/TV (OR: 3.1; 95% CI: 1.6 – 5.9; $p = 0.0003$), government agencies (OR: 5.6; 95% CI: 2.8 – 11.0; $p < 0.0001$), healthcare providers (OR: 8.0; 95% CI: 4.0 – 15.7; $p < 0.0001$), print media (OR: 4.1; 95% CI: 1.9 – 8.8; $p = 0.0001$) very significantly influenced their opinion regarding vaccination and acceptance of COVID-19 vaccines with higher odds reported for each information source. Health providers who perceived themselves as susceptible were almost 10 times more likely to have accepted vaccines (OR: 9.8; 95% CI: 4.8 – 19.8; $p < 0.0001$). Similarly, those who were very worried were about 5 times more likely to have accepted vaccines compared to those who were not worried (OR: 4.7; 95% CI: 2.2 – 10.1; $p < 0.0001$) concerns over vaccine safety and interventions to address health care providers concerns should be put in place taking into consideration the age, sex health care provider category, with hybrid interventions put in place to strengthen public education and address concerns about vaccine safety. Further studies are also suggested to be undertaken on vaccine safety and perception on susceptibility towards the disease as there is scanty information regarding the same.

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LIST OF ABBREVIATIONS AND ACRONYMS

B.C.R.H	:	Busia County Referral Hospital.
C.D.C	:	Centre for Disease Control
COVID -19	:	Corona Virus Disease of 2019
G.O. K	:	Government of Kenya.
H.C.P	:	Health care providers
LMICs	:	Low- and Middle-Income Countries
M.O.H	:	Ministry of Health.
N.P. I	:	Non Pharmaceutical Interventions.
SARS	:	Severe acute respiratory syndrome
S.C.T	:	Social Cognitive Theory.
S.P.S.S	:	Statistical Program me for Social Science.
W.H.O	:	World Health Organization.

OPERATIONAL DEFINITIONS OF KEY TERMS

COVID-19 vaccine acceptance: Refers to health care providers who undertook at least one dose of COVID -19 vaccine

COVID -19: a new infection that arises from the Severe Acute Respiratory Syndrome Corona Virus 2 (SARS Cov- 2), whose symptoms vary from mild to grave forms.

Healthcare providers: providers of the healthcare service for patients in health facilities include; Doctors, nurses and midwives, pharmacist's laboratory technician, Pharmacists, public health officers, counselors

Vaccine: a substance that is scientifically prepared and approved can stimulate the production of antibodies in the body against specific antigen that helps in reducing the disease severity. It can either be administered orally or through an injection.

Perceptions: An individual's views concerning the COVID 19 vaccine.

Vaccine complacency: low perception in regards to the COVID 19 disease thus deeming COVID -19 vaccination unnecessary.

CHAPTER ONE

INTRODUCTION

1.1 Overview

The chapter introduces the background information of the COVID-19 disease, statement of problem, study objectives, Justification of the study and the theoretical and conceptual framework.

1.2 Background Information

The Corona Virus disease of 2019 (COVID -19) is a novel infection that was initially pointed out in the middle of an upsurge of respiratory illnesses in Wuhan city, Hubei province, China (WHO2020). It was announced by the W.H.O on 31st December 2019, and proclaimed as an outbreak and a worldwide health emergency on 30th January 2020. On March 11, 2020, it was announced as a widespread pandemic. (WHO,2020). The term COVID -19 is a phrase got from the name Corona Virus disease 2019(WHO 2020). On February 11th 2020, the Corona virus study group of international taxonomy of viruses gave a proclamation of a formal nomination for the new virus: Severe Acute Respiratory Syndrome Corona Virus 2 (SARS-CoV-2) (WHO 2020). The syndrome spreads through droplets and contact with fomites in the environment of the infected person, with signs and symptoms ranging from asymptomatic to fever, dry cough, dyspnea, aches, anosmia and ageusia, to severe acute respiratory distress (WHO 2020). As described by Cennimo *et al.*, (2022), diagnosis of the virus includes detecting viral particles through polymerase chain reaction (PCR) after collection of oral and nasal pharyngeal swabs and also detecting the antibodies to the virus on blood serum.

The virus affected most countries across the world, leading to a devastating impact; that resulted to a numerous death worldwide and presented an unusual provocation to food networks, the world of work and public health (WHO, 2020). The social – economic disturbance created by the pandemic was catastrophic as millions of people were at risk of plunging into pennilessness; this was as a result of some of the non - pharmaceutical interventions (N.P.I s) that were imposed to include partial or total lockdowns movement restrictions that have so far been able to control the disease progression (ILO 2022).

Vaccines are worthwhile and dependable public health interventions as they help reduce the high disease burden globally (Ozawa *et al.*,2013). COVID -19 Vaccines were meant to furnish acquired immunity to protect one from the severe acute respiratory syndrome corona virus 2 (CDC 2019). When large populations are vaccinated, herd immunity is achieved (Sadarangani 2016). As of April 2021, 14 vaccines, were permitted for public use to include two RNA, 5 convectional in activated vaccines, 5 viral vector vaccines and two protein Sub Unit vaccines (Dal-Ré *et al.*, 2021). Most countries world- wide executed a gradual deployment plan that gave priority those who were at the highest risk of complications such as the old, health care providers and those with comorbidities (The Guardian 2020).

The availability of the COVID-19 vaccines might not reflect into its utilization (Dal-Ré *et al.*,2021). Although governments had provided the vaccines, their utilization is still voluntary. According to Shaw *et al.*, (2021) many researches indicate that some health care providers were not prepared to receive the COVID-19 vaccines even when availed to their countries. A report of a field research undertaken in Central Africa, the Democratic Republic of Congo, revealed nearly 28% of health care providers would to accept the COVID-19 vaccine when availed (Nzaji *et al.*, 2020). Some

rationale for not accepting COVID-19 vaccines that had been pointed out included anxiety over the vaccine's safety and side effects, as well as the date at which the vaccine was developed/approval (Wang *et al.*, 2019).

Vaccine acceptance was set upon three factors that included confidence, convenience and complacency. Where confidence was the believe in the safeguarding against a disease, efficacy of the vaccine, trust in policy makers and transmission system such as the health care system (French *et al.*,2020). Most individuals have reservations on vaccine safety thus a major challenge that can be fixed by policy makers, health care providers, community heads, as well as governments, so as to raise acceptance. Convenience is how easily one can access to the vaccines which includes physical availability, accessibility and affordability (MacDonald,2015) while vaccine complacency has been linked with perceptions of low registered risks of Communicable diseases hence more negative attitude in relation to the vaccine (MacDonald, 2015).

As of November 25th, 2021, globally, the pandemic resulted in 260,682,363 (32.5%) COVID -19 cases, 5,203,984 deaths (0.65%), Africa having 3,656,605 cases 90,122 deaths, while Kenya experienced 254,781 cases, 5330 deaths and Busia County 5683 cases with 68 deaths (MoH, 2021; WHO,2021).

WHO estimates that between 80,000 - 180 000 health care workers could have died globally from COVID-19 with a total of 7, 848 COVID-19 infections and 53 deaths among HCW in Kenya, 247 infections and 3 deaths reported in Busia. (WHO October 2021; MOH Kenya 2021; EOC-Busia SITREP 2021).

One of the earliest studies among health care workers found that they initially were almost 12 times at a higher risk of getting COVID-19 than the general population in the United Kingdom (UK) and the United States (US) (Nguyen *et al.*, 2021).

80% of health care providers in the high-income countries to include the USA, China had been fully vaccinated against COVID -19 as compared to 27% Africa (WHO 25th November 2021).

Vaccine acceptance among Kenyan health care providers was rated at 71% (Hafso *et al.*, 2021). The acceptance among health care providers in Busia County remained undetermined, thus there was need to understand more on the levels of acceptance among health care providers in Busia County.

1.3 Statement of the problem

The global development agenda was used to target the, eradication of poverty, hunger, and improvement of health through SDG 1, 2, and 3 to which the COVID -19 pandemic was a threat towards the efforts in achieving this agenda. This was occasioned by the non -pharmaceutical interventions put in place that led to massive deaths globally and presented an extra ordinary challenge to the wellbeing of the Public, food systems and socio-economic activities (UN,2020). A 5.2 percent decline was observed in the global gross domestic product (World bank 2021), this led to a rise in inflation worldwide thus making the daily living somehow unbearable.

Reports have that until 5th June 2020 at least 90,000 health care workers globally had been infected by COVID-10 with more than 260 nurses losing their lives to the pandemic (Euro news 2020). Based on data reported to WHO by countries in the African Region, there had been more than 150 ,400 COVID-19 infections among health workers since March 2020, accounting for 2.5% of all the confirmed cases and

2.6% of the total health work force in the region. With Five countries (Algeria, Ghana, Kenya, South Africa and Zimbabwe) accounting for about 70% of all the COVID-19 infections reported in health workers: (WHO NOV 2021)

Available data from 119 countries suggested that by September 2021, 2 out of 5 health care workers were fully vaccinated on average, with considerable difference across regions and economic groupings. With less than 1 in 10 having been fully vaccinated in the African region, while 22 mostly high-income countries reported that above 80% of their personnel were fully vaccinated. These rates only accounted for data reported to WHO through the standard mechanisms (WHO 2021) while 70.9% of all healthcare workers in Kenya willing take a COVID-19 vaccine (Hafso 2022), The vaccination status for health care providers in Busia County still remained undetermined. Thus, the study aimed at assessing the levels of Covid -19 vaccine acceptance and associated factors among health care providers in Busia County.

1.4 Study Objectives

1.4.1 Main Objectives

To assess the COVID-19 vaccine acceptance and the associated factors among health care providers in Busia County, Kenya.

1.4.2 Specific Objectives

1. To determine the level of COVID -19 acceptance among health care providers in Busia County, Kenya.
2. To analyze the influence of socio-demographic attributes on COVID-19 vaccine acceptance among health care providers in Busia County.
3. To establish the relationship between information source and COVID -19 vaccines acceptance among the health care workers.

4. To establish the association between healthcare provider knowledge, perceptions, psychological effects and the COVID- 19 vaccines acceptance.

1.5 Research Questions

1. What is the level of COVID 19-Vaccine acceptance among health care providers in Busia Couty?
2. What are the socio demographic attributes influencing COVID -19 vaccine acceptance among health care providers?
3. What are the most preferred information sources on COVID-19 vaccines among health providers?
4. What are the associations between association between healthcare provider knowledge, perceptions and psychological effects on the COVID-19 vaccines acceptance?

1.6 Justification of the Study

The success of vaccines in controlling Vaccine preventable diseases has been profound. Many diseases that previously raged unrestrained are now contained and others have been eliminated in parts of the world (American academy of microbiology 2005).

Despite this breakthrough, many infectious diseases continue to emerge and strike, especially in the low- and middle-income countries where vaccines are inaccessible, unaffordable, or both (American academy of microbiology 2005).

Coronavirus disease came about with health, economic and social crisis affecting communities at their core (UN, 2021). Busia County was performing poorly (5.1%) in terms of COVID-19 vaccination in the general population compared other counties in

the former western region with, Vihiga -7.1%, Bungoma - 6.1%, and Kakamega - 5.8% (MOH Kenya 2021). This trend was worrying bearing in mind that the COVID-19 Vaccination coverage was half -way below the National Coverage of 10.8% (MOH Kenya 2021). The county also hosts multiple groups of persons who were classified as risk populations such as the long track drivers, key populations, cross boarder traders among others (MOH, 2021). Additionally, unlike the other 3 counties in the former western province, Busia County has five out of its seven Sub -Counties hosting over 60 informal border crossing points, with approximately 23,000 people cross through the non-official boarder points. (Lamarque *et al.*, 2022) cross-border healthcare seeking has been reported at 80% of all points of entry. Which means that the unscreened individuals posed a great risk towards the vulnerable the health care providers (Lamarque *et al.*,2022). Three health care providers had lost their lives to the disease which was the highest in the former western region. Despite the vaccine availability in Busia County, there seemed to be a gap in its utilization among the communities. Hence it was then extremely important to ascertain the vaccination status and look into the factors that affect acceptance for vaccines among the health care providers as they are considered as the back bone of the health care system. Without a strong work force then the whole population will be at risk of the consequences that came along with the COVID-19 disease. Thus, the study therefore sought to determine the COVID-19 vaccine acceptance and associated factors among health care providers in Busia County in, Kenya.

As Kenya and the world are in the process of introducing new vaccines it is important for the immunization programs to have an understanding of the factors influencing vaccine acceptance and uptake for them to take the necessary measures to improve its acceptability among health care providers. This would rather avert vaccine hesitancy

and in turn reduce the chances of emergence and reemergence of vaccine preventable diseases

Results from will enable policymakers to develop effective strategies to promote vaccine acceptance and also obtain knowledge about the major factors that influence acceptance of COVID-19 vaccines and other vaccines that are set to be rolled out.

1.7 Assumptions of the Study

The researcher presumed that the study population selected for use in this study represented a true picture of the whole population of health care providers. That all health care providers who will be approached to answer the questions, will be willing to do so. That they gave out the correct answers to the best of their knowledge that are non-coerced and that they will answer all the questions provided in the questionnaire.

1.8 Limitations of the Study

This being a Cross -sectional study, there were no causal links that could be established between the dependent and independent variables thus additional time points should be included in future to survey and further understand how people's attitudes towards vaccination change over time. There was absence of a longitudinal follow up as the various aspects like perceptions, information source and attitudes which may be affected by factors like updated information, new technology, emergence of newer variants etc.

The findings of the study were based on health care providers thus may not reflect the general public's population. The emerging of the "don't know groups may have resulted in loss of some statistical variability when dichotomizing the outcome variable, "COVID-19 Vaccine acceptance", The responses by health care providers

may be influenced by their social desirability as they may respond to study in a manner that is viewed favorable by others.

The study was also conducted at a time when the country was experiencing a sixth wave which could have impacted on the health care providers perceptions. The study received responses from a diverse group of health care providers thus tackled vaccination acceptance among the various groups getting a wider perspective of their vaccination status and factors that affect vaccine acceptance among health care providers.

The study concentrated on COVID-19 acceptance thus did not take the reasons why participants were hesitant to take the COVID-19 vaccine, the researcher therefore recommends for further research to be done on vaccine hesitancy.

Because of the lack of restrictions on the decision processes involved in choosing groups, multi-stage sampling has a level of subjectivity which was addressed by ensuring the questions asked were open ended, there was the involvement of a professionals and colleagues outside the study who reviewed the research plan and data to see if they can identify a possibility for bias

1.9 Theoretical Framework

Developed in the 1950s by a social psychologist Hoch Baum Rosenstock (Rosenstock, 1974). The health belief Model suggests that chances of an individual's assuming certain behavior of health determined by believes in some individual threat of ailment, trust the in efficacy of the suggested health behavior. The initial articulation of the HBM, Rosenstock (1974) advised from using the model on cross-sectional data. His reason being, that in order for the relationship between the behavior and the components of the model to have any meaning in the context of a cross sectional

design, it becomes very useful to assume that people's perceptions of these components have not changed since the behavior was adopted. He argued that once one engages in a behavior, they are convinced to adjust to be consistent with the adopted behavior (i.e., cognitive dissonance theory). The theory predicts that cross-sectional datasets might give incorrect approximations of the connections between the constituents and the behavior. Contrarily, Jan and Becker (1984) argued that some cross-sectional relationships would be weaker. They further explained that once individuals begin to adopt to a certain health behavior, they would perceive themselves as being less susceptible.

Numerous evaluations of the HBM with examples those of Janz and Becker (1984) described that barriers, benefits and susceptibility are good predictors of behavior however severity was not. This review was not a meta-analysis but a count of the number of times a component was predictive of a behavior as opposed to actually estimating mean effect sizes. Zimmerman and Vernberg (1994) described HBM as a forecast for behavior, but only weakly. Harrison *et al.*, (1992) undertook a metanalysis and deduced that retrospective researches bore a remarkably great impact sizes than prospective studies. Furthermore, there were a number of issues related to the last-mentioned review thus, conclusions must be noted with a lot of care. To be precise, the methodology for inclusion in the analysis was very accurate. Therefore, the effect sizes were based on the data that was collected from 3515 participants.

