

Covid -19 Vaccine Acceptance Among Health Care Providers In Busia County, Kenya

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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 had caused a lot of damage which impacted the wellness 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. Broadly, several vaccines had since then been declared to be secure and efficacious for human consumption, to include Pfizer, Oxford/AstraZeneca, Moderna, Janssen, Sputnik V, Sinovac, and Sinopharm. The general public acceptance for inoculation against COVID-19 disease still remains undetermined. Health care providers have the highest susceptibility to the Corona Virus as they manage multiple patients on their day-to-day activities. They health care providers, have an extremely important role in the acceptance of any vaccine as they instill confidence to the public in any vaccination activity. The study aimed at assessing the reception of the COVID -19 vaccines amid health care providers in Busia County. A sample size of 423 health care providers were determined using the fisher's formula, facts were gathered using an online questionnaire that had both open and closed ended questions. All data collected was transferred into Microsoft Excel spreadsheet, uploaded and was put into codes into the SPSS version 26 software for final evaluation. Simple descriptive analyses, like frequencies, percentages, mean, and standard deviation, Graphs and figures were computed for Socio-demographic aspects, the knowledge scores regarding COVID-19 vaccine, and the perceived susceptibility, barriers and benefits 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. Ethical approval was sought from the various authorities. From the study results, acceptance for COVID-19 vaccines was high. (94.3%), with Nurses being 2.9 times more likely to accept the vaccine (AOR: 2.9; 95% CI: 1.1 – 7.5; $p = 0.027$). Healthcare providers who perceived themselves as susceptible were 8.7 times more likely to have accepted vaccines. (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; $p = 0.051$). Further, those who said that government agencies very significantly influenced their opinion regarding vaccination had higher odds of accepting vaccine (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 providers 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; $p = 0.010$). Some reasons cited for accepting to be vaccinated included the belief that COVID-19 vaccine will prevent them from COVID-19 infection and that the benefits of the vaccine outweigh the risks.

The study recommended that health promotion interventions to target doctors, clinical officers, more so males below 35 years and are un married. Further research to demonstrate vaccine safety, and on factors influencing vaccine acceptance to include perceptions among health care providers as the current study showed a positive influence on vaccine acceptance.

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I. INTRODUCTION

Background Information

The Corona Virus (COVID -19) is a novel disease that was initially pointed out in the middle of an upsurge of respiratory illnesses in Wuhan city, Hubei province, China. It was announced by the W.H.O on 31st December 2019, proclaimed as an outbreak and a global 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 was chosen by W.H.O. 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). 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. As described by Cennimo *et al.*, (2022), diagnosis of the virus includes detecting viral particles through polymerase chain reaction (PCR) by collecting oral and nasal pharyngeal swabs and also detecting the antibodies to the virus on blood serum.

The virus has 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). According to a Joint statement of 13th October 2021 by ILO, FAO, IFAD, &WHO, 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.

Vaccines are worthwhile and dependable public health interventions as they help reduce the high disease burden globally. COVID -19 they were meant to furnish acquired immunity to protect one from severe acute respiratory syndrome Corona virus 2. When large populations are vaccinated, herd immunity is achieved. As of April 2021, 14 vaccines, were permitted for public use to include two RNA, 5 conventional 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 distribution 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 obtainability of the COVID-19 vaccines might not interpret into its utilization (Dal-Ré *et al.*,2021). Although governments had provided the vaccines, their utilization is still voluntary. Evidence suggests that some care providers were not prepared to receive the COVID-19 vaccines even when availed to their countries (Shaw *et al.*, 2021). In a narrative data review on COVID-19 vaccine acceptance by Sallam (2021), conducted in 114 countries across the world, the COVID -19 vaccine acceptance rates of $\geq 60\%$ was noted in 72/114 countries as compared to 42/114 whose rates of acceptance were between 13% and 59%. Cases of COVID-19 vaccine hesitancy were noted in the Middle East, Northern Africa, Europe, Central Asia and western and central Africa.

Lazarus *et al.*, (2021) in their study across 19 countries, on 13,426 participants 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

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 (Kerr *et al.*, 2021). Mohamed *et al.*, (2021), a study in Malaysia on knowledge, reception, and perception on COVID-19 vaccines, 55.9% of the interviewees were convinced that they were at risk of spreading the virus to other people, 30% of the respondents informed the survey they were vulnerable of contracting a severe form of the COVID-19 vaccine allowing them to gravitate towards the willingness of vaccination.