In recent times, a meta-analysis of the effectiveness of the HBM components to longitudinally predict behavior had been done. Carpenter (2010) noted, in a review of 18 researches that benefits and barriers were recurrently the main predictors. The effect sizes were minimal for susceptibility and severity. Findings such as this may

cause serious doubts on the utilization of the four-components model of the HBM, which have been most commonly used.

The Health Belief Model is a health-specific social reasoning model (Coulson *et al.*, 2016) It was initially designed in response to the failure of a free tuberculosis (TB) screening program. LaMorte (2019), in his model that targeted the 6 main components, to include attitudes towards a perceived threat of an infection. The main components were as follows:

Perceived susceptibility – which explains to one’s subjective perceptions on the possibility of contracting an illness or disease. There was a great difference in an individual's perception of personal risk to an illness or disease.

Perceived severity – It is related someone’s perception of the magnitude of acquiring an illness or disease (or leaving the illness or disease unattended to). There was great difference in one's beliefs on the seriousness of a disease, and most often people considered the prognosis like disability, death, and social consequences like family and social relationships when assessing the seriousness.

Perceived benefits – It is an individual’s feelings and views on the success of multiple measures available to decrease the risk of an illness or disease (or to treat illness or disease). The pathway an individual considers in disease prevention (or curing) illness is determined by their reflection and analysis of the perceived susceptibility and perceived benefit, in that an individual was to agree to the proposed medical action if it seemed advantageous.

Perceived barriers – It is one’s feeling towards barriers to conducting a suggested action of health concern. There great discrepancy in one's feelings for hindrances, or obstacles, that yield a cost-benefit evaluation. A person may consider the advantages

of an action versus the feeling that it may be costly, life threatening (e.g., side effects), uncomfortable (e.g., painful), tedious, or disruptive.

Cue to action - Is the incitement required to ignite the decision process to the acceptance of a desired health action. They could be from be within like stomachache, gasping, or without for example, others' opinions, illness of a community member and articles in the newspaper.

Self-efficacy – This is the level of a one's confidence in their capacity to correctly execute a behavior. The component was included onto the framework in the mid-1980's. Self-efficacy is a constituent component in many behavioral models and is closely related to a person's willingness to conduct themselves in a desired behavior (Jones *et al.*, 2015).

The frame work points out on a number of factors which influence vaccine acceptance. It considers other health behavioral theories and a body of experimental writeup looking at the stimulants for vaccine acceptance, likelihood for vaccination and hesitancy. This model is key as it will be of benefit to programs which focus on the improvement of vaccine uptake and adherence to improving communication messages while handling individuals socio-cultural, political barriers which will enable multitudes to gain the benefits of vaccination and therefore improve vaccine acceptance.

Limitations of Health Belief Model

The HBM has some limitations which may hamper its use in public health. They include the following:

It does not put into consideration an individual's views, principles, or other stimulants that can utter to an individual's acceptance to a health behavior.

The model does not consider the individual's constant behaviors and which may advise the adjudication process of one to agree to a proposed action (e.g., stop smoking)

It doesn't touch on issues conducted for reasons that are not health related like as social acceptance, issues concerning the environment or economy which may deny or promote a recommended action.

The model assumes that every person has the same amount of information on diseases and illness, and that cues to action are generally accepted, as they encourage people to conform to certain behaviors and that the main aim of these decision-making process are health related actions.

The model describes more than it explains. It has no suggestion to strategies for changing health behavior change. In health behaviors on prevention, initial research has shown that perceived vulnerability, benefits, and barriers are often related to the coveted health behavior; perceived severity is hardly associated with the coveted health behavior. The person's establishments come in handy, depending on the health outcome that pleases an individual, for the efficient utilization of the model, it ought to be blended with various additional models which look after for the environmental perspective, as well as propose approaches for change.

During the 2009 outburst of the swine flu, the Indiana State Department of Health (ISDH), that was supported by the national government, rolled out an intense H1N1 immunization campaign (Jones, 2015). The 30-second TV and radio spots captured the Indiana Governor Mitch Daniels and state health commissioner Judy Monroe, who inspired Indiana citizens via posts like, "Don't get the flu, and don't spread the flu." All in all, the numerous amounts of news media reporting on the swine flu outburst,

campaign promoters wanted to build on the pre-existing acuties of one's danger by placing campaign posts within the core elements of the HBM (Jones, 2015). By utilizing radio and television, the ISDH created a chain of public messages, in both Spanish and English languages, geared at improving the mindfulness rates of H1N1, as well as inspiring people to get vaccinated through stressing on the advantages of vaccination, controlling the obstacles of immunization, as well as improving public's perceptions of their capacity to be vaccinated. To assess the influence of the campaign, the assessing team tracked H1N1 immunization behavior and determined exposure (Jones, 2015).

Herrmann *et al.*, (2018) used the Health Belief Model to survey reasons why adult females were for or against the extraction of their ovaries to lessen their chances of getting cancer. The paper described adult females' reasons using the four paradigms of the HBM that is: perceived vulnerability, severity, benefits, as well as barriers. Those who were worried and felt at risk of developing ovarian cancer were more probable to have an oophorectomy. The women's anxiety was frequently worsened by seeing family members feel pain or succumb to cancer. Women thought about several obstacles and possible benefits towards submit themselves to the surgical procedure but placed their conclusion on "gut feeling" and experiential factors, instead than numerical risk assessment. Age, menopausal status and commitments especially towards the family were some factors that influenced but did not determine the women's decisions on oophorectomy. Women cited that they lacked support for decision making and were more appreciative if their doctors explained to them the mode of treatment they chose, provision of individualized information, involvement of their general practitioners in the decision-making processes and being offered a second consultation to follow-up on any queries that the women might be having.

The findings suggested that the decision on whether to have an oophorectomy was a very personal decision this could be described with the help of the HBM (Herrmann *et al.*, 2018). The results pointed out that there was need to employ hybrid decision support to help enhance doctor-patient-communication and patient-centered attention that correlated to risk lessening surgery in women who had high chances of developing of ovarian cancer.

This is described in the figure below:

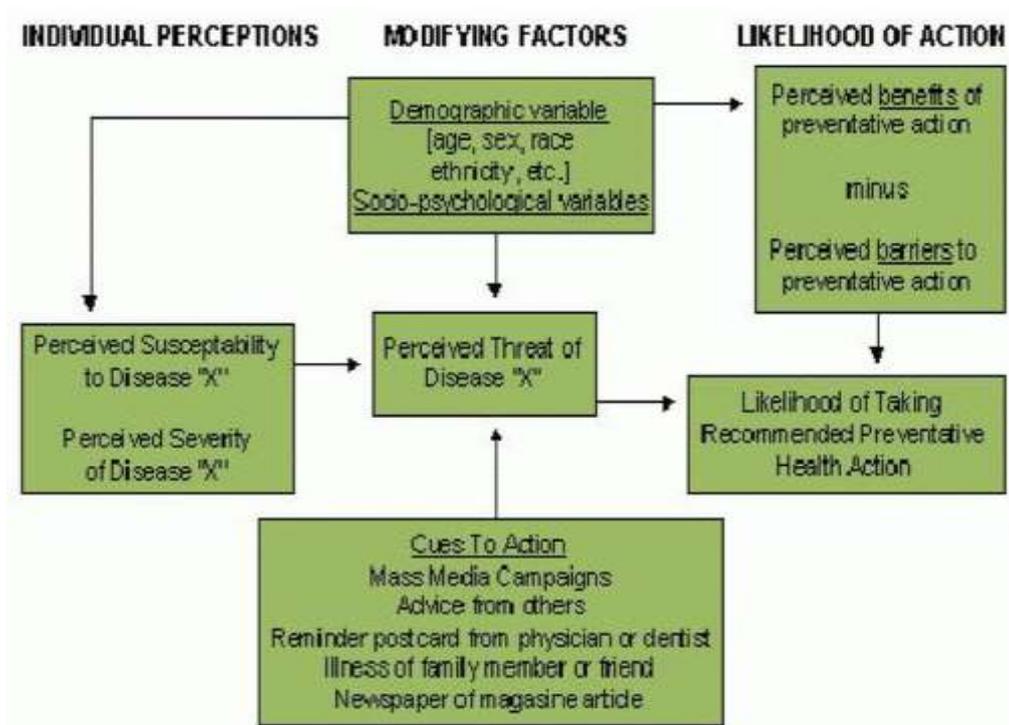


Figure 1.1 The Health Belief Model adapted from Janz and Becker (1984).

1.10 Conceptual Framework

The Health Belief Model (HBM) was conceptualized in the study, it is a structure that was used to expound, predict, and impact behaviors of persons or groups with regards to their wellbeing. It permits scholars to clarify and predict health promotion behaviors in connection with waves of believes by looking at the association of health behaviors and utilization of health services. This model discusses more about actions that are related with health matter that require the presence of satisfactory stimulation e.g., an ailment, perceived threat, the belief of a deadly health issue or complication due to an infection, perceived advantages, the belief that adhering to guidance on wellness will be advantageous in decreasing the perceived threats, and that the advantages overshadow the costs. The model was initially considered to determine beliefs and opinions towards seasonal influenza and pandemic swine flu vaccine, in addition to the associations connecting acuties and self-funded hepatitis B immunization (Rajamoorthy *et al.*, 2018). However, few researches have looked at the several components of the HBM that can project acceptances of the vaccine, even though there are researches that have evaluated the reception of and desire to pay for the COVID-19 vaccines in the Asia Pacific region. It is of great importance to investigate the present-day level of COVID-19 vaccine acceptances and point out at the factors affecting to inform the state and public health officers in tackling vaccine reluctance and plan appropriately to improve the COVID -19 Vaccine uptake.

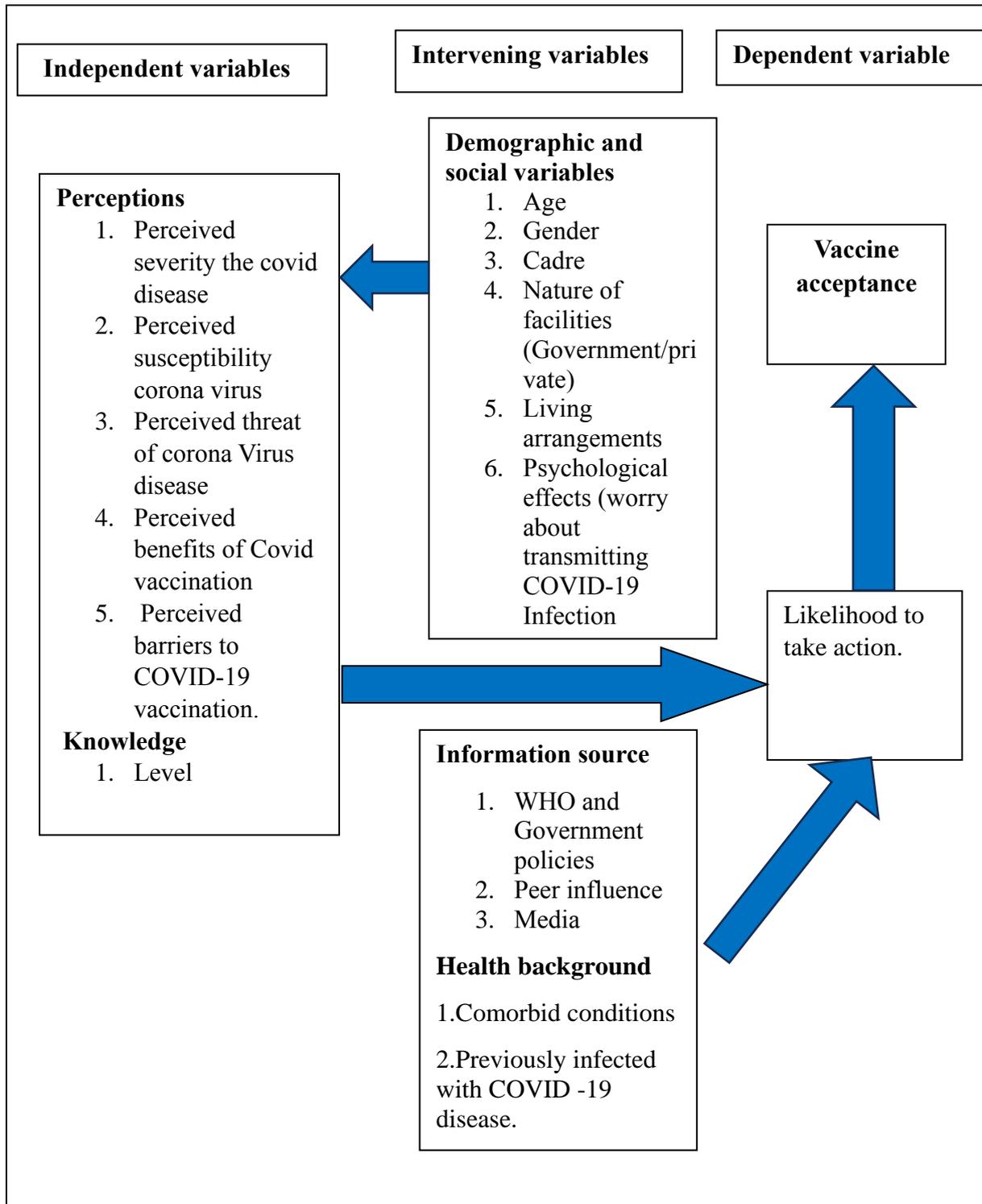


Figure 1.2 Conceptual framework, adopted and modified from the health belief model

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

The chapter takes into detail the literature regarding the acceptance of the COVID -19 vaccines among health care providers in Busia County. Factors that influence the vaccine acceptance to include demographic characteristics, information sources, attitude knowledge and individual perception perceptions.

The empirical review of the study was based on the specific objectives. Literature search was done using different databases and resources by use of Boolean searching key word search, Searching using subject headings, from the library reading through published documents, and policy documents.

2.2 Introduction

After first emerging in late 2019 (Li Q *et al.*, 2020), the COVID-19 disease had spread across the world and achieved pandemic status in March 2020. In the absence of pharmaceutical interventions, population-wide lockdowns and social distancing measures were enforced to slow the spread of the virus and reduce deaths (Wilder-Smith *et al.*, 2020).

Vaccines are a very important means to promote health outcomes, increase long life by regulating and protecting populations from communicable diseases such as tuberculosis, polio, plague etc. High mortality and morbidity rate that was linked with the disease inspired the evolution of its vaccines that are safe, as well as efficient. This was a crucial step to end the pandemic (WHO 2020).

The vaccine was purposed to provide acquired immunity to counter the SARSCov2, which is the virus that brings about the Corona virus disease of 2019 (WHO 2020). This vaccine is the first ever vaccine for a communicable disease that was manufactured in under several years, no vaccines had been manufactured for protection against coronavirus infection in humans (Moriera et. al; 2021). WHO proposed to achieve 70% COVID-19 vaccination coverage in all countries by mid-2022(WHO 2021). It was expected that achieving 60–90% vaccination coverage could generate sufficient herd immunity to block the transmission of SARS-CoV-2 in the population (Anderson *et al.*, 2020). Identification of factors that relate with vaccine acceptance are urgently required to make education materials that are related to the COVID -19 circumstances and policy implementation.

As many vaccines had been permitted for use, vaccine effectiveness was being evaluated by use of case controls, and observational studies. Twenty-five vaccines had been permitted for public use to include (1 DNA vaccine, 2RNA vaccines ,10 Convectional inactivated vaccines, 5Viral vector vaccines and 7 Subunit Vaccines). In Kenya we had 2 mRNA (Pfizer and Moderna), 2 viral vector vaccines (Johnson and Jansen, and AstraZeneca) and 1 type of in activated vaccine (Sinopharm Vaccine).

A study conducted in August 2021 by the Virginia department of health on vaccine effectiveness, indicated the vaccines that were ready for use within the United States, had a high efficacy in protecting one from mortality and morbidity associated with COVID -19. When compared, individuals who had completed their primary series of vaccination, versus those who were not vaccinated against COVID -19, were 5 times exposed to COVID -19, 10-times chance of being admitted in hospitals and 11 times likely to die (CDC, 2021b). Another study revealed that the people who had not received any form of vaccination were 6 times more at risk of testing positive, a 37

times chance of being admitted to the hospital, and 67 times infectious compared to individuals who had completed the primary doses of vaccines. CDC noted that vaccine efficacy dropped from 91% against the alpha to 66% against the Delta variant (Fowlkes *et al.*, 2021).