A study on vaccine acceptance and its linked factors among the adult inhabitants in Kuwait, by Albufeira *et al.*, (2021) identified that (1257/2368) 53.1% of the participants were receptive to get vaccinated, where males seemed to be more likely be vaccinated compared to the females (58% vs 50.9%) $p < 0.001$. Those that generally considered vaccines to contain health related risks were less willing to accept vaccination (95% CI:0.35-0.44), while those who had initially been immunized of influenza were reported to be more willing to be given the COVID-19 vaccine (C.I 1.31- 1.58) and willingness to be vaccinated raised as perceived chances for being infected with COVID -19 disease .

Nurul Azmwati *et al* in their study on knowledge, acceptance and perception on COVID-19 vaccines among Malaysians in August 2021, about 55.9% of the participants perceived that they were able to spread the virus to other people ,while 30% of the respondents said they were susceptible to get severe COVID-19 disease, thus were willing to be vaccinated, more than half were worried about the vaccines adverse effects and about 1/3 agreed that scary information about the vaccine was rampant on social media. Majority believed that the vaccine would protect them and others who are not vaccinated.

A survey conducted by the WHO Africa (2021), indicated that, in Africa, 1 in 4 health care providers are fully vaccinated. Only 27% of health care providers had completed their primary doses of vaccinations with only 6 African countries reaching more than 90% vaccinations while 9 had less than 40% fully vaccinated, this was associated to vaccine hesitancy. A report of a field research undertaken in Central Africa, in 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 vaccines safety and side effects and the rate at which the vaccine was developed/approval (Wang *et al.*, 2019).

In Kenya, a study surveyed approximately 1000 participants to determine potential acceptance rates and factors influencing acceptance of a COVID-19 vaccine. The report findings indicate the level of COVID-19 vaccine acceptance in Kenya was relatively high with 54% of respondents willing to be inoculated at the time of analysis, and 71% to take part in a vaccine trial. Participants were asked if they would take a vaccine if one were available.

54% said they would take the vaccine, 41% said they would wait to see how it reacts with other people and 5% responded “no”. Faith et al., (2020)

Vaccine acceptance among Kenyan health care providers was rated at 71%, according to a study by Abdulle *et al.*, (2022).

Vaccine acceptance was set upon three factors that included confidence, convenience and complacency. Where confidence is 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 leaders and governments so as to raise acceptance. Convenience is how easily one can obtain to the vaccines which includes physical availability, accessibility and affordability (MacDonald,2015). 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 Covid -19 cases, 5,203,984 deaths, 235,538,889 recoveries with 4,227,747,682 (54.2%) first doses and 3,323,269,961 (42.6%) of second doses while those who have received booster doses are 214, 986,380 (2.8%), (United Nations Geo Scheme).

The situation in Africa was 8,614,525 reported cases, with 8,060,459 recoveries accounting for 94% of all cases reported, 222,254 deaths accounting for 4.3% of deaths reported globally (Africa CDC reports 2021) 6.66% of the total population were fully vaccinated. Whereas, Kenya had 254,862 COVID-19 cumulative cases, with 5,332 deaths. Vaccination status stood at 4,405,888 (8.2%) for first dose and 2,603,541 (4.8%) of those fully vaccinated.

At the same time, Busia County had 5,683 cases with 68 deaths and a cumulative total of 52, 345-10.8% of its target population had received the first dose and 22,010 (4.5%) for the second dose to whom professional health care providers vaccinated were 519 out of a target 1,475 (35.1%) having received at least one dose (Daily SITREP Busia County 25th November 2021).

Problem Statement

The pandemic led to a destructive impact that caused massive deaths globally and presented an extra ordinary challenge to the wellbeing of the Public, food systems and socio-economic activities. The disruption of socio-economic activities caused by the pandemic were mind blowing as multitudes of people were more likely to become paupers. This was attributed to some of the non - pharmaceutical interventions (N.P.I s) that included travel restrictions and partial or total lockdowns that have so far been able to control the disease progression (WHO, 2020). These NPIs applies across the world caused strife in attaining the sustainable development goals 1, 2, 3, and 8 (that focus on eradicating poverty zero hunger, eradicating of communicable diseases, and ensuring of the economic growth). Another crisis was the emergence of new COVID-19 Variants the Delta (B.1.617.2) and Omicron (B.1.1.529) Variants (Variants of importance and Variants of Concern). They spread faster (2 to 20 times) and are more contagious than the initial form of SARS CoV 2. Vaccines were additional protective measures introduced to help curb the pandemic. The most urgent aim of vaccinating individuals was to shield them against acute disease, with the abiding aim to eventually put it to an end. In most countries, vaccines were introduced in a phased manner targeting those most at risk with health care providers being among those prioritized in the first phase. Even though this is the case and vaccines are now available to all, their acceptance among health care providers was still low (35.1%) in Busia County with very little information being available on the acceptance among health care providers in Kenya and in Busia County to be specific.