Vaccine distribution: As of 23rd November 2021, over 7 billion doses had been administered world -wide with about 53.4% of the globe's populace having received one primary dosage of the COVID vaccine, while 27.15 million had received two the primary dosages of the vaccine (Myers, 2021). From these global statistics, only 5% of the individuals in under-developed countries had received their first vaccine by October 2021 (Myers, 2021). Countries like China and Japan having vaccinated 84.4 and 79% of their populations, respectively (Myers 2021).

Vaccine Access: Vaccine equity was not yet fully reached or even estimated and this disadvantaged countries with good and poor access. As of November 2020, affluent countries that represented 14% of the world's inhabitants, had committed to purchase 51% of the dosages that were yet to be sold; with some acquiring more doses than they needed to vaccinate their entire population (So & Woo, 2020). The director general of the WHO, Tedres Adhanom, announced, in January 2021, a warning on issues of equitable distribution "more than 39 million doses had been administered in at least 49 higher income countries and not a Million, a thousand but Just 25 in LMIC" (Schlein, 2021). In a meeting in April 2021, the WHO talked on the trouble of continuous inequities in the world's vaccine distribution. That even though 9% the globes inhabitants were in twenty-nine poorest countries, the countries had only received 0.3 % of all the vaccines (United Nations, 2021b).

The World Health Organization, the European Commission, and France ushered the COVAX strategy with the aim of enabling countries acquire the COVID-19 tools (ACT) (WHO 2021). This strategy was viewed as the world's game plan to the COVID-19 pandemic. It was set as the globe's road map to realize the equality and accessibility to the COVID-19 vaccines in the 190 countries, this was regardless of the developmental stage or income generation level. COVAX was meant to close the gap of the inequality that existed between the affluent and the underprivileged inhabitants in various African nations by guaranteeing easy availability and accessibility of the vaccines to everyone (WHO 2022). Despite these possible advantages presented by the COVID-19 vaccines, unreliable sources had informed the unwillingness of a great number of people to consent to receive the vaccine. This occurrence deters the success of the disease's control and response (Afolabi & Ilesanmi, 2021).

Economics: Unequal: Vaccine distribution is detrimental to the world's economy interfering with the world's supply chain, with most vaccines being set aside for the rich countries, the poor people were under vaccinated, some died unnecessarily, become disabled due to diseases, as they lived under lockdown, restrictions thus could not continue with their day-to-day socio-economic activities (UN 2021). Poor countries lost a higher percentage GDP that would make them suffer long term effects while super powers would gain USD 4.80 and spend about 1 pound on giving vaccines to lower income countries (C.D.C 2020).

2.3 Vaccine Acceptance

Health care providers have a high risk of getting infected with the COVID-19 disease thus more likely to infect their loved ones, fellow colleagues and the community at large. Therefore, protecting them is a primary public health duty (GB Mulu *et al.*, 2020).

Studies indicated that health care workers who are vaccinated are more likely to recommend vaccination to friends and family (Zhang J *et al.*, 2011).

Health care providers are important sources of information for vaccines. Effective communication from Health care providers to clients has been shown to improve adherence to vaccination recommendations (Omer SB *et al.*, 2009; Wheeler M 2013)

High COVID -19 vaccines acceptance is required to reduce deaths from COVID-19 disease and speed up an end of the disease (WHO2021). Vaccine acceptance among populations and especially health care workers is an important and effective tool to control of the disease. Activists against vaccines have negatively campaigned in many countries on the need for vaccination, with some challenging the presence of the COVID-19 disease (Ullah *et al.*, 2021) Mis-information passed through many channels of communication could have a negative impact on the acceptance of the vaccine. Additionally, the hurried speed of formulating and developing the vaccine further built-up worrying concerns and safety questions among societies, and could therefore compromise acceptance (Fadda *et al.*, 2020).

In a data review on the COVID-19 vaccine acceptance, conducted in 114 countries across the world, the level of acceptance among the general population was over 60% in 72 countries as opposed to the remaining 42 nations whose rates of acceptance fell between 13% and 59%. Cases of low acceptance towards the COVID-19 vaccine were

noted in Northern Africa, the Middle East, Europe, Central Asia, as well as western and central Africa by (Sallam 2021).

Lazarus *et al.*, (2021A) in a study across 19 countries indicated that 71.5% of the study group would be very or somewhat likely to take vaccines while about 48.1% would accept the vaccine if their employers recommended, the difference in vaccine acceptance globally ranged from 90% in China and less than 55% in Russia.

Kayanda *et al.*, (2021) showed the rate of adoption and acceptance to be generally high in sub-Saharan Africa, where at least four fifths expressed the will to receive the vaccine in most of the countries. The level of acceptance fluctuated from a majority in Ethiopia (97.9%) to levels below the herd immunity requirement in countries like Mali (64.5%). The general concerns about the COVID-19 vaccines, as well as their complications were categorized as some of the basic causes of low acceptance across some 6 countries namely Malawi, Burkina Faso, Nigeria, Ethiopia, Uganda, and Mali (Kayanda *et al.*, 2021). These findings indicated that limited supplies, poor demand, are likely to be the key bottleneck to reaching high COVID-19 vaccine coverage in Sub-Saharan Africa.

A rapid systematic review of global vaccine acceptance among health care workers ranged from approximately 28% to 73% (Li M *et al.*, 2021). Similarly, a comprehensive review and meta-analysis of cross-sectional studies of health workers intentions to get vaccinated indicated an average acceptance rate at 51 percent. The authors however did admit that the population studied were generally from developed countries which limited the study's generalizability (Luo C *et al.*, 2021).

Noushad *et al.*, indicated that 69% of health care workers globally decided to accept a vaccine, there was high heterogeneity in agreement between Health care workers in low and lower-middle income countries (L-LMICs) and upper-middle- and high-income countries (UM-HICs), with acceptance rates of 62 and 75%, respectively.

Ackah *et al.*, (2021) estimated vaccine acceptance at 48% [95% CI:38%-57%] for healthcare workers, and 34% [95% CI:29% while Zerihun in their study on acceptance of COVID-19 vaccine among healthcare workers in Africa, estimated the pooled prevalence of COVID-19 vaccine acceptance in Africa was 56.59 (95%CI; 46.26–66.92; I² = 99.6%, p = 0.000). In a study conducted in Kenya with an aim of investigating possible acceptance rates, as well as the elements affecting acceptance of the vaccine. 54% of the participants were willing to be vaccinated at the time of analysis, and 71% were ready to participate in a vaccine trial. The remaining 41% said they would wait to see how it reacts with other people while 5% responded were unwilling to accept to be vaccinated.

Rumors, misconception and misinformation are other contributing factors that determine vaccine acceptance and uptake, this is fueled by the many movements that were against vaccines and by foreign intrusion which capitalized on the of social media platforms (Faith *et al.*, 2020). Vaccine acceptance among Kenyan health care providers was rated at 71% (Abdulle *et al.*, 2022). While Mudhune *et al.*, noted that most health care workers reported being partially or fully vaccinated against COVID-19 (92%, n = 685) (Mudhune *et al.*, 2023). from the above findings, vaccine acceptance in Africa and among health care providers seems to be low thus the need to advocate for the vaccine and also investigate more on the reasons for the low acceptance among health care providers. More studies still need to be done on vaccine

acceptance among health care providers as little or no information is available on the same.

2.4 Socio-Demographic factors characteristics and vaccine acceptance

Globally, it is significant that the COVID-19 vaccines were more accepted among male health care workers across 12 surveyed countries. Moreover, older HCWs had significantly greater intention to accept the COVID-19 vaccine compared to younger health care workers. Similarly, the acceptance was higher among HCWs who were previously infected with SARS-CoV-2 (Noushad *et al.*, 2021).

Low COVID-19 vaccine acceptance had been found to be linked to the female sex, younger age, lower household income, and educational attainment, as well as lower levels of annual seasonal influenza vaccination (COCONEL Group, 2020; Fisher *et al.*, 2020; Neumann-Böhme *et al.*, 2020; Sallam, 2021; Sherman *et al.*, 2021; Ward *et al.*, 2020).

In the United States, variations in vaccine acceptance were distinguished by gender and racial identity. Female health care workers had lower vaccine acceptance at 31% compared to male counterparts at (49%) and trans/non-binary HCWs (43%) (Rahul *et al.*, 2021). Male healthcare workers in Iran, were more willing to uptake the COVID-19 Vaccine unlike the Females, those who were married, 1683 (62.3%) reported being willing to uptake the COVID-19 vaccination. While, 62.4% (n = 790) of respondents who had a history of COVID-19 infection stated that they were willing to receive a COVID-19 vaccine, while 20.2% (n=256) stated that they would refuse the vaccination. Koorosh *et al.*, 2022).

The correlations of socio-demographic and health indicators among the samples of healthcare workers and non-healthcare workers in China showed a lower acceptance of the COVID -19 Vaccine in the female healthcare workers (AOR = 1.52, 95% CI: 1.12–2.07) (Ming -Wei *et al.*, 2021). Demographically, older people tended to accept the COVID-19 vaccine unlike the young people, those in employment or those living in the cities. Women showed a higher level of vaccine confidence in general but reported being skeptical when it comes to the COVID-19 vaccine. (Rumbi 2021) Similarly, in a large-scale study conducted between March 2020 to March 2021 by the humanitarian action that there was a higher vaccine acceptance to the older populations compared to the younger population. In the same study, higher income, levels of education correlated with higher vaccine acceptance (CDC2021).

According to Astawus *et al.*, (2022) history of COVID-19 infection (AOR: 2.7, 95%CI: 1.6, 4.7) and being male (AOR: 1.8, 95%CI: 1.2, 2.7) were found to have a significant association with COVID-19 vaccine acceptance among the general public in East Africa.

In Kenya uptake of the vaccine among health care workers was significantly associated with religion ($\chi^2(1, n = 723) = 9.35, p = 0.041$), being married ($\chi^2(1, n = 724) = 10.13, p = 0.007$), specific healthcare cadres ($\chi^2(9, n = 746) = 57.58, p < 0.001$), health facility type. This could be attributed to the availability and the free cost of vaccines (Mudhune *et al.*, 2023). The elderly and those that presented with pre-existing conditions, experienced poor disease outcomes that were linked to the massive deaths. (WHO 2020). In Botswana COVID-19 acceptance level were rated at of 73.4%. The high acceptance rate was noted on those with Co-morbidities Tlale *et al.*, (2022). Contrary to this, studies in the United States where individuals with serious comorbidities significantly remained low on acceptance giving the assumption that

the most vulnerable would automatically accept the COVID -19 vaccine are erroneous Tsai *et al.*, (2022). This calls for the health care team to initiate discussions focusing on the impact of the vaccine on underlying conditions. This study correlates with that in Buli and Indonesia where comorbidity was associated with low vaccine acceptance that was attributed to false and incorrect data on quality, safety, effectiveness of the COVID -19 Vaccines, as well as perceived vaccine unsafety for individuals with comorbidities (Utami *et al.*, 2022).

2.5 Information source and vaccine acceptance

Sources of information play an important role in vaccination knowledge and acceptability (L. A. Kestenbaum *et al.*, 2015). They have shown to greatly impact on the knowledge and thus vaccine acceptance (Ahiakpa *et al.*, 2022). Therefore, it could be important for immunization programmes to utilize the information sources to improve the knowledge of the populations which will in turn increase vaccine acceptance among the communities.

Other sources of information that were considered to be least effective in the study included religious gatherings at 4.1% and use of flyers at 0.6%. (Ahiakpa *et al.*, 2022)

Most Egyptian staff reported that the primary source of information about COVID-19 vaccination was the social media as Facebook and WhatsApp (47.5%) (S.M. Saeid *et al.*, 2021). However, in another study, the primary source of information was the government website (46%) and the social media was the source for only (17%) of their staff.

Martin *et al.*, (2021) reported news and social media to be the commonest source of information on COVID -19 in Ghana at 58%. Similarly, to Yilma *et al.*, (2022) which identified that both had a correlation to COVID- 19 vaccine acceptance.

According to the Pan American Health Organization, one of the significant differences between previous endemics and COVID-19 is that the information or news were instantly virtualized through digital media platforms. Despite the ease of access, largely facilitated by people, it also raises many concerns in how to mitigate the impacts of COVID-19 vaccine primary rumors to include: vaccination is unsafe as it was developed quickly, altering DNA due to vaccination, including a tracking device, severe reactions, causing infertility among women, and many others (University of Missouri 2020)

Human beings are not blank slates; they carry a wealth of memories, emotions, and learned associations from their past encounters. These past experiences serve as a foundation for interpreting and evaluating new experiences

2.6 Knowledge, perceptions and psychological effects on the COVID-19 vaccines acceptance

The Holy Bible, in the book of Hosea 4:1 quotes that ‘My people perish due to lack of knowledge’. The English people also quote ‘knowledge is power’. This clearly indicates that knowledge is everything as it makes one to make sound decision after understanding the concept of a product. Without knowledge then the population tends to be swayed away by any form of wave by believing in hearsay and not facts. Determination of a population’s knowledge on COVID 19 vaccines is important as it will help increase public acceptance and lower the levels of vaccine hesitancy in combating the COVID -19 disease. In this study, more than half of the study participants had inadequate knowledge (55.0%)

Mohamed *et al.*, (2021) on knowledge on COVID -19 vaccine among Malaysians, indicated that 872, (62.0%) of the interviewees lacked adequate information regarding COVID -19 vaccines as most of the respondents did not know on the eligibility criteria

for vaccination. Those who were learned, high income earners and individuals at high risk, were notably considered to be knowledgeable. With Females and those in the lower age group being closely associated with acceptance compared to the previous studies. Internet was found to have yielded an increase in awareness, among Africans. This was in-turn associated to be among the factors that were closely related with vaccine acceptance that was cited to be at 59%. Perception involves the way in which something is regarded, understood or interpreted. Human beings are not blank slates as they carry along a wealth of memories, emotions and learned associations from their past experiences. these serve as a foundation for interpreting and evaluating new experiences (Snow 2023).

The Health Belief Model (Rosenstock *et al.*, 1988; Strecher & Rosenstock, 1997) postulates that intention to engage in health behavior in response to a health threat is influenced by people's beliefs about the seriousness of the threat, susceptibility to the threat, ability to perform behaviors' that reduce harm from the threat, and the potential costs and benefits of engaging in an action that will reduce the threat. General anti-vaccination attitudes, perception of COVID-19 as harmless and therefore vaccination unnecessary, safety concerns regarding a perceived rushed development process, lack of trust, and wanting more information before making a decision are among the emerging research reasons for low COVID-19 vaccination acceptance. (COCONEL Group, 2020; Fisher *et al.*, 2020; Neumann-Böhme *et al.*, 2020; Ward *et al.*, 2020).

The perceived threat from COVID-19 is likely to shift over time) and attitudes towards vaccination may shift as new evidence on safety and efficacy becomes available, which may have an impact on the uptake of initial and “booster” vaccinations (Schneider *et al.*, 2021).

Specific barriers to COVID-19 vaccine uptake include concerns about safety and efficacy in light of its rapid development, mistrust of government and pharmaceutical companies, dislike of coercive policies, and perceived lack of relaxation in COVID-19-related restrictions as the vaccination programme progressed (Rhiannon *et al.*, 2022) Serious adverse events were of high public interest and ranged between mild to severe cases leading to anaphylaxis. 1:1000 people were hypersensitive to one or more vaccine ingredients and 2-5 per million vaccinated people in the USA were likely to develop anaphylaxis (Greenhawt *et al.*, 2021; UK Government, 2021).

Observations conducted in the United States, Malaysia, and Israel showed that perceived risk and anxiety towards the COVID-19 virus was linked to vaccine acceptance Additional factors, like perceived benefits, the price of vaccines and the efficiency of preventive behaviors are also cited in the health behavior models as determinants of behavior change in a given health behavior (Kerr *et al.*, 2021). Scarce details on the possible price, issuance and efficiency of a COVID-19 vaccine have been availed, giving the assumption that populations have not yet to evaluated the potential advantages of a vaccine besides that of a purely hypothetical arena (Kreps *et al.*, 2020).

Mohamed *et al.*, (2021), in a research conducted in Malaysia on knowledge, acceptance and perception on COVID -19 vaccines, 55.9% of the interviewees were convinced that they were at risk of spreading the infection to others, 30% of the respondents informed the survey that they were vulnerable of contracting a severe form of the COVID- 19 disease making them more willing to be vaccinated, with more than a half being worried on the complications of the vaccine and about 1/3 agreed there was scarce information about the vaccine which was unbridled on social media.

Most of the participants agreed that the COVID vaccine would protect them and others who are not vaccinated.

60% of those who would reject the COVID -19 vaccine believed that it would not be safe compared to 16% who would accept the vaccine (Africa CDC, 2021). The younger people (younger than 44 years) and those who believed in the conspiracy theory, thought that the COVID -19 disease was exaggerated thus were also more skeptical about the vaccine (Africa CDC, 2021). People who responded to refuse the vaccine significantly stated that the disease does not exist (15% compared to 4% who among those would accept it), Men were more concerned on the risks posed by COVID -19 disease unlike the Females with almost 1:2 respondents believing that the disease was planned by foreign actors (Africa CDC, 2021).

Perceptions of geopolitics, and that vaccine were evolved and manufactured from outside Africa, withholding the correct information and the basis for vaccines to be in cooperated in COVAX contributed to doubts (CDC2021). There were pertinent concerns on the impact of favoring the wants of national governments and external actors in 'Corona business' these influenced perceptions of vaccine delivery and safety (Africa CDC, 2021).

Multiple rumors, conspiracy theories, misinformation, inadequate community involvement, and social norms influenced vaccine acceptance. For instance, a renowned columnist and political leader publicly declared the conspiracy that COVID-19 is designed against Muslims to help Jewish people rule the world. Further, he claimed that the vaccine contains a micro-chip to control the individual through 5G towers. These conspiracy theories had a negative impact on the population's perceptions therefore, hindering vaccine acceptance among people (Khan YH *et al.*, 2020)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Overview

This chapter presents the methodology that the study used. It contains the following sections; study design, study area, target population, sample procedure, sample size, collection of data, data analysis and presentation.

3.2 Study Area

The Study was carried out in Busia County-Kenya. Busia County is situated in the former Western province and along the Lake Victoria Basin. Its neighbors are the Republic of Uganda to the West and North, Bungoma County to the North East, Kakamega County to the East, and Siaya County to the South. The County has seven sub-counties namely: Bunyala, Matayos, Butula, Nambale, Samia, Teso North and Teso South. According to the KNBS, 2019, Busia County holds 893,681 inhabitants within 1,696 km² (KNBS, 2019).

In the 7 sub counties we have 1 county referral hospital at Matayos Sub County, 12 level 4 gazetted sub county hospitals with 18 health centers and 63 dispensaries, (source monitoring and evaluation reports Busia County 2022). These facilities have a total workforce of 1475 health care providers. Distributed as shown in table 3.1.

Table 3.1 Distribution of health care providers in Busia County

Staff cadres	GOK	NGO, FBO	Private
Doctors	69	3	1
Dental technologists	1	1	0
Public Health Officers	68	0	0
Pharmacy officers	39	8	2
Orthopedic	14	0	0
Laboratory officers	82	12	4
Nutrition officers	29	0	1
Radiographers	12	1	0
Physiotherapists	14	1	0
Occupation therapists	9	0	0
Plaster technicians	6	0	0
Health Records & Information Officers	43	3	3
Medical engineers	11	0	0
Clinical officers	131	67	34
Nurses	676	32	97
Counselors	26	1	0
Total	1204	129	142

3.3 Research Design

Research design is a plan with regard to achieving the aims of study, to accomplish the objectives of answering the study questions (Wahyuni, 2012). The study adopted a cross sectional survey research design as it is linked with the deductive approach in order answer the who, where, what, how much or how many questions (Cooper & Schindler, 2006). All the specifications for the sample members can captured at one single point in time.

On the target populations, Bryk and Raudenbush (1992) states that either the total population or a part of it is selected. A cross sectional descriptive study was used to investigate on elements that affect the acceptance of COVID-19 vaccine among health care-providers in Busia County, Kenya.

3.4 Target Population

The study population comprise of the number of individuals, proceedings or matters that interest the researcher and so they desire to probe further (Sekaran & Bougie, 2016). The target population for this research was all the health care providers in Busia County. Busia has a total of 1475 health care providers as seen in table 3.1 above distributed across the 7 sub counties.

Table 3.2 Target population

Category	Target population	Percentage (%)
G.O.K facilities	1204	81.6
Private facilities	129	8.7
Faith based facilities	142	9.7
Totals	1475	100

(Source: Health sector working group report – Busia County)

Out of the 1475 health care providers, 247 had COVID-19 infections and 3 deaths with the county’s COVID-19 vaccination coverage being at 5.1% way below the national coverage at 10.8%

3.5 Inclusion and Exclusion Criteria

3.5.1 Inclusion Criteria

- Health care providers working in health facilities within Busia who consented to participate.

3.5.2 Exclusion Criteria

- Health care providers who were on leave or hospitalized
- Health care providers on attachment or internship

3.6 Variables

3.6.1 Independent Variables

Socio-demographic characteristics, Perceived severity, perceived vulnerability for the COVID -19 disease, perceived barriers and benefits of the disease's vaccines, level of knowledge and sources of information and their significance.

3.6.2 Intervening variables

Sources of information, Individual attributes like health background.

3.6.3 Dependent Variables

COVID -19 vaccine acceptance

3.7 Sample and Sampling Technique

3.7.1 Sample Size determination

- Calculation of the sample size adopted the formula at 95% CI:
- $n = Z^2 pq/d^2$
- n – Sample size
- Z- The standard normal deviate (1.96 for a 95% CI)
- d- 0.05 as the level of desired accuracy
- P- The proportion of the populace with and since it was unknown, p was set to 0.50, which appeared to be the highest variability.
- q- The section of the populace that lacks the characteristic (E.g., $1-p$)

$$n = (1.96)^2 \times (0.5) (0.5) / (0.05)^2$$

$$(1.96)^2 \times .5(.5) / (.05)^2$$

$$(3.8416 \times .25) / .0025$$

$$.9604 / .0025$$

$$384.16 = 385 = 385 + 10\% \text{ for any refusal} = 423 \text{ participant}$$

Table 3.3 Sample size distribution per sub county

Sub-County	Frequency	Percent
Bunyala	58	13.7
Butula	59	13.9
Matayos	70	16.5
Nambale	58	13.7
Samia	56	13.2
Teso-North	58	13.7
Teso-South	64	15.1
Total	423	100.0

3.7.2 Sample distribution by cadre

The table 3.4 shows the distribution of the health care providers by cadre

Table 3.4: Sample distribution by cadre

Cadre	Frequency	Percent
Biomedical Engineer	3	.7
CHEW	6	1.4
Clinical officer	31	7.3
Doctor	14	3.3
Health Administrator	4	.9
HRIO	14	3.3
HTS	2	.5
Laboratory Officer	14	3.3
Nurse	305	72.1
Nutritionist	4	.9
Pharmacist	11	2.6
Physiotherapist	2	.5
Public Health Officer	13	3.1
Total	423	100.0

3.7.3 Sampling technique

A sample is an impression selected from the populace by an explained strategy (Saunders *et al.*, 2015). It is a representation of a sub set of a practicable size. Samples are usually collected while statistics are calculated from the samples so that we can come up with deductions or hypothesis from the sample of the population (Kothari, 2004). Multi stage sampling was applied in the study. Awung (2015) noted that proportionate stratified sampling; the number of characters that are apportioned to the

several divisions are proportional to the characterization of the divisions in the target populace. Such sampling techniques are suitable for the study as it accounts for the diverse staffing populations (Hicks-Clarke & Iles, 2000).

Busia County was selected on the basis that it was performing very poorly in terms of COVID-19 vaccination as compared to other counties in the western region of Kenya, being a border county with about 60 formal and informal entry points, and a host to vulnerable groups like cross boarder traders and long track drivers. In the western Kenya region, Busia County had lost the highest number of health care providers thus the County was thought to be the best to undertake the study. All the 7 sub counties eligible for study thus were considered on the basis of this being a convenient way of organizing sampling and data collection.

All health facilities were organized according to the level of service provision for example level 2, 3, etc. then randomly selected (172 facilities and 94 randomly selected). Inclusion of health care providers in the final sample was based on probability proportionate sampling using duty rotas.

3.8 Data Collection Tools and Procedures

Data collection process involved the researcher engaging both the County health management and the sub county health management teams (sub county medical officers of health and the public health nurse) during their regular meetings to sensitize them on the importance of the study for the purposes of buying in. The researcher promised to share the results findings with the teams. The County director of health, went further and officially informed the 7 sub county management teams who in turn informed the facility in charges on the intended survey. Prior to data collection the researcher trained 7 research assistants for 2 weeks to familiarize themselves with the

data collection tools. The researcher supervised the research assistants in the initial stages and observed their activities as per their training guide. The research assistants acted as team leads who were to identify active health care providers serving within the facilities, line list contacts then and form a what's app group for the purposes of communication with regards to the study. Primary data was collected using Structured questionnaires that were interviewer administered via Kobo collect tool. The process of data collection took 3 weeks between 25th May to 15th June 2022. The use of electronic data collection method was deemed most suitable throughout the period of gathering data as the COVID-19 cases had risen from 1% and below since February 2022 to 12.8 % by June 22nd 2022 (NERCC on COVID-19 update 11th March 2022 and June 2022) . Also as a country and a County , one of the lessons learnt during the COVID -19 responses was to use digital technology since it allowed prompt access to truthful and trustworthy data (World economic forum October 2020) The participants were guaranteed discretion and anonymity. Participants voluntarily participated in the study.

The interviewees were assured of confidentiality, anonymity and in addition they were promised to be briefed on the research findings as a form of incentive. They were also assured that having received or not received vaccinations could not lead to any repercussions. Privacy and confidentiality of the participants, was ensured as they were required not to provide any form of identification on the online tool that was only accessed by the research team.

Since the researcher had the access to the online data forms, she was able to view progress on the responses. A total of 423 questionnaires were filled. The study utilized the primary data to get answers to the specific objectives. The data collection was done through structured questionnaires. Structured questions that allowed the uniformity of

responses to questions (Cooper & Schindler, 2006). Questionnaires were preferred as the respondents were able to use them easily without any form of help, anonymously, they were cost effective, and a quicker than other methods while reaching out to a larger sample (Creswell 2013).

The objective of the first part were socio- demographic information of the respondents to include, the second part looked at the factors influencing vaccine uptake to include, perceptions and attitudes. Open ended questions, Likert scales were used to obtain responses from the interviewees.

3.9 Validity and reliability

To ensure content validity, nursing experts were consulted, including Community health Nursing experts from The Masinde Muliro university of science and technology, Immunization experts form the unit of vaccines and immunization -Kenya and Nurses in leadership and management from Busia, Vihiga and Bungoma counties.

This study conducted a pretest in Vihiga county to test the validity and reliability of the research instruments by administering the developed questionnaires to 10% of the sample size (n=423), which sums to a sample of 43 respondents, (Doody & Doody, 2015). This test was to ascertain whether the tool was likely to collect the intended information. The data obtained from the pretest was analyzed and a Cronbach's coefficient alpha score was found to be at $\alpha=0.83$. The pretest participants provided feedback and a content review was made before proceeding to the field for the final data collection. The final questionnaire was estimated to take between 5 to 10 min to complete the results obtained from the pretest study were not used to analyze the final study to avoid data contamination.

3.9.1 Data Analysis technique and presentation

It is the process of scrutinizing; cleaning, converting and modeling data with an objective of focusing attention to relevant information that will inform decision making (Mugenda & Mugenda 1999).

At the analysis level, there were no email nor Ip addresses. The phone number was the only identifier that was deleted after data extraction was done. Data was extracted from KOBO collect edited for accuracy, readability, consistence and completeness; thereafter coded and entered into a computer using software SPSS (Statistical Package for the Social Sciences) version 26. Data was analyzed using descriptive statistics. Descriptive statistics were used to describe the socio demographic Characteristics of health care providers, Chi-square test was performed for categorical variables. Bivariate logistic regression was used to examine associations between individual factors influencing acceptance of COVID-19 vaccines among the respondents and Multivariate logistic regression was done and included all the independent variables with p value of < 0.05 in the model to determine predictors of vaccine acceptance controlling for confounders. Odds ratio to show the strength of the association/predictors, 95% confidence intervals and p-values were reported.

3.10 Ethical Considerations

Before conducting the research, the researcher obtained ethical endorsement from the Masinde Muliro University's ethics committee (appendix iv). Preceding data collection, the researcher acquired an introduction letter from Masinde Muliro University that assisted in defining the main motive of the research, as well as usher in the researcher to the participants while observing the set ethical standards. The researcher then sought for permission to collect data in from the National Commission for Science, Technology and Innovations (NACOSTI) (appendix vi). The researcher

then wrote to the Director of Health -Busia County to request for permission to collect data. The Director in turn wrote to the Sub County MOHs (appendix viii) informing them on the researcher's intention to collect data.

The data collected was solely for purposes of study and was not to be personalized. Ethical principles employed during data collection were Voluntary participation where the participant would give an Informed consent before engaging in the study and were free to withdraw at any point of the study. Participants were also informed that they could not be penalized for having not received any form of vaccination.

Privacy and confidentiality where the data collected was accessed by the researcher and data analyst, all information linked to the participants like phone numbers were deleted to ensure anonymity of the participants. to ensure data protection the data was solely used for the study and not shared to any other third party. All the ethical principles regarding the inclusion of human subjects were followed strictly.

CHAPTER FOUR

RESULTS

4.0 Overview

This chapter is organized as per the conceptual framework and objectives. Initially, descriptive analysis was done on the knowledge of healthcare providers concerning the COVID-19 vaccine, the perceptions of healthcare workers with regard to the vaccine, and acceptance of vaccines among medical caregivers. Later the drivers connected to vaccine acceptance were determined using logistic regression.

4.1 Response Rate and Population Characteristics

4.1.1 Response rate

A total of 423 respondents took part in the study and all completed the survey giving a response rate of 100%.

4.2 Characteristics and demographics of respondents

Participants characteristics are shown in Table 4.1. Most of the respondents were aged between 30- 39 years (39.0%) with a mean age of 38.2 ± 10.4 ranging from 21.0 – 73.0 years. Five of the respondents who were over 60 years of age were from private and faith-based health facilities. Most were females (57.2%), married (77.1%), Christians (97.9%), living with other people (81.1%), employed by the government (90.8%) and nurses (72.1%).

Table 4.1: Characteristics and demographics of respondents

Variable	Categories	n	%
Age group in years	20 – 29	97	22.9
	30 – 39	165	39.0
	40 – 49	79	18.7
	≥ 50	82	19.4
Mean age ± SD (Range) in years		38.2 ± 10.4	(21.0 – 73.0)
Gender	Male	181	42.8
	Female	242	57.2
Marital status	Single	79	18.7
	Married	326	77.1
	Divorced	4	0.9
	Widow	14	3.3
Religion	Christians	414	97.9
	Muslims	9	2.1
Living arrangement	Living with other people	343	81.1
	Living alone	80	18.9
Employer	Government	384	90.8
	Private	26	6.1
	Faith-based	8	1.9
	NGO	5	1.2
Cadre	Doctor	14	3.3
	Nurse	305	72.1
	Clinical Officer	31	7.3
	Laboratory Technicians	14	3.3
	Others (Public Health Officers, Pharmacists, Health Records)	59	13.9

4.2.1 Health background of respondents

Table 4.2 shows results on respondents' health background. Only 10.4% had a history of chronic medical conditions. The leading condition was hypertension (38.6%) followed by asthma (27.3%). Majority (80.4%) had been in contact with COVID-19 patients with most of the contacts being patients (71.8%) and 18.8% of the contacts being family members. Half of the respondents (50.9%) knew someone who died of COVID-19. However, only 5% had been diagnosed of the same disease.