With this in mind, the research was under taken to evaluate the reception of the COVID -19 vaccine among health care providers in Busia County to inform strategies aimed at increasing its acceptance. Additionally, Health care providers are also presumed to be the primary consumers of the vaccine and thus have a great influence on the general public for the success of any immunization activity.

Study Objectives

Main Objectives

To assess the COVID -19 vaccine reception among medical practitioners in Busia County, Kenya.

Specific Objectives

1. To determine the influence of demographic factors on COVID-19vaccine acceptance among health care providers.
2. To assess the relationship between knowledge of the health care providers on the COVID- 19 vaccines acceptance.
3. To assess the association between healthcare provider attitude, knowledge, perceived benefit, susceptibility, psychological effects on the COVID-19 vaccines acceptance.
4. To explore the level of acceptance of COVID-19vaccines among health care providers.

Research Questions

1. What are the individual characteristics influencing COVID -19 vaccine acceptance among health care providers?
2. What are the sources of information on COVID -19 vaccines among health care providers?
3. What are the perceptions among the health care providers regarding the COVID -19 Vaccines acceptance?

Justification of the Study

Vaccine hesitancy is a prospective threat to the world's health. After the COVID-19 vaccine development, little information is available on its acceptance among communities. Founded on the review of initial available literature, there was a clear indication that a limited amount of research and knowledge has been done on factors influencing the acceptance and uptake of COVID-19 vaccine across the globe, none had been done to evaluate these elements that influence acceptance of COVID-19 vaccine in Busia County, Kenya. This was of great concern because Busia County is a County in western Kenya which was highly affected by COVID-19 pandemic due to the porous border, long distance truck drivers and other factors like cross border traders, fisher folks etc.

It is also crucial to have increased vaccination coverage among health care providers which is not only for their own benefit but also for the entire population that they attend to. This is a guarantee that preventive medical health institutions are working during trying times. Most countries also prioritized health care providers in the first phase of vaccination but there is still a low coverage in Busia County where by 25th November 2021, only 519 out of 1475 professional health care providers (35.1%) had taken their first dose of the vaccine. Which shows that a majority were still unvaccinated therefore remained perilously exposed to the extreme form of COVID -19 and not unless they embraced the vaccination idea, we put into danger all the efforts to curb the COVID -19 infections.

Therefore, the study was motivated by the desire to fill the gap of knowledge and provide information to add to the craftsmanship on factors influencing acceptance of COVID-19 vaccine among health care providers.

The study aims to uncover reception levels of COVID-19 vaccine among Busia County medical practitioners and promoting masterplan that could be applied to promote the acceptance of COVID-19 vaccine in the Country. It will inform public health workers and policy makers about the perceptions surrounding the COVID-19 vaccine among Busia County Health Care Providers and how that can be improved to enhance COVID-19 vaccine acceptance in Kenya. Study results will be expected to enable policy makers to obtain knowledge about the major factors that affect the acceptance of COVID-19 vaccine, the data will be essential to help, plan implement and evaluate communication activities such as developing strategies that could address the health care providers concerns and thus increase vaccine uptake which is a key measure on controlling the spread of the disease.

Limitations of the Study

The study will limitations that included:

The study was conducted in Busia County thus may be generalized to similar counties which may have their own unique or county specific factors.

Assumptions of the Study

The researcher presumed that the study population selected for the study represented a true picture of the entire population 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.