Table 4.2: Health background of respondents

Variable	Categories	n	%
Has chronic medical condition	Yes	44	10.4
	No	375	88.6
	Don't know	4	1.0
Type of co-morbidity	Hypertension	17	38.6
	Asthma	12	27.3
	HIV/AIDS	6	13.6
	Others (Diabetes mellitus, Spondylosis, Peptic ulcer, Hypercholesteremia, Goiter, Glaucoma, Cancer)	9	20.4
Has been in contact with COVID-19 patient	Yes	340	80.4
	No	61	14.4
	Don't know	22	5.2
Relationship with the COVID-19 contact	Patient at the hospital	244	71.8
	Family member	64	18.8
	No relationship at all	32	9.4
Knows someone who died of COVID-19	Yes	187	50.9
	No	180	49.1
Been diagnosed with COVID-19	Yes	21	5.0
	No	402	95.0

4.2.2 Knowledge on who is eligible for COVID-19 vaccination

The level of knowledge was assessed using structured questionnaires and it was divided into good knowledge and poor knowledge

Healthcare providers' knowledge on who is eligible for COVID-19 vaccine was assessed and results reported in Table 4.3. One-in five agreed that it is legally mandatory to be vaccinated for COVID-19 which is not correct in Kenya. Majority did not agree that infants less than 1 year are eligible (88.4%). An even higher proportion confirmed that children aged 15 to 18 (90.5%) and adults above 18 years (96.9%) qualify for the vaccination. Three-quarters (74.9%) correctly stated that pregnant and lactating mothers as well as patients with chronic illnesses (83.2%) are eligible. Majority disagreed that persons with active COVID-19 should get vaccinated

(76.8%) while most agreed that persons who have recovered from the same disease qualify for vaccination (85.6%). While 82.0% were right in confirming that those with immunocompromised diseases should be vaccinated against COVID-19, 72.1% failed to realize that persons with allergy to food items should not get the vaccine. About half (49.6%) correctly stated that generally the vaccine confers immunity after the second dose.

Table 4.3: Knowledge on eligibility for COVID-19 and duration immunity is conferred vaccination

Variable	Categories	N	%
It is legally mandatory to be vaccinated for COVID-19	Yes	87	20.6
	No	322	76.1
	Don't know	14	3.3
<i>COVID19 Vaccine Eligibility</i>			
Infant < 1 year	Yes	19	4.5
	No	374	88.4
	Don't know	30	7.1
Children 15 to 18 years	Yes	383	90.5
	No	27	6.4
	Don't know	13	3.1
Adults above 18 years	Yes	410	96.9
	No	7	1.7
	Don't know	6	1.4
Pregnant ladies and lactating mothers	Yes	317	74.9
	No	72	17.0
	Don't know	34	8.0
Patients with chronic illnesses	Yes	352	83.2
	No	53	12.5
	Don't know	18	4.3
Persons with active COVID19	Yes	49	11.6
	No	325	76.8
	Don't know	49	11.6
Persons who recovered from COVID19	Yes	362	85.6
	No	45	10.6
	Don't know	16	3.8
Persons allergic to food items	Yes	305	72.1
	No	64	15.1
	Don't know	54	12.8
Immunocompromised	Yes	347	82.0
	No	49	11.6
	Don't know	27	6.4
COVID19 Vaccine confers immunity against COVID19 infection after	After first dose	62	14.7
	After second dose	210	49.6
	After 14 days after first dose	93	22.0
	Don't know	58	13.7

4.2.3 Source of information (Cue to action) that significantly influenced respondent's opinion regarding vaccination

The health belief model posits that a cue, or trigger, is necessary for prompting engagement in health-promoting behaviors. Table 4.4 shows results on sources of information that significantly influenced respondents' opinion regarding vaccination. Leading among these was information from WHO/UN bodies where 78.2% of the respondents said was very significant. This was followed by healthcare providers (76.4%), government agencies (68.8%) and news from national radio/TV (66.4%). Of least significance were social media e.g., Facebook, WhatsApp, Twitter, etc (43.5%) and discussion among peers, family (35.0%).

Table 4.4: Source of information (cue to action) that significantly influenced respondent's opinion regarding vaccination

Source of information	Categories	N	%
News from national radio /TV	Very significant	281	66.4
	Significant	113	26.1
	Insignificant	29	6.9
Government agencies	Very significant	291	68.8
	Significant	102	24.1
	Insignificant	30	7.1
Social media e.g., Facebook, WhatsApp, Twitter, etc	Very significant	184	43.5
	Significant	167	39.5
	Insignificant	72	17.0
Discussion amongst peers, family	Very significant	148	35.0
	Significant	210	49.6
	Insignificant	65	15.4
Healthcare providers	Very significant	323	76.4
	Significant	75	17.7
	Insignificant	25	5.9
Print media	Very significant	207	48.9
	Significant	183	43.3
	Insignificant	33	7.8
WHO/UN bodies	Very significant	331	78.2
	Significant	66	15.6
	Insignificant	26	6.2

4.2.4 COVID-19 vaccination status and perceived benefits of having the vaccine

Table 4.5 presents study findings on COVID-19 vaccination status and reasons for having been vaccinated. Majority (94.3%) were vaccinated against COVID-19 infection. Several reasons were given for having had the vaccine. Most received two doses (60.9%). Majority (89.8%) received the required number of doses that are recommended i.e., at least a single dose of Johnson & Johnson vaccine or at least two doses of the other vaccines. This was the group that was operationalized as those who had acceptance vaccination.

Only 13.7% agreed that they took the vaccine because they thought there is no harm in taking the COVID-19 vaccine. An even smaller proportion (12.1%) believed that COVID-19 vaccine will be useful in protecting me from the infection with an equal proportion agreeing that COVID-19 vaccine is available free of cost. About one in ten (11.1%) felt that the benefits of taking the COVID-19 vaccine outweighs the risks involved. One in five (21.0%) believed that taking the COVID-19 vaccine is a societal responsibility. Nineteen percent held the view that there is sufficient data regarding the vaccine's safety and efficacy released by the government. A quarter (25.3%) agreed that many people are taking COVID-19 vaccine.

Most of the respondents agreed that COVID-19 vaccine is the most likely way to stop this pandemic (70.4%), is safe (77.5%) and is the best way to avoid the complications of COVID-19 is by being vaccinated (50.6%) and is the most likely way to stop this pandemic (70.4%).

Table 4.5: COVID-19 vaccination status and perceived benefits of having the vaccine

Variable	Categories	n	%
Has been vaccinated against COVID-19 infection	Yes	399	94.3
	No	24	5.7
Number of doses received	1	13.5	13.5
	2	60.9	60.9
	3	25.6	25.6
Received the required number of doses of COVID-19 vaccines	Yes	380	89.8
	No	43	10.2
Perceived benefits			
I think there is no harm in taking the COVID-19 vaccine	Agree	58	13.7
	Disagree	365	86.3
I believe COVID-19 vaccine will be useful in protecting me from the infection.	Agree	51	12.1
	Disagree	372	87.9
COVID-19 vaccine is available free of cost	Agree	52	12.3
	Disagree	371	87.7
I feel the benefits of taking the COVID-19 vaccine outweighs the risks involved	Agree	47	11.1
	Disagree	376	88.9
I believe that taking the COVID-19 vaccine is a societal responsibility	Agree	89	21.0
	Disagree	334	79.0
There is sufficient data regarding the vaccine's safety and efficacy released by the government	Agree	81	19.1
	Disagree	342	80.9
Many people are taking COVID-19 vaccine	Agree	107	25.3
	Disagree	316	74.7
COVID-19 vaccine is the most likely way to stop this pandemic	Agree	298	70.4
	Disagree	125	29.6
The COVID-19 vaccine is Safe	Agree	328	77.5
	Disagree	95	22.5
The best way to avoid the complications of COVID-19 is by being vaccinated	Agree	214	50.6
	Disagree	209	49.4

4.2.6 Type of COVID-19 vaccine received

Figure 4.2 shows type of COVID-19 received by respondents. The leading type of vaccine received was AstraZeneca (n = 309; 63.6%) followed by Pfizer (n=80;

16.5%), Moderna (n = 55; 11.3%) and Johnson & Johnson (n = 39; 8%) Some had received as many as three doses of.

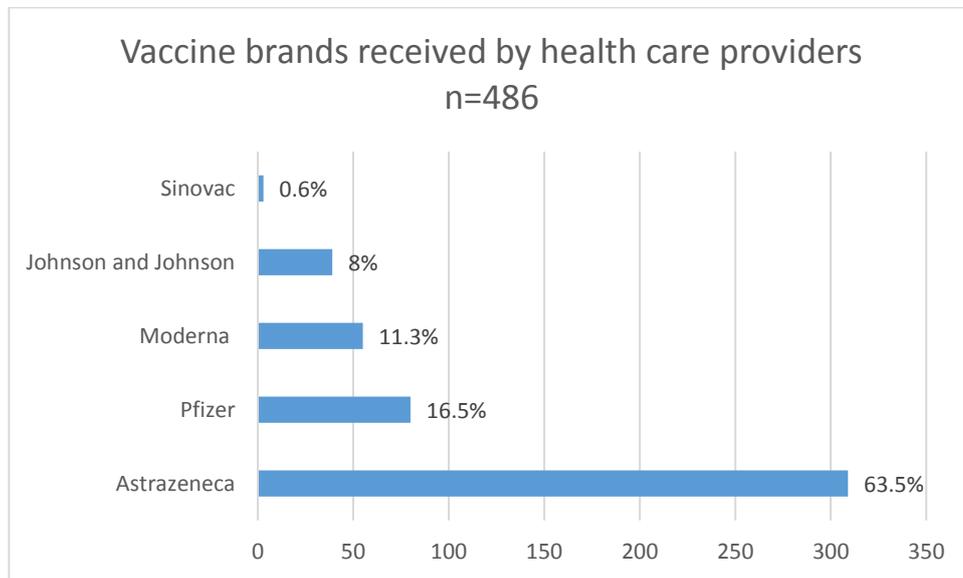


Figure 4.1 Type of COVID-19 vaccine received

4.2.7 Perceived barriers to getting vaccinated against COVID-19

Table 4.6 shows results on respondents who were not vaccinated perceived barriers to being vaccinated against COVID-19. Three-quarters (75%) stated that there was inadequate data about the safety of a new vaccine while 20.8% were against vaccine in general or avoided medications whenever possible. Out of the 24 who did not get the vaccine, 12.5% said that they had already had COVID-19 infection. One-half were concerned with adverse effects of the vaccine while 20.8% were afraid of acquiring COVID-19 from the vaccine. Another 29.2% were concerned of vaccine being ineffective from COVID-19 mutations. Only a small proportion (8.3%) feared because of prior adverse reaction to the vaccine. A higher proportion (70.8%) perceived themselves not at high risk to acquire COVID19 infection with an equal proportion perceiving themselves not at high risk to develop complications if I get infected with COVID -19. A smaller proportion believed that the speed with which COVID-19

vaccine was discovered was a scientific achievement (37.5%) compared to 62.5% who felt it was rushed without enough testing.

Table 4.6: Perceived barriers to getting vaccinated against COVID-19

Variable	Categories	n	%
Inadequate data about the safety of a new vaccine	Yes	18	75.0
	No	6	25.0
I am against vaccine in general (or I avoid medications whenever possible)	Yes	5	20.8
	No	19	79.2
I already had COVID infection	Yes	3	12.5
	No	21	87.5
A concern of adverse effects of the vaccine	Yes	12	50.0
	No	12	50.0
Afraid of acquiring COVID-19 from the vaccine	Yes	5	20.8
	No	19	79.2
A concern of vaccine being ineffective from COVID-19 mutations	Yes	7	29.2
	No	17	70.8
Prior adverse reaction to the vaccine	Yes	2	8.3
	No	22	91.7
I perceive myself not at high risk to acquire COVID19 infection	Yes	17	70.8
	No	7	29.2
I perceive myself not at high risk to develop complications if I get infected with COVID-19	Yes	17	70.8
	No	7	29.2
Speed with which COVID-19 vaccine was discovered	A scientific achievement	9	37.5
	Rushed without enough testing	15	62.5

4.2.8 Perceived susceptibility to COVID-19 infection

Figure 4.3 displays study findings on respondents self-rated perceived susceptibility to COVID-19 infection. Less than half (n = 198; 46.8%) rated themselves as highly susceptible, 31.0% as susceptible compared to 10.2% who perceived themselves as highly unsusceptible.

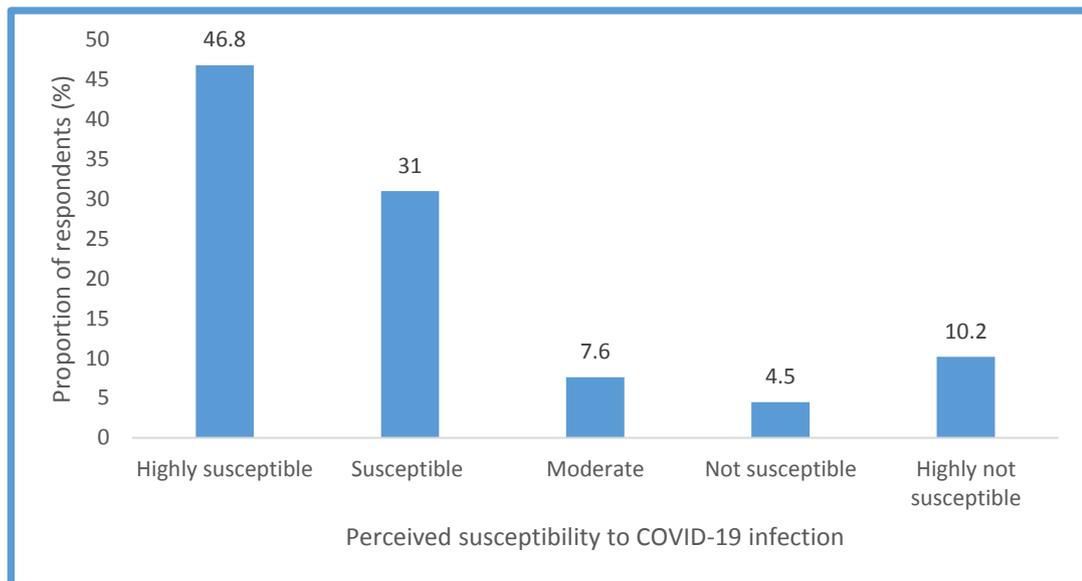


Figure 4.2 Perceived susceptibility to COVID-19 infection

4.2.9 Psychological effects (Rating of how much worry respondent experienced over the past 2 weeks about transmitting the COVID19 infection to the family)

Figure 4.4 shows results on the rating of how much worry respondent experienced over the past 2 weeks about transmitting COVID-19 infection to the family. More than half (52.1%) were either very worried or extremely worried. Less than one in five (19.6%) were not worried at all.