Theoretical Framework

The theoretical review of the study was based on the Health Belief Model. The model was founded in 1974 by Rosenstock. During the early research it was believed that people responded differently on how they perceived certain health problems. Their views or feelings concerning a certain health issue triggered some form of behavior change that made them act in a certain way. It is important to note that individuals' beliefs are somehow related to the way they interact and conduct themselves in response to a certain stimulus. This is described in the figure:

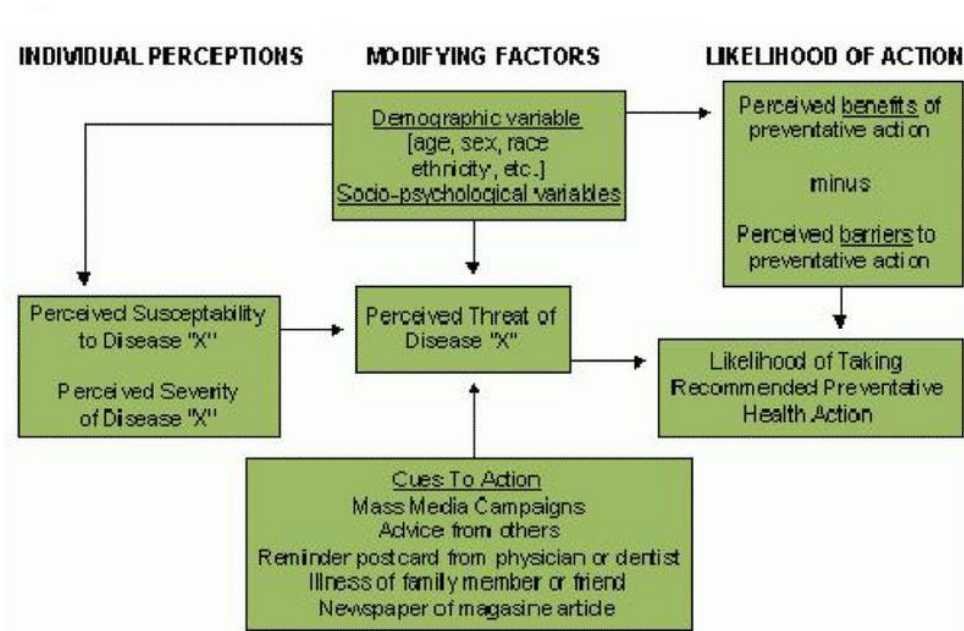


Figure 1.1 The Health Belief Model

Conceptual Framework

The Conceptual framework for the study was informed by the health belief model. It examines the influence of individual characteristics, knowledge, perceptions of health care providers on COVID -19 vaccine acceptance. The individual characteristics include: - age, gender, marital status, nature of work place, previous exposure to COVID -19 disease, history of chronic illnesses, and living arrangements.

Knowledge has been conceptualized as the information health care providers have with regards to COVID -19, the sources of this information and trust they hold on the sources.

The perceptions include perceived barriers, perceived risks, perceived benefits, perceived severity and threats. This is further described in figure 1.2.

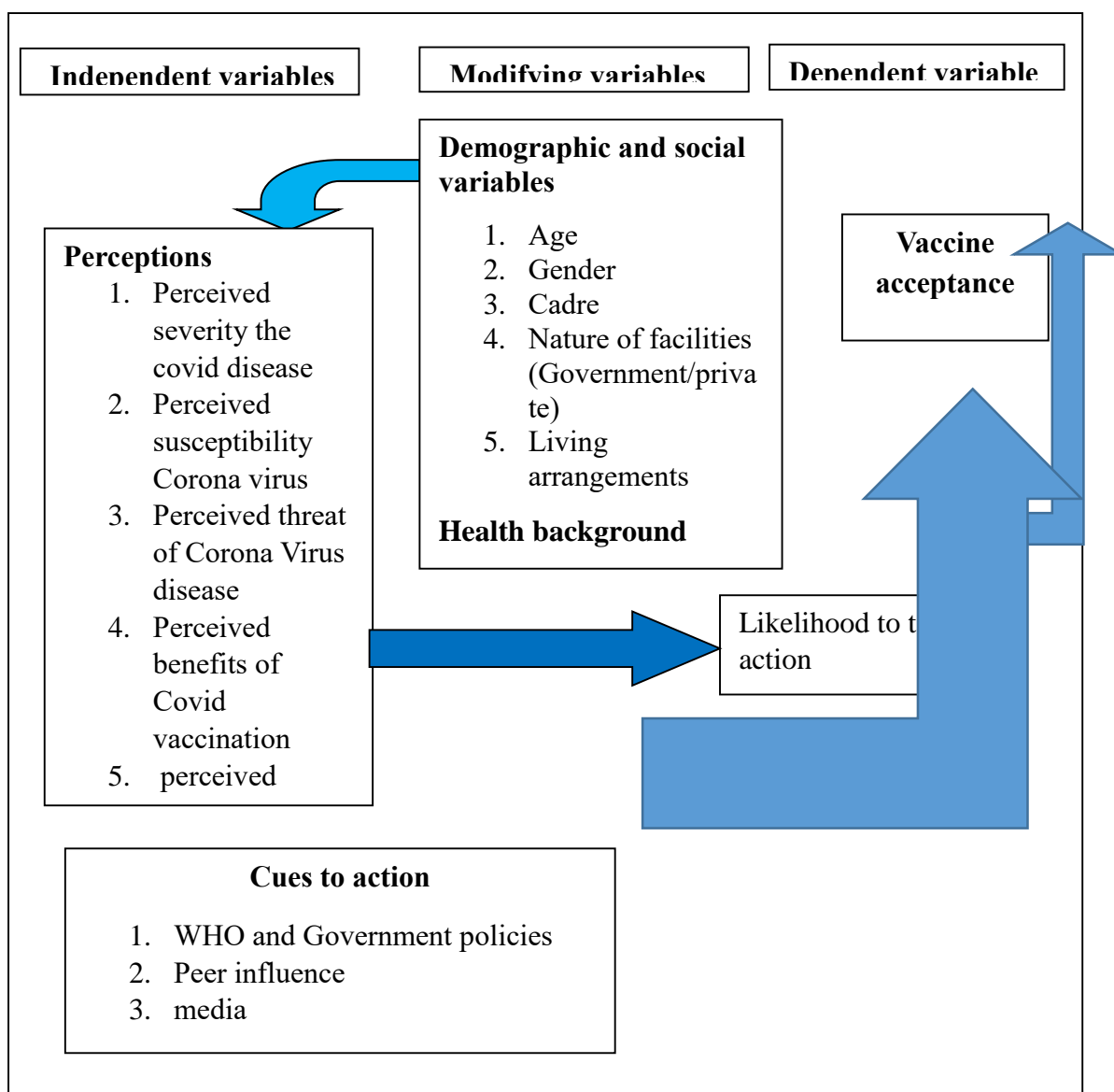


Figure 1.2 Conceptual framework

II. LITERATURE REVIEW

Overview

The chapter takes into detail the literature on the adoption and reception of the COVID -19 vaccines among health care workers in Busia County. Factors that influence the vaccine acceptance to include: individual characteristics in terms of age, sex, confounding factors like availability of the COVID -19 vaccines, knowledge, attitudes and perception on the COVID -19 vaccine, and individual factors like lack of interest, and time to get vaccinated.

Introduction

The rapid upsurge of the Coronavirus disease of 2019, was professed a Public Health Emergency of International Concerns, in January 30, 2020; and a pandemic on March 11, 2020 (Jebri, 2020). Kenya introduced pandemic preparedness, planning, core focus on the immunization program, this was done according to the WHO recommendations.

Vaccines are a very important means to promote health outcomes, increase life longevity 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).

A COVID -19 Vaccine was purposed to provide acquired immunity in opposition to severe acute respiratory syndrome Corona virus 2 (SARSCov2); which is the virus that brings about Corona virus disease 2019.

The COVID -19, a vaccine, is the first ever vaccine for a communicable disease that was manufactured under several years, no vaccines have been manufactured for protection against Coronavirus infection in humans. A 55–82% vaccination coverage is needed to realize herd immunity in opposition to the SARS-CoV-2. The identification components related with acceptance of COVID-19 vaccine are desperately required to make education materials that are related to the COVID -19 circumstances and policy implementation. The Avian Corona virus from the genus Gamma Corona virus that infects birds leading to infectious bronchitis in birds is among the vaccines that were produced against zoonotic diseases caused by Corona viruses.

As many vaccines have been permitted for use, bona-fide vaccine effectiveness is being evaluated by use of case controls, and observational studies .25 vaccines have 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 currently we have 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 COVID -19 vaccines which were ready for use in the United States, had a high efficacy in protecting one from mortality and morbidity due to COVID -19. When compared, individuals who had completed their primary series of vaccination, the Centre for Disease Control recorded that individuals who were not vaccinated against COVID -19, were 5 times exposed to COVID -19, a 10-time probability 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 likely to die compared to those 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).