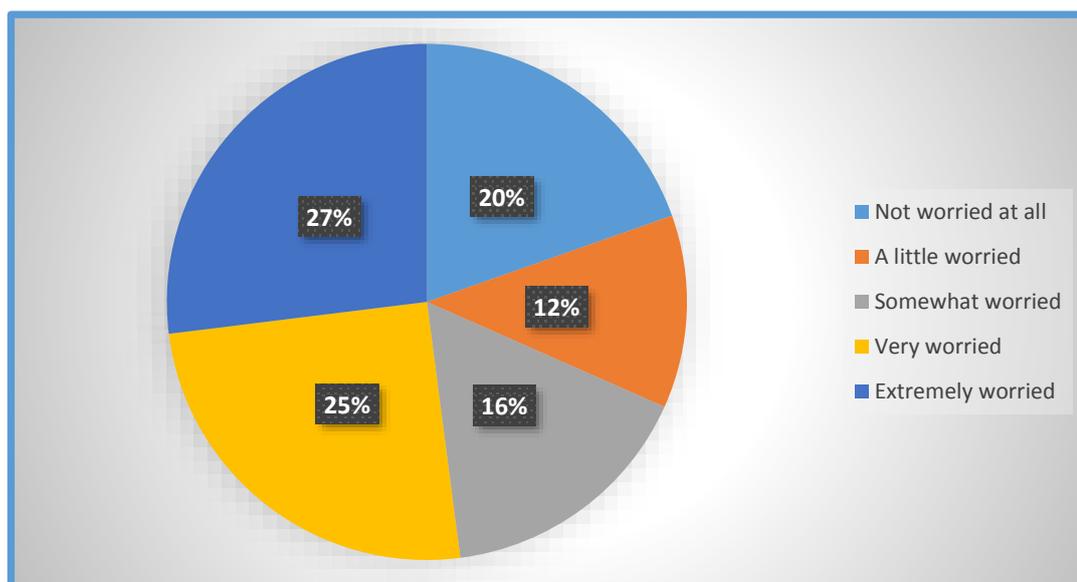


Figure 4.3: Rating of how much worry respondent experienced over the past 2 weeks about transmitting the COVID19 infection to the family

4.3 Association between socio-demographic factors and acceptance of COVID-19 vaccines

Bivariate logistic regression analysis showed several independent variables including age group, marital status, living arrangement, type of employer and cadre were significantly associated with healthcare provider accepting the vaccine (Table 4.7). Respondents who were younger than 29 years were 80% less likely to accept vaccines compared to their older counterparts (OR: 0.2; 95% CI: 0.1 – 0.4; $p < 0.0001$). The married were 3.8 times more likely to have accepted vaccines unlike the single, divorced or widows (OR: 3.8; 95% CI: 2.0 – 7.3; $p < 0.0001$). Equally, healthcare providers who were living with other people were 6.4-fold more likely to have accepted vaccines (OR: 5.2; 95% CI: 2.7 – 10.0; $p < 0.0001$) compared to those who were living alone. Those who were employed by the government compared to their colleagues who were employees of faith-based, private or NGO institutions were three times as likely to have accepted COVID-19 vaccines (OR: 3.1; 95% CI: 1.3 – 7.0; $p = 0.01$). Results also show that nurses were twice as likely as doctors, clinical officers,

among others to have been acceptors of vaccines (OR: 2.0; 95% CI: 1.1 – 3.8; p = 0.03). Although not statistically significant males were less likely to have accepted the vaccines (p = 0.07).

Table 4.7: Association between socio-demographic factors and acceptance of COVID-19 vaccines

Independent variable	Categories	N	COVID-19 vaccine acceptance		OR	95% CI	P value
			Yes	No			
Age group in years	20 - 29	97	77.3	22.7	0.2	0.1 – 0.4	< 0.0001
	≥ 30	326	93.6	6.4			
Gender	Male	181	86.7	13.3	0.6	0.3 – 1.1	0.07
	Female	242	92.1	7.9			
Marital status	Married	326	93.2	6.8	3.8	2.0 – 7.3	< 0.0001
	Single,	97	78.3	21.7			
	Divorced						
	Widow						
Living arrangement	Living with other people	343	93.6	6.4	5.2	2.7 – 10.0	< 0.0001
	Lives alone	80	73.7	26.3			
Employer	Government	384	91.2	8.8	3.1	1.3 – 7.0	0.01
	Private,	39	76.9	23.1			
	Faith-based, NGO						
Cadre	Nurse	305	91.8	8.2	2.0	1.1 – 3.8	0.03
	Other health care providers	118	84.7	15.3			

4.4 Association between health providers medical background and acceptance of COVID-19 vaccines

Table 4.8 presents bivariate logistic regression analysis results on the Association between health providers medical background and acceptance of COVID-19 vaccines. Two variables were independently associated with acceptance of COVID-19 vaccines. Healthcare providers who had been in contact with COVID-19 patients had higher odds of accepting vaccines than those who had not been in contact with such patients

(OR: 4.4; 95% CI: 2.3 – 8.4; $p < 0.0001$). Where such relationship with the contact was a patient in the hospital, the concerned healthcare providers were twice as likely to have accepted vaccination than cases where the contact was a family member or stranger (OR: 2.0; 95% CI: 1.1 – 3.8; $p = 0.03$). On the contrary, those with chronic illness were less likely to have accepted vaccines though the association was not statistically significant ($p = 0.19$).

Table 4.8: Association between health providers’ medical background and acceptance of COVID-19 vaccines

Independent variable	Categories	n	COVID-19 vaccine acceptance		OR	95% CI	P value
			Yes	No			
Has chronic illness	Yes	44	84.1	15.9	0.6	0.2 – 1.3	0.19
	No	379	90.5	9.5			
Has been in contact with COVID-19 patient	Yes	340	93.2	6.8	4.4	2.3 – 8.4	< 0.0001
	No	83	75.9	24.1			
Relationship with the COVID-19 contact	Patient at the hospital	244	92.6	7.4	2.0	1.1 – 3.8	0.03
	Family member or stranger	179	86.0	14.0			
Knows someone who died of COVID-19	Yes	187	90.9	9.1	1.2	0.6 – 2.3	0.51
	No	236	89.0	11.0			
Has been diagnosed with COVID-19	Yes	21	95.2	4.8	2.3	0.3 – 17.8	0.71
	No	402	89.6	10.4			

4.5 Association between source of information and acceptance of COVID-19 vaccines

Table 4.9 presents results on the association between source of information on COVID-19 and acceptance of COVID-19 vaccines. There was significant association between healthcare providers who affirmed radio/TV (OR: 3.1; 95% CI: 1.6 – 5.9; $p = 0.0003$), government agencies (OR: 5.6; 95% CI: 2.8 – 11.0; $p < 0.0001$), healthcare providers (OR: 8.0; 95% CI: 4.0 – 15.7; $p < 0.0001$), print media (OR: 4.1; 95% CI: 1.9 – 8.8; $p = 0.0001$) very significantly influenced their opinion regarding vaccination and acceptance of COVID-19 vaccines with higher odds reported for each source of information.

Table 4.9: Association between source of information and acceptance of COVID-19 vaccines

Independent variable	Categories	n	COVID-19 vaccine acceptance		OR	95% CI	P value
			Yes	No			
Radio / TV	Yes	281	93.6	6.4	3.1	1.6 – 5.9	0.0003
	No	142	82.4	17.6			
Government agencies	Yes	291	95.2	4.8	5.6	2.8 – 11.0	< 0.0001
	No	132	78.0	22.0			
Social media	Yes	184	91.3	8.7	1.3	0.7 – 2.6	0.38
	No	239	88.7	11.3			
Discussion with peers, family	Yes	148	90.5	9.5	1.1	0.6 – 2.2	0.72
	No	275	89.4	10.6			
Healthcare providers	Yes	323	95.4	4.6	8.0	4.0 – 15.7	< 0.0001
	No	100	72.0	28.0			
Print media	Yes	207	95.6	4.4	4.1	1.9 – 8.8	0.0001
	No	216	84.3	15.7			
WHO/UN bodies	Yes	331	91.2	8.8	1.9	0.9 – 3.7	0.07

Association between healthcare provider knowledge, perceptions and psychological effect and acceptance of COVID-19 vaccines

Table 4.10 shows bivariate logistic regression analysis results on the association between Health Belief Model parameters and healthcare providers' acceptance of COVID-19 vaccines. The parameters examined were attitude, knowledge, perceived benefits, perceived susceptibility and rated level of worries regarding transmitting the infection to the family and their relationship with acceptance of vaccines. Attitude, benefits, susceptibility and worries were assessed using Likert scale. Responses in each parameter were summed up and overall score greater than or equal to 4 compared with a score of less than 4, the former indicating positive attitude, perceived benefit, perceived susceptibility or very worried. Knowledge was scored as 1 for the right response and zero for wrong score. The scores were summed and a score of 6 and above considered as 'good knowledge level' and a score of less than 6 as poor knowledge.

Results show that health providers who perceived themselves as susceptible were almost 10 times more likely to have accepted vaccines (OR: 9.8; 95% CI: 4.8 – 19.8; $p < 0.0001$). Similarly, those who were very worried were about 5 times more likely to have accepted vaccines compared to those who were not worried (OR: 4.7; 95% CI: 2.2 – 10.1; $p < 0.0001$). Attitude, perceived benefits and knowledge of healthcare providers were not significantly associated with acceptance of COVID-19 vaccines.

Table 4.10: Association between healthcare provider knowledge, perceptions and psychological effects on acceptance of COVID-19 vaccines

Independent variable	Attitude	n	COVID-19 vaccine acceptance		OR	95% CI	P value
			Yes	No			
Knowledge Level	Good	176	88.6	11.4	0.8	0.4 – 1.5	0.49
	poor	247	90.7	9.3			
Perceived benefit	Yes	32	84.4	16.6	0.6	0.2 – 1.6	0.35
	No	391	90.3	9.7			
Perceived susceptibility	Susceptible	372	93.8	6.2	9.8	4.8 – 19.8	< 0.0001
	Not susceptible	51	60.8	39.2			
Rating of worries about transmitting COVID-19 to family	Very worried	220	95.9	4.1	4.7	2.2 – 10.1	< 0.0001
	Not worried	203	83.2	16.8			

4.7 Determinants of COVID-19 vaccine acceptance among healthcare providers

In the multivariate logistic regression model, being a nurse was independently associated with vaccine acceptance (aOR: 2.9; 95% CI: 1.1 – 7.5; $p = 0.027$) compared to doctors and other healthcare providers. Nurses were more likely to be acceptors of vaccine. Healthcare providers who perceived themselves as susceptible were 8.7 times more likely to have accepted vaccines than those who were felt they were susceptible (aOR: 8.7; 95% CI: 3.4 – 22.4; $p < 0.0001$). Similarly, those who were very worried compared to those who were not, were 2.5-fold more likely to have accepted COVID-19 vaccines (aOR: 2.5; 95% CI: 1.0 – 6.2; $p = 0.051$). Equally, those who said that government agencies very significantly influenced their opinion regarding vaccination had higher odds of accepting vaccines unlike those whom the source somewhat or insignificantly influenced their opinion (aOR: 2.9; 95% CI: 1.1 – 8.1; $p = 0.034$). The same was true of those whose opinion were very significantly influenced by healthcare

providers (aOR: 4.4; 95% CI: 1.3 – 14.8; p = 0.016) with reported higher odds of accepting vaccines. On the other hand, after controlling for confounders, healthcare workers who agreed that information from WHO/UN bodies very significantly influenced their opinion regarding vaccination were 80% less likely to have accepted vaccines (aOR: 0.2; 95% CI: 0.1 – 0.7; p = 0.010).

Table 4.11: Determinants of COVID-19 vaccine acceptance among healthcare providers

Determinants	Categories	Estimate	AOR	95% CI	P value
Age group	20 – 29 vs \geq 30	-0.68	0.5	0.2 – 1.4	0.178
Marital status	Male vs Female	-0.38	0.7	0.3 – 1.7	0.411
Marital status	Married vs Single, Divorced, Widow	0.52	1.7	0.6 – 5.0	0.348
Living arrangement	Living with people vs Living alone	0.57	1.8	0.6 – 5.3	0.305
Employer	Government vs Others	0.83	2.3	0.7 – 7.8	0.185
Cadre	Nurse vs Doctors, etc.	1.07	2.9	1.1 – 7.5	0.027
Has co-morbidity	Yes, vs No	-0.74	0.5	0.1 – 1.7	0.263
Has been in contact with COVID-19 patient	Yes, vs No	0.80	2.2	0.6 – 8.2	0.231
Relationship with the COVID-19 contact	Patient at the hospital vs Family member, stranger	-0.28	0.7	0.2 – 2.6	0.659
Perceived susceptibility	Susceptible vs Not susceptible	2.16	8.7	3.4 – 22.4	< 0.0001
Worries	Very worried vs Not worried	0.92	2.5	1.0 – 6.2	0.051
Radio / TV	Yes, vs No	0.002	1.0	0.4 – 2.8	1.000
Government agencies	Yes, vs No	1.08	2.9	1.1 – 8.1	0.034
Healthcare providers	Yes, vs No	1.48	4.4	1.3 – 14.8	0.016
Print media	Yes, vs No	0.55	1.7	0.6 – 5.2	0.322
WHO/UN bodies	Yes, vs No	-1.67	0.2	0.1 – 0.7	0.010

CHAPTER FIVE

DISCUSSION OF THE FINDINGS

5.1 Introduction

This chapter highlights a discussion of the findings in view of the current literature on the topic under study.

5.1.1 Response Rate

The 100% response rate was achieved due to the curiosity among the health care providers especially following the pronouncement of increased numbers of COVID 19 cases in the month of June 2022. Therefore, they had the motivation of wanting to know where the county was in terms of health caregivers' vaccination status. There was also some form of excitement across board as most of the health care providers thought that the study would be beneficial to all. Most of them reported that the study was an eye opener and an encouragement for many young health care providers.

The distribution of the sample size per sub county ranged from 56 to 70 staffs (13.2 to 16.5%) with Matayos Sub -county having 16.5% of the respondents this was attributed to Matayos Sub County being the host to Busia County referral Hospital and also having most of the private hospitals while Sub counties like Bunyala had fewer facilities with few numbers of staff deployed.

5.2 Acceptance of COVID 19 Vaccine

Vaccines are the most effective prophylactic strategy in the COVID-19 era for controlling the spread of infectious diseases and therefor have an increased life expectancy (Sautto et.al.,2019)

The acceptance rate for COVID-19 vaccine was 94.3% of the sampled health care providers. This was attributed to a morbidity of 3 senior health care providers that increased the levels of susceptibility among the health care workers who therefore saw the need to accept the vaccine. This above conclusion corroborates findings from a Saudi Arabian investigation (A. Alhofaian *et al.*, 2021), in which more than two-thirds of the health care provider were willing to receive the vaccine, and nurses were reported the highest acceptance level among healthcare providers. Yet it is odd with the finding of a study conducted in Taiwan (Kukreti *et al.*, 2021) which revealed that willingness to receive the vaccine among healthcare providers and outpatients appeared low.

This is higher than reported acceptance rates of between 39.3% and 82.5% in similar studies elsewhere (Ackah *et al.*, 2022; Martin *et al.*, 2021; Dzieciolowska *et al.*, 2021; Elharake *et al.*, 2021; Moucheraud *et al.*, 2022; Noushad *et al.*, 2022; Shekhar *et al.*, 2021; Ye *et al.*, 2020). An 82.5 % acceptance was reported in a study done in Malawi on a similar population (Moucheraud *et al.*, ., 2022). In Ethiopia 74.5% (n = 332) of the health care providers consented to get the vaccine, while 76.98%health care providers in the USA of agreed to be vaccinated (Shekhar *et al.*, ., 2021; Yilma *et al.*, .,2022). A research done in March 2021 in Ghana revealed a significantly low acceptance of 39.3% (n = 92) (Martin *et al.*, .,2021). This difference in uptake can be related to the time difference since the USA study was done in December 2020, the Ethiopian study in February 2021, Malawi and Ghana studies in March 2021 while the current was completed in June 2022. These differences can be related to increased availability of vaccines in Africa which was recommended by studies that had demonstrated a massive difference in uptake between African countries and other countries worldwide partly due to unavailability of vaccines (Ackah *et al.*, 2022;

Noushad *et al.*, .,2022). The results could also imply success in efforts that were done to promote the acceptability of COVID-19 vaccines worldwide more so in Africa as has been recommended (Ackah *et al.*, .,2022). The greater acceptance rate in the research can be attributed to the vaccine availability that is in constant supply and also owing to the steady increase in awareness and faith in the vaccine not like at the initial stages of vaccine administration, when previous researches were carried out (Noushad *et al.*,2022). The main reasons cited for vaccine acceptance were for personal reasons such travel, and others for defense from the deadly illness, a discovery similar to the Ugandan, Egyptian, and Polish researches (Kanyike *et al.*, 2021; Saied *et al.*, 2021; Szmyd *et al.*, 2021).

AstraZeneca was the most received vaccine (n=309) followed by Pfizer (n = 80), and lastly Sinovac which at the time of the study had not yet been deployed in the county unlike AstraZeneca which deployed in Kenya and in Busia County in the initial stages, in contrast to that, in Egypt, the most accepted vaccine was Pfizer (22%) followed by AstraZeneca (7.1%) (Saied *et al.*,2021).

Moreover, the most accepted vaccines in Brazil were USA vaccine (82%) and Oxford/England vaccine (81%). The acceptance of a particular brand of COVID-19 vaccination would depend on the availability and on the national policy of administration of vaccines as well.