Serious adverse events are of high public interest and have been ranging between mild to severe cases that may lead to anaphylaxis. 1:1000 people are hypersensitive to one or more vaccine ingredients and 2-5 per million vaccinated people in the USA are likely to develop anaphylaxis (Greenhawt *et al.*, 2021; UK Government, 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 population had received one primary dose of the Covid vaccine, while 27.15 million had been received two the primary doses of the COVID -19 vaccine, with only 5% of the people in under-developed countries receiving 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 hurt countries with good and poor access. Affluent countries that represented 14% of the world’s inhabitants as of November 2020 had committed to buy 51% of all the doses that were yet to be sold; with some acquiring more doses than they needed to vaccinate their entire population (So & Woo, 2020). In January 2021, the WHO director general Tedros Adhanom announced a warning on issues with equitable distribution “more than 39 million doses have been administered in at least 49 higher income countries not a Million, a thousand but Just 25” (Schlein, 2021). In a meeting in April 2021, the WHO talked about 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).

COVAX, was strategy to enable countries to acquire the COVID-19 Tools (ACT). It was ushered in by the World Health Organization, the European Commission, and France as the world’s game plan to the COVID-19 pandemic. It was set as the globes road map to realize the equality and accessibility to the COVID-19 vaccines in the 190 countries, this was regardless of the developmental phase or level of income. COVAX was meant to traverse the gap of the inequality that existed between the poor and other inhabitants in many African countries by ensuring that COVID-19 vaccines were availed to everyone. Despite these possible advantages presented by the COVID-19 vaccines, undependable proof has informed the unwillingness of a great number of people to accept the proposed COVID-19 vaccine, this deters the success of the disease’s outbreak 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 are under vaccinated, they die unnecessarily, become disable due to diseases, and live under lockdown, restrictions thus cannot continue with their day-to-day socio-economic activities therefore harming the over and under vaccinated economies. 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 1pound on giving vaccines to lower income countries this is according to studies by C.D.C.

By November 25th 2021, 260,682,363 COVID -19 cases had been confirmed worldwide, 5,203,984 deaths, 235,538,889 recoveries with 4,227,747,682 first doses -54.2% and 3,323,269,961 -42.6% of second doses while those who have received booster doses are 214, 986,380 -2.8%, in Kenya, the current COVID -19 cumulative cases stands at 254,862 with 5332 deaths vaccination status stands at 4,405,888 – 8.2% for first dose and 2,603,541 – 4.8% who have been fully vaccinated (WHO, 2021). Busia County has had 5683 cases with 68 deaths and has vaccinated a cumulative total of 52, 345-10.8% of its target population for the first dose and 22,010-4.5% for the second dose with the total number of professional health care providers vaccinated standing at 519 out of 1475 (39.9%) (Daily SITREP Busia County 25th November 2021).

Vaccine Acceptance

High COVID -19 vaccines acceptance is required to reduce deaths from COVID-19 disease and speed up an end of the disease. Vaccine campaigns aimed at curbing Coronavirus 2019 disease (COVID-19) are usually independent on vaccine effectiveness and safety. Vaccine acceptance amid the citizens and healthcare workers is important in the effective control of the disease. Governments, public health officials and advocacy groups ought to prepare enough to tackle hesitancy and increase knowledge on vaccines to enable the public to embrace immunization appropriately. Activists against vaccines have negatively campaigned in many countries on the need for vaccination, with some challenging the presence of the COVID-19 disease. Mis-information passed through many channels of communication could have a huge effect on the reception levels of the vaccine. Additionally, the hurried pace of vaccine development further built-up public anxieties and could therefore compromise acceptance (Fadda *et al.*, 2020).

In a narrative data review on COVID -19 vaccine acceptance by Sallam (2021), figures from studies of 114 countries across the world, the COVID -19 vaccine acceptance rates $\geq 60\%$ was noted in 72/114 countries as compared to 42/114 whose rates of acceptance were 13% and 59%. Cases of COVID -19 vaccine hesitancy were noted in the Middle East, Northern Africa, Europe, Central Asia and western and central Africa.

In another study by Lazarus *et al.*, (2021) across 19 countries, 13,426 participants 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.