5.3. Health care providers characteristics and demographics and vaccine acceptance

Most of the respondents were aged between 30- 39 years (n=165) with a mean age of 38.2 ± 10.4 ranging from 21.0 – 73.0 years, this could attributed to the rate at which employment is conducted in the county as the last mass employment for health care

providers by the government was 14 years ago , this age limits were higher than of a study conducted in Sudan where most of the healthcare staff in this study were young (67%) and aged between 18 and 35 years(Eman *et al.*, 2021) while in other studies, less than 30% of their staff were aged below 30 years (Al-Mohaithef *et al.*, 2021;El-Mohandes *et al.*, 2021)

Independent variables including age group, marital status, living arrangement, type of employer and cadre were significantly associated with healthcare provider accepting the vaccine. Respondents who were younger than 29 years were 80% less likely to accept vaccines compared to their older this was attributed to the low perceived risk for contracting the COVID-19 disease unlike the older counterparts this corresponds with that of Malawi where the younger participants were less likely to accept the vaccines (74.2% of participants aged 20–29 years vs >85% among participants aged >30 years) (Moucheraud *et al.*, ., 2022; Yilma *et al.*, 2022). The Turkish and Chinese community members ($p=0.001$) with older ages were also more willing to get COVID-19 vaccines (H. İkişik *et al.*, 2021; C. Wang *et al.*, 2021). Contrary to this finding, health care workers between 25-34 years of age in the Kingdom of Saudi Arabia were more likely to accept a COVID-19 vaccine unlike those who were 35-44, 45-54, and 55 years and older (Elharake *et al.*, 2021). Older health care workers in China, were also found to be less likely to accept the COVID-19 vaccine unlike the younger HCWs, this was likely due to their concerns about the vaccine's safety and efficacy (Wang *et al.*,2021). Similarly, another study conducted in the United States found that HCWs aged 50 and older were less likely to report receiving the COVID-19 vaccine than younger HCWs, possibly due to their greater concerns about the vaccine's safety and side effects (Painter *et al.*, 2021). According to Hurley and Freund (2021), age was negatively correlated with COVID-19 vaccine acceptance. Overall, these findings

underscore the need to consider age and perceptions, when developing strategies to promote COVID-19 vaccine acceptance among HCWs.

Most of the respondents were females (n=242), this was attributed to most respondents being Nurses a profession that is considered to be “female dominated” contrary to the Emirati staff who had more males (64.9%) than female (F. Ahamed *et al.*,2021) However, in other studies (Al-Mohaithef *et al.*, 2021; El-Mohandes *et al.*, 2021) percentages of males and females were almost equal.

Although not statistically significant males were less likely to have accepted the vaccines. Due to the poor health seeking behaviors among the males. This finding was similar to a study conducted in Sudan where there was no statistically significant difference in vaccine acceptability between males and females (Eman *et al.*, 2021). Coronavirus vaccine acceptance was also noted to be 2.19 times higher among female health care workers in Addis Ababa and Adama in Ethiopia (than among male healthcare workers (Girmay *et.al.*, 2023). Contrary to the above study findings other empirical studies indicate that male health care workers are more likely to accept COVID-19 vaccines compared to female health care workers(J. Shaw *et al.*, 2021; M. K. Nzaji *et al.*, 2021; R. Shekhar *et al.*, 2021; A. Gagneux-Brunon 2021; Qattan AMN *et al.*, 2021; Dzieciolowska *et al.*, 2021 ; İkişik *et al.*, 2021) Which agrees with results from a similar study in Saudi Arabia, where that male health workers were more likely to take a COVID-19 vaccine unlike their female counterparts (67% vs 33%).

The married were 3.8 times more likely to have accepted vaccines unlike the single, divorced or widows. This is a new finding that had not been reported by reviewed studies and relates to the increased likely hood of those living with others to be

vaccinated as elicited in this study. It is not known whether acceptability of vaccines is as a result of a need to protect or be healthy and present for loved ones. Equally, healthcare providers who were living with other people were 6.4-fold more likely to have accepted vaccines

Those who were employed by the government compared to their colleagues who were employees of faith-based, private or NGO institutions were three times as likely to have accepted COVID-19 vaccines this was due to the availability of vaccines in the public facilities as the government initially deployed the vaccines in high volume public facilities before the private facilities.

Results also show that nurses were twice as likely as doctors, clinical officers, among others to have been acceptors of vaccines this was attributed to their perceived susceptibility as they are in contact with patients for long hours, and since majority are females who are considered to have better health seeking behaviors unlike the male's. This is consistent to a study in Malawi and the USA where the clinical health workers to include Nurses had a higher acceptance rates than that of lay workers (health records officer and community assistants) (Moucheraud *et al.*, ., 2022; Shekhar *et al.*, (2021)and contrary to a survey out carried in Hong Kong and other studies that reported low COVID-19 vaccine acceptance among nurses as (Kwok *et al.*, 2021 ;J. Shaw *et al.*, 2021; A. A. Dror 2020; M. K. Nzaji *et al.*, 2021; A. Gagneux-Brunon *et al.*, 2021).

The study demonstrated a 10.4% (n=44) comorbidity rate among the respondents which was comparable to research conducted in Ghana which observed a rate of 9.4% but lower than that of 18.4% reported by a Malawian study. Although not statistically significant, those with comorbidities were less likely to accept the COVID-19 vaccine

unlike those without this was due to misinformation on eligibility criteria for the vaccine and fear of side effects. This result was supported by Gagneux-Brunon *et al.*, (2021) who found that chronic condition was not a predictor of acceptance of COVID-19 vaccine among HCWs. This is contrary to various researches that have reported a significant influence of comorbidity on vaccine acceptance (Dzieciolowska *et al.*, ., 2021; Ye *et al.*, ., 2020). Additionally, a study indicated that healthcare workers with no known chronic diseases were 9.4 times higher to receive the vaccine than those with underlying causes (Girmay *et al.*, 2023). The findings also showed that health care workers whose has been in contact with COVID-19 patient were 4 times more likely to accept the vaccine this could have increased their perceived risk of contracting the COVID -19 disease thus the need to vaccinate in order to protect themselves.

5.4 Sources on COVID 19 vaccine among health care providers and vaccine acceptance

Understanding the sources of information about COVID-19 vaccines that people trust the most is critical to future national vaccination programs (Siegrist *et al.*; 2014; El-Elimat T 2021).

There was significant association between healthcare providers who affirmed radio/TV (n=281), government agencies (n=291), healthcare providers (n=323), print media (n=207) these information sources significantly influenced their opinion regarding vaccination and acceptance of COVID-19 vaccines with higher odds reported for each source of information .This corresponds well with Martin *et al.*, (2021) who reported news and social media to be the commonest source of information on COVID 19 in Ghana at 58% similarly, Yilma *et al.*, ., (2022) reported that 72% of their respondents named social media as their major source of information compared to a paltry 16% mentioning journals. The current study was also able to

demonstrate that despite social media a major source of their information's respondents tended to trust information derived from the government and international agencies like the WHO which was favorable as this had not been elicited in the reviewed studies. Palestinians indicated that social media and the internet were the most trusted sources of information regarding COVID-19 vaccines, while the government and pharmaceutical companies were the least trusted information sources (Mohammed *et al.*,2021) which is consistent with Malik Sallam et. al. findings that social media is the main source of information among participants who have higher Vaccine Conspiracy Belief Scale (VCBS) scores (Sallam et al.,2021).

5.5. Healthcare provider Knowledge, Perceived benefit, perceived susceptibility, psychological effect and acceptance of COVID-19 vaccines

Knowledge has been shown to influence decisions on taking a preventive action against a disease before (Saah *et al.*, 2021). Knowledge is vital in stopping spreading the coronavirus, a Chinese study has reported that knowledge has a direct impact on attitudes (Moro *et al.*,2019) Level of knowledge on COVID 19 vaccine was at (n=176; 41.7%) this much which is lower compared with studies from Northeast Ethiopia (62%) (Adane *et al.*, 2022), Saudi Arabia (76%) (Al-Zalfawi et.al., 2022), and China (91.3%) (Li H et.al.,2022). Furthermore, there has been increased health knowledge seeking behavior in the era of COVID and notably from internet sources as been has been demonstrated by several studies similar to the current study (Martin *et al.*, 2021; Moucheraud *et al.*,2022; Yilma *et al.*, 2022, results in a study reported by Cordina *et al.*, also indicated high levels of knowledge unlike the current study. Although not statistically significant, Knowledge seemed to have a negative impact on COVID-19 vaccine acceptance as those with good knowledge had a slightly lower acceptance than those with poor knowledge this is contrary to findings in Ghana where those with

adequate knowledge about COVID-19 vaccine (cOR) had higher odds for accepting the vaccine (Amponsah-Tabiet *et al.*, 2023).

Regarding perception of COVID-19 vaccination, (n=298) of the healthcare providers believed that the COVID-19 vaccine is the most likely way to stop this pandemic, similarly, 72.8% of healthcare staff in Sudan believed that vaccination is the key to combat the pandemic while (67.9%), a lower percentage was reported in an Egyptian study (Saied *et al.*, 2021). The most cited barrier to vaccine acceptance by the respondents was lack of information on vaccine safety (n=18), which was in tandem with several studies in Africa reviewed by Ackah *et al.*, (2022) where a good number of study participants in Africa were concerned with the vaccine safety in terms of the speed with which the vaccine was discovered (n=15), this was also reported by and Martin *et al.*, (2021). This was also a concern in several other studies by (C. Wang *et al.*, 2021; W. A. Al-Qerem *et al.*, 2021; S. Ozawa *et al.*, 2013; M. K. Zarobkiewicz *et al.*, 2017; J. Shaw *et al.*, 2021; A. A. Dror *et al.*, 2021; R. Shekhar *et al.*, 2021; B. Roy *et al.*,). For instance, a study in the Kingdom of Saudi Arabia found concerns about the safety of vaccines and concern about side effects as the main reasons for unwillingness to accept COVID-19 vaccine. Other studies suggested barriers to vaccination to include lack of social trust, vaccine novelty and unavailability of vaccines which did not feature in the current study (Moucheraud *et al.*, 2022; Noushad *et al.*, 2022; Yilma *et al.*, 2022). This is contrary to a study (41.8%) of the Palestinian population believed that the COVID-19 vaccine was safe (Islam *et al.*, 2021). When being compared with other populations, about a quarter of people in Bangladesh believe that the COVID-19 vaccine is safe (Debendra *et al.*, 2022).

Results show that healthcare providers who perceived themselves as susceptible were almost 10 times more likely to have accepted vaccines. Factors associated with willingness to get vaccinated included the epidemic situation and its prognosis, perception of disease severity, and perceived risk of getting infected. (Luodan *et al.*, 2020). According to Hurley and Freund (2021), age was negatively correlated with COVID-19 vaccine acceptance, which suggested that older adults had a less positive perception of the vaccine.

Similarly, those who were very worried were about 5 times more likely to have accepted vaccines compared to those who were not worried. Perceived benefits of healthcare providers were not significantly associated with acceptance of COVID-19 vaccines. This is unlike reports from south Gondar Ethiopia where they were more likely to be willing to get vaccinated as they reported higher levels of perceived benefits of the COVID-19 vaccine (OR = 4.49 (Yisak *et al.*, 2022)). Perceived benefits, perceived barriers and cues to action were found to have an influence in the acceptance of COVID-19 vaccines among health care providers and the general population according to a study using the health belief model (Al-Metwali *et al.*, 2021). In a study conducted in Hong Kong, Perceived Severity, perceived benefits and cues to action had a positive correlation to vaccine acceptance (WongMc *et al.*, 2021).

Half of the study participants expressed concerns about the vaccines' adverse effects. The study's findings corroborate Pogue *et al.*, '(2020) conclusion that most participants (63%) in the United States of America expressed concern about the COVID-19 vaccine's negative effects (Velikonja *et al.*, . 2021). Additionally, (Fakonti *et al.*, ., 2021) found in his study that the primary reasons for nurses and midwives in Cyprus not obtaining the COVID-19 vaccine were worries about the vaccine's rapidly fear and developing of side effects. Although (Fares *et al.*, ., 2021) found that vaccine

hesitation was due to a lack of clinical testing and concern about vaccine side effects, the primary factor that may boost vaccination acceptability among healthcare professionals was access to sufficient and correct information about available vaccinations. Another survey performed in Jordan discovered that (49%) of participants felt that most of the people would avoid taking the vaccine owing to worries about the Vaccine's adverse effects and that they simply don't trust any information regarding the vaccine (El-Elimat *et al.*,2021). Furthermore, Taylor, Landry, Paluszek, and Fergus (2021) found that health care workers who had not received the COVID-19 vaccine were more likely to have negative perceptions of the vaccine, including concerns about safety and efficacy.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The study objectives were met. This study was able to assess the COVID-19 vaccine acceptance and the associated factors among health care providers in Busia County, Kenya.

COVID 19 vaccine acceptance was high at 94.3% which is impressive and way higher than rates estimated by studies done elsewhere especially in Africa. This implies success in efforts to increase acceptance of this Vaccine in Busia County and similar settings are bearing fruit. This may also relate to the reduced rates of positivity reported in Kenya in recent times. Youthful health providers (less than 35 years old) were less likely to accept the vaccines compared to the older ones.

Acceptance was higher among female health providers compared to their male counterparts. The health workers who were married and were living with their loved ones had a higher regard for vaccination. The rate of acceptance was higher among lay health workers like health records officers unlike the clinical health workers like nurses and doctors.

Information from government agencies and discussions among peers were significant determinants of how knowledgeable a health care worker was about COVID 19.

A good number (10.6%) of the providers reported have chronic conditions. However, there was a lower vaccine acceptance level among this group compared to those who reported not having chronic conditions.

The attitude to COVID 19 vaccination and perceptions on risk, susceptibility benefits and barriers of health providers about COVID 19 and the vaccines were also elicited by the study. The study was able to demonstrate that 59% of the health providers had a positive attitude towards vaccination against COVID- 19. 65% of the health providers perceived themselves to be at risk of acquiring the disease. 70.4% of the health providers perceived the vaccine is the most likely way to stop this pandemic. Perceived susceptibility and rating of worries about transmitting COVID-19 disease to the family were positively associated with vaccine acceptance. The most common perceived barrier was inadequate information of vaccine safety and oddly those who cited this barrier had a higher level of acceptance. Previous experience with negative side effects of the vaccine was also a common barrier mentioned and this barrier negatively influenced acceptability.

6.2. Recommendations

6.2.1. Recommendations for Policy and Practice

Following the conclusions made from the study findings we recommended that: -

To policy

- Interventions should be designed to address the health care providers concerns which should be tailor made to take into consideration the age, sex, and category of health care providers.
- Policy makers in the ministry of health Kenya should employ a hybrid of methods to strengthen public education on COVID -19 vaccine and the benefits receiving vaccination
- Concerns about the vaccine safety and adverse effects should be addressed in totality

- Ministry of health to get the understanding of key stake holders to include health care providers to improve trust and thus avoid doubts and infodemics that could lead to hesitancy.

6.2.2. Recommendation for Research

- More studies done on vaccine safety to minimize adverse effects thus make vaccines friendlier
- More studies to be conducted on perception on susceptibility as the current study showed a positive influence on vaccine acceptability but there is scanty literature to support this finding in the context of COVID -19 vaccine

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APPENDICES

APPENDIX I: Letter of Introduction

Dear Respondent,

My name is Juliet Kilima, a Master's of Science in Nursing (Community Health) student at The Masinde Muliro University of Science and Technology. I am currently conducting research on: COVID -19 Vaccine acceptance and hesitancy among health care Providers in Busia - Kenya. I hereby request you to provide me with the information in the questionnaire which will greatly aid me to achieve my research objectives and fulfill part requirement of my masters' degree. This research is for academic purposes only and any information offered will be treated confidentially and used for the purpose of this research only. I assure that your responses and identity will be kept confidential. Your participation is voluntary and you can withdraw at any time without penalty. The findings of the research will ultimately help improve the performance of this company. By completing the questionnaire, you indicate that you voluntarily participate in this research.

Regards,

Juliet Kilima

APPENDIX II: Informed Consent Form

Information Sheet

The following information is to enable you to give voluntary, informed consent to participate in this study. Please read the information carefully before signing the consent form (part B).

Study title: COVID -19 VACCINE ACCEPTANCE AND HESITANCY AMONG HEALTH CARE PROVIDERS IN BUSIA COUNTY -KENYA

Investigators Names: Juliet Kilima Ilahalwa

Address

87 -50400

Busia -Kenya

Tel: 0722 571 603

Aim and Significance of the study

The purpose of this study is to explore the knowledge, perceptions and beliefs and assess the level of the COVID -19 vaccine acceptance among health care providers. The study will inform the policy makers on perceptions surrounding the COVID -19 vaccine among health care providers and how to enhance the vaccine uptake in Kenya

What participation will involve

Upon enrolment in the study, you will be asked some questions on demographic data and socioeconomic activities which you will respond to as truthfully as you can and this will be tape recorded. In addition, a field assistant will ask you questions concerning your perception, in regard to the COVID -19 disease and vaccine. The interview will take at most 20 minutes. As a participant in this study, you will be required to give honest information to their level best. Participation is voluntary and refusal to participate will involve no penalty. You may withdraw from participating in this study at any time without giving reasons. There are no foreseeable risks and immediate benefits for participating in this study. The findings from this study will help improve service provision.

Data Security

All information you provide us will remain confidential. Only the study team will have this information and will be treated with confidentiality unless your express permission is obtained. This will not affect services you are receiving.

Consent Form

Please read the previous information sheet (or have the information read to you) carefully before completing and signing this consent form. Should you have any questions about the study please feel free to ask the investigator prior to signing your consent

Consent Form for the Study

**COVID -19 VACCINE ACCEPTANCE AMONG HEALTH CARE PROVIDERS IN
BUSIA COUNTY-KENYA**

Investigator's name: Juliet Kilima Ilahhalwa

P.O Box 87 -50400, Busia -Kenya

FOR COMPLETION BY PARTICIPANTS

I have read the following sheet concerning this study and I understand what will be required of me if I take part in the study.

Any questions regarding this study have been answered by

.....
.....

I understand that at any time I may withdraw from the study without giving a reason and this will not affect the care am receiving at the hospital.

I AGREE TO TAKE PART IN THE STUDY:

Name of participant.....

Signed..... (Or thumb print)

Date.....

APPENDIX III: Questionnaire

Greetings dear healthcare provider,

COVID-19 vaccines have been available in the country and county since march 2021.

These vaccines have undergone all required testing and have received regulatory approval for use in humans from the health authorities in Kenya and in other countries.

Vaccination has also been

recommended by the World Health Organization (WHO).

Kindly take 5 minutes to answer, keeping in mind that all your answers are confidential. This will also give you more insight into several COVID vaccines.

The study was approved by the...NACOSTI ... REF NUMBER: 751464, LICENSE NUMBER: NACOSTI/P/22/16898

I am a healthcare worker in Kenya, and

- I **ACCEPT** to participate in this Survey
- I do **NOT accept** to participate in this Survey

Socio- demographic factors

1. What is your age?

Age in years:

2. What is your gender?

1. Female
2. Male
3. Other

3. Sub -county:

- Bunyala
- Butula
- Matayos
- Nambale
- Samia
- Teso-North
- Teso-South

4. You work as:

1. Doctor
2. Nurse
3. Clinical officer
4. Laboratory officer
5. Other (please specify)

5. Are you now married, widowed, divorced, separated, or have you never been married?

1. Married and living with children
2. Married but living alone
3. Widowed
4. Divorced
5. Never married

Health back ground

6. Do you have a chronic medical condition?

(Like Hypertension, DM, chronic kidney disease, Heart disease, Asthma, COPD, Cancer,

Immunocompromised state, SCD, Obesity)

1. No
2. Yes (please specify)

7. Have you been previously in contact with Corona (proven or suspected COVID) patients?

(Please choose all that apply)

1. Yes: With COVID-Infected Patient
2. Yes: With COVID-positive family member or friend
3. No: No contact at all

8. Have you been infected with laboratory-confirmed COVID-19 yourself?

1. Yes
2. No

COVID -19 vaccine acceptance

9. Have you taken the COVID -19 vaccine?

1. Yes (first dose)
2. Yes (both doses)
3. No

If no,

10. What are your reasons for not taking the vaccine?

1. (Choose what apply)
2. Inadequate data about the safety of a new vaccine
3. I am against vaccine in general (or I avoid medications whenever possible)
4. Vaccine administration is painful or inconvenient
5. I already had COVID infection
6. A concern of adverse effects of the vaccine
7. A concern of acquiring COVID19 from the vaccine
8. A concern of vaccine being ineffective from COVID mutations
9. Prior adverse reaction to the vaccine
10. I perceive myself not at high risk to acquire COVID19 infection
11. I perceive myself not at high risk to develop complications if I get infected with COVID19 infection
12. Other (please specify)

Knowledge on COVID -19 vaccine

11. Is it legally mandatory to take COVID -19 vaccination?

1. Yes
2. No
3. Don't know

12. We have mentioned a group of people who may or may not be eligible for taking COVID-19 vaccine.

Please mark your opinion for the same by checking the most appropriate option.

Group	Eligible	Not eligible	Don't know	
Infant below 1 year				
Children 15 to 18 years				
Adults above 18 years				
Pregnant ladies and lactating mothers				
Patients with chronic illnesses like diabetes, hypertension and heart disease				
Persons with active COVID -19				
Persons recovered from COVID -19				
Persons allergic to food items				
Immunocompromised				

13. Protective immunity against COVID 19 infection will be achieved after?

1. First dose
2. Second dose
3. 14 days after first dose
4. Don't know

14. What are your thoughts concerning the COVID -19 Vaccine?

1. It is a scientific achievement to find a vaccine that fast
2. It was probably rushed without enough testing
3. Other (please specify)

15. COVID vaccine is the most likely way to stop this pandemic.

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

16. The COVID vaccine is safe.

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

17. The best way to avoid the complications of COVID is by being vaccinated

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree
- 6.

Information source

18. In the present era there are multiple sources of information regarding a particular issue.

How significantly have the following sources of information influenced your opinion regarding vaccination?

Sources of information	Insignificant	Somewhat significant	Very significant
News from national radio /tv			
Government agencies			
Social media e.g., Face book., what's app, twitter, etc			
Discussion amongst peers, family			
Health care providers			
Other sources of information ...please specify			

Perception

Perceived susceptibility

19. On a scale from 1 to 5, please rate how much worry you experienced over the past 2 weeks about transmitting the COVID19 Infection to your family:

1-Not worried at all 2- Little worried 3- Somewhat worried 4- Very worried 5- Extremely worried.

I will recommend my family to get vaccinated against COVID -19

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

Perceived benefits

20. If you have taken the vaccine certain factors must have motivated you for your turn to get vaccinated, certain factors might be responsible for your decision to take the vaccine. given below, there are certain statements regarding this. please mark your response according to you that best explains your opinion for each statement respectively.

I have taken /will take the COVID -19 vaccine because:	Strongly Dis-agree	disagree	Neither agree nor disagree	agree	Strongly agree
I think there is no harm in taking the COVID -19 vaccine.					
I believe COVID vaccine will be useful in protecting me from the COVID -19 infection.					
COVID vaccine is available free of cost					
I feel the benefits of taking the COVID-19 vaccine outweighs the risks involved					
I believe that taking the COVID 19 vaccine is a societal responsibility					
There is sufficient data regarding the vaccine's safety and efficacy released by the government					
Many people are taking COVID -19 vaccine					

APPENDIX IV: Research Authorization Letter From DPS



MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY
(MMUST)

Tel: 056-30870

Fax: 056-30153

E-mail: directordps@mmust.ac.ke

Website: www.mmust.ac.ke

Directorate of Postgraduate Studies

P.O Box 190

Kakamega — 50100

Kenya

Ref: MMU/COR: 509099

14th March 2022

Juliet Kilima Ilahalwa,

HNR/G/O I -

54505/2020,

P.O. Box

190-50100,

KAKAMEGA

A.

Dear Ms. Ilahalwa,

RE: APPROVAL OF PROPOSAL

I am pleased to inform you that the Directorate of Postgraduate Studies has considered and approved your Masters Proposal entitled: "COVID -19 Vaccine Acceptances and Hesitancy among Health Care Providers in Busia County, Kenya" and appointed the following as supervisors:

- | | |
|--------------------------|-------|
| 1. Dr. Everlyne Morema | MMUST |
| 2. Dr. Consolata Lusweti | MMUST |

You are required to submit through your supervisor(s) progress reports every three months to the Director of Postgraduate Studies. Such reports should be copied to the following: Chairman, School of Nursing & Midwifery Graduate Studies Committee and Chairman, Department of Nursing Research, Education and Management and Graduate Studies Committee. Kindly adhere to research ethics consideration in conducting research.

It is the policy and regulations of the University that you observe a deadline of two years from the date of registration to complete your Master's thesis. Do not hesitate to consult this office in case of any problem encountered in the course of your work.

We wish you the best in your research and hope the study will make original contribution to knowledge.

Yours Sincerely,

Yours

Prof. Stephen O. Odebero, PhD, FIEEP

APPENDIX V: IERC Authorization Letter



MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY

Tel: 056-31375

Fax: 056-30153

E-mail: ierc@mmust.ac.ke

Website: www.mmust.ac.ke

Institutional Ethics and Review Committee (IERC)

P. O Box 190,

50100.

Kakamega,

KENYA

REF: MMU/COR: 403012 Vol 6 (01)

Date: April 04th, 2022

To: Juliet Kilima Ilahalwa

Dear Madam,

RE: COVID -19 VACCINE ACCEPTANCES AND HESITANCY AMONG HEALTH CARE PROVIDERS IN BUSIA COUNTY -KENYA.

This is to inform you that the Masinde Muliro University of Science and Technology Institutional Ethics and Review Committee (MMUST-IERC) has reviewed and approved your above research proposal. Your application approval number is MMUST/IERC/034/2022. The approval covers for the period between April 04th, 2022 to April 04th, 2023.

This approval is subject to compliance with the following requirements;

I. Only approved documents including informed consents, study instruments, MTA will be used.
II. All changes Including (amendments, deviations, and violations) are submitted for review and approval by MMUST-IERC.

III. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to MMUST-IERC within 72 hours of notification

IV. Any changes, anticipated or otherwise that may Increase the risks or affected safety or welfare of study participants and others or affect the Integrity of the research must be reported to MMUST-IERC within 72 hours

v. Clearance for export of biological specimens must be obtained from relevant institutions.

VI. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period Attach a comprehensive progress report to support the renewal.

vii. Submission of an executive summary report within 90 days upon completion of the study to MMUSTIERC.

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

Yours Sincerely,

Prof. Gordon Nguka (PhD)

Chairperson, Institutional Ethics and Review Committee

Copy to:

██████ The Secretary, National Bio-Ethics Committee

APPENDIX VI: NACOSTI License


REPUBLIC OF KENYA
National Commission for Science, Technology and Innovation


**NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY & INNOVATION**

Ref No: **751464** Date of Issue: **09/April/2022**

RESEARCH LICENSE



This is to Certify that Ms. JULIETY KILIMA ILAHALWA of Masinde Muliro University of Science and Technology, has been licensed to conduct research in Busia on the topic: COVID -19 VACCINE ACCEPTANCES AND HESITANCY AMONG HEALTH CARE PROVIDERS IN BUSIA COUNTY -KENYA for the period ending : 09/April/2023.

License No: **NACOSTI/P/22/16898**

751464
Applicant Identification Number

Director General
**NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY &
INNOVATION**

Verification QR Code



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

APPENDIX VII: Authority Letter from County Health Director, Busia



COUNTY GOVERNMENT BUSIA
County Health Director
Health & Sanitation Department
P.O. BOX 1040 – 50400
BUSIA, KENYA



REF: CHBSA/H/ADMIN/1/56/VOL.II/78

Date: 17th May, 2022

ALL SUPTS
DEPARTMENT OF HEALTH AND SANITATION
BUSIA COUNTY

Dear Sir/Madam,

RE: AUTHORITY TO CONDUCT RESEARCH

Mrs. Juliet Kilima Ilahilwa is undertaking a Master's of Science in advanced Nursing practice degree at Masinde Muliro University of Science and Technology (MMUST), she has been authorized to undertake research on "Covid- 19 Vaccine acceptances and Hesitancy among health care providers in Busia County – Kenya" in partial fulfilment of her degree at Masinde Muliro University.

Please find attached Masinde Muliro University of Science and Technology IERC approval for your perusal.

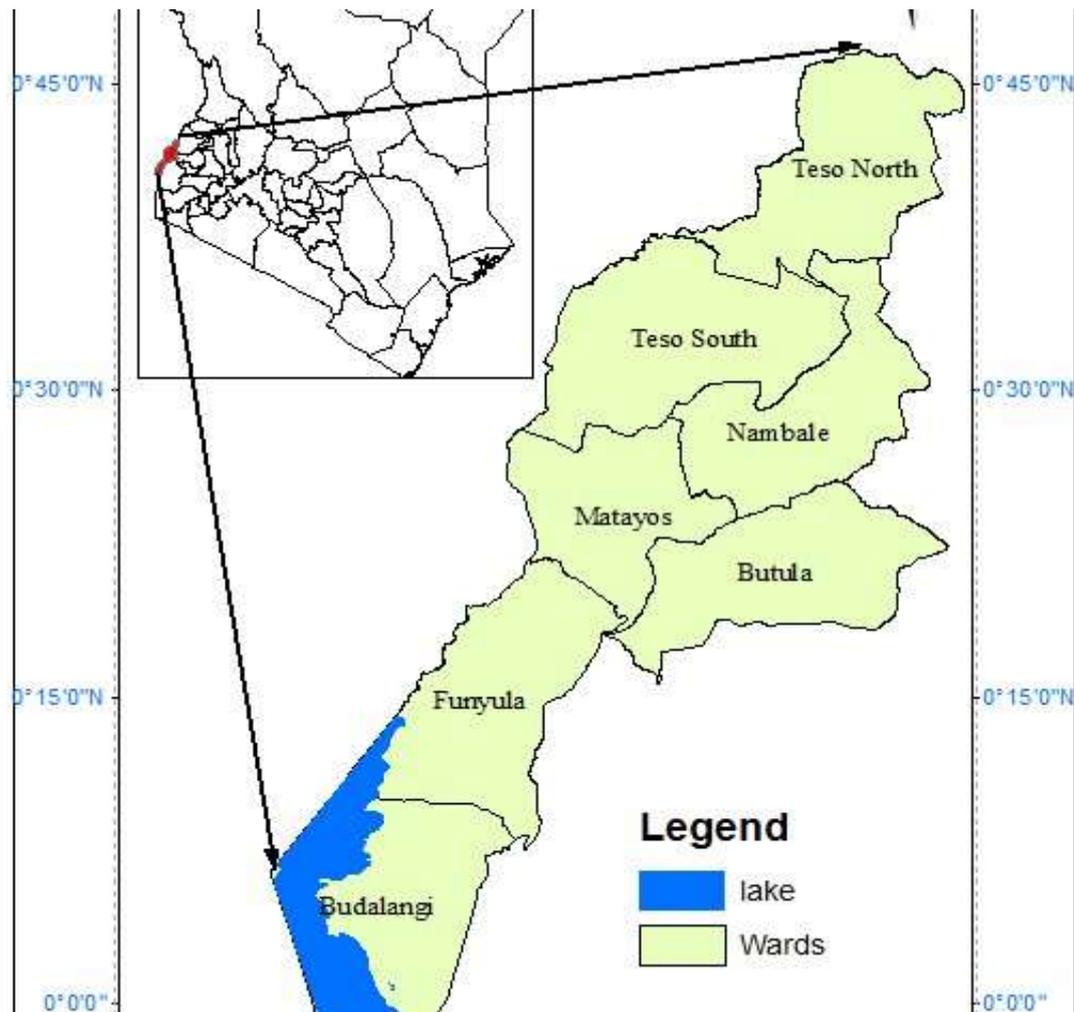
The purpose of this letter is to request you to accord her any necessary cooperation as she collects data in all Sub County hospitals.

Yours faithfully,

Dr. Mena Lutomia
County Director of Health
Department of Health and Sanitation
BUSIA COUNTY

CC: CUCM Department of health and sanitation
Chief Officer Department of health and sanitation

APPENDIX VIII: Map of Busia County Showing the Sub Counties



Source KCSEPDF.CO. KE

Busia County profile

APPENDIX IX: Map of Health Facilities

BUSIA COUNTY HEALTH FACILITIES 2021