The findings in a survey conducted by Kayanda *et al.*, (2021) show acceptance was generally high in sub-Saharan Africa, where at least four fifths expressed the will to get vaccinated in all but one country. Vaccine acceptance fluctuated from a majority in Ethiopia (97.9 percent) to below the herd immunity requirement in countries like Mali (64.5 percent). Worries on the vaccines in general and their complications were categorized as some of the basic causes of hesitancy towards a COVID-19 vaccines across some 6 countries namely Burkina Faso, Ethiopia, Malawi, Mali, Nigeria and Uganda. These findings indicate that restricted supplies, not incompetent demand, are likely to present a major obstruction to reaching high COVID-19 vaccine coverage in Sub-Saharan Africa.

A survey conducted by the WHO Africa (2021), indicated that, in Africa, 1 in 4 health care providers are fully vaccinated. Only 27% of health care providers had completed their primary doses of vaccinations with only 6 African countries reaching more than 90% vaccinations while 9 had less than 40% fully vaccinated, this was associated to vaccine hesitancy. Some studies indicated that about 40% of the health workers were willing to get a COVID-19 vaccination in Ghana with less than 50% in Ethiopia. Worries over the safety of the vaccine and complications of the vaccines have been outlined to be key causes of hesitancy.

Research on reluctance and acceptance of the vaccine among medical care givers in South Africa, Wiysonge *et al.* (2022) indicated that 59% (233/394) of the health care providers would accept the vaccine while 41% (163) were hesitant, they would either not take the vaccine while some were undecided on whether to accept or not.

Vaccine acceptance among Kenyan health care providers was rated at 71%, and this is according to a study by Abdulle *et al.*, (2022). In Busia County, and as of 23rd November 2021, out of the 1475 Professional health care providers (35.1%) had gotten their first shot of the COVID-19 vaccine injection. More studies still need to be done on vaccine acceptance among health care providers as little or no information is available on the same.

Individual characteristics and vaccine acceptance

Socio -Demographic Factors and Vaccine Acceptance

A study on vaccine acceptance and its linked factors among the adult inhabitants in Kuwait, Albufeira *et al.*, (2021) identified that (1257/2368) 53.1 % of the participants were receptive to get vaccinated, where males seemed to be more likely be vaccinated compared to the females (58% vs 50.9%) $p < 0.001$. Those that generally considered vaccines to contain health related risks were less willing to accept vaccination(95% CI:0.35-0.44), while those who had initially been immunized of influenza were reported to be more willing to be given the

COVID -19 vaccine (C.I 1.31- 1.58) and willingness to be vaccinated raised as perceived chances for being infected with COVID -19 disease .

Research indicates the healthcare workers in the emergency sector and those who were given extra duties as a result of the pandemic were more likely to accepting the vaccination against COVID -19 disease, the same has been demonstrated that those who were optimistic regarding prophylactic measures against illness. (Kaplan *et al.*, 2021).

Omer *et al.*, (2009), noted that 20% of the adults resorted that they would only get vaccinated if it becomes a requirement by their employers or not get vaccinated at all.

In times of difficulties in life, like misfortunes, and uncertainties, religion usually gives a form of solace as a way of managing the uncertainty (Koenig *et al.*, 2022). This form of solace includes depending on one's faith, for protection, comfort, and also for interpretation of events. Credible data cites that during a stressful event, most people will dwell on prayers, reading of the scripture, and becoming close to God as the way of alleviating the problem (Pargament 2011). Other studies indicate that those individuals with a strong religious believe are prone to be of anti-vaccine. A study among American muslim physicians, participants were involved in bioethical guidance from the Islamic jury had lower odds of advocating porcine-based flu vaccines to their clients (Mahdi *et al.*, 2016). In Utah, where Mormon religion is common, 74% of the residents classified themselves to be "highly religious "the community is ranked 46th in the country with the highest Human papillomavirus vaccination (Walker *et al.*,2017).

Faith *et al.*, (2020) conducted a survey in Kenya in which they interviewed about 1000 participants, the study aimed at investigating potential acceptance rates and factors influencing acceptance of a COVID-19 vaccine. Majority of the participants were located and represented as follows Nairobi (64%), Kiambu (12%) and Machakos (3%), with 21% of the participants dispersed around other counties. 65% of participants in the study were male and 35% female. From the survey of the likelihood of vaccine acceptance in Kenya was relatively high with 54% willing to be inoculated 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 capitalize on the of social media platforms. Most of the anti – vaccination campaigns championed by politicians from far right together with those against vaccination, non –governmental organizations including those identified as the so-called rumor mongers by the center for countering digital hate (Hotez, 2021).

Inequalities and differences in the social determinants of health on matters related to accessibility to proper health care, socio-economic rank, surroundings, opportunities to study, and work levels are disparities compounded by in equalities in tracing immunization status.

The Kaiser family foundation, consistently noted reduced levels of vaccinations in the African – American and the Latin population was attributed to access and hesitancy (Ndugga *et al.*, 2022).

The lack of understanding and knowledge on who, where, when one is supposed to be vaccinated with the availability of proof on vaccination influence and decisions. Issues surrounding the safety of vaccines safety, possible harm, efficacy, fast development, cost and successes of COVID -19 vaccines are some of the main prognosticators for vaccine acceptance (Gagneux-Brunon *et al.*, 2021).

Previous encounters with vaccination and vaccination services have an impacted in forth coming decisions concerning vaccinations, the recognized importance and benefits of vaccination e.g., to prevent or protect from chronic disease, the want to return to normal are well known predictors of vaccine acceptance.

Researches on COVID-19 vaccine acceptance and uptake is still in its infant stage, most of the work done indicate that COVID-19 vaccine hesitancy is associated hesitancy towards other vaccines. Those who marshal others against vaccination or have little trust of the safety of vaccines are generally more likely to reject COVID-19 vaccination. (Motta *et al.*, 2021). COVID-19 vaccine acceptances and uptake are motivated by several factors, to include issues surrounding the safety and effectiveness of the vaccine developed with unmatched speed, in accurate information from the various internet platforms such as Facebook, what's app and Twitter about effects of the vaccine, and continued efforts by those against vaccination instill doubt to the general population (Haseltine, 2020). Research suggested that in the United States, reluctance to get the COVID-19 vaccine was common among blacks, women and the right wingers. Contrarily, those who had a lot of trust in specialists and taken a COVID-19 test, were less likely to be vaccine hesitant (Callaghan *et al.*, 2020).

Researchers on health behaviors on immunization have focused on providing motivation as a way of enticing individuals to drive them towards accepting the COVID -19 vaccination. For instance, research points out economic incentives as a potent inducement for vaccination behavior, convincing the undecided groups to get vaccinated (Betsch *et al.*, (2015). Comparably, a review, by Kane *et al.*, (2004) revealed that motivations such as cash money, free gifts and lotteries tend to have an impact on how people behave, when the people are asked to perform a simple tasks like immunization versus more complex like losing weight. Little is known on the impact

of economic harm caused by COVID -19 disease on vaccine uptake, understanding from Prospect Theory implies that individuals choose to concentrate on losses compared to equal gains (Kahneman, 2011) leading to suspecting that perceptions obtained from research on positive motivation can also apply losses. It is expected that the weighty association between non vaccination and an individual's ability to meet their needs consistently like, going back to work place, and reviving the economy, other than motivation would entice the hesitant people to get a COVID vaccine once it becomes available (Van der Linden & Savoie, 2020).

Health background and vaccine acceptance

During the COVID-19 pandemic, the elderly and those that presented with pre-existing conditions, experienced poor disease outcomes that were linked to the massive deaths. (WHO 2020).

In a study conducted in Botswana on COVID-19 reception level and risk perception on COVID -19 vaccine, there was an acceptance rate of 73.4%. The high acceptance rate was noted on those with Co-morbidities Tlale *et al.*, (2022). Contrary to this, research was conducted 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. Utami *et al.*, (2022) in their study in Buli and Indonesia comorbidity associated with low vaccine acceptance that was attributed to false and incorrect information about safety of COVID -19 Vaccines and perceived vaccine unsafety for individuals with comorbidities.

Knowledge and vaccine acceptance

The Holy Bible, in the book of Hosea 4:1 quote 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.

Mohamed *et al.*, (2021), in their web-based survey 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 and individuals at high risk, were notably considered to be knowledgeable. Females and those in the lower age group were closely associated with acceptance compared to the previous studies e.g., in February, the African CDC found that, young people in African countries tended to be hesitant. Elgendy *et al.*, (2021), in research on public awareness about Corona virus vaccine acceptance and hesitancy, 69% of the participants believed after being vaccinated they may contract Corona virus disease from the vaccine with 93 % indicating that the vaccine will put the pandemic to an end, while 86% has doubts about the vaccine without any specific reasons. Majority of the participants (94%) agreed that the vaccine provided immunity for a period of 6 to 1 year. The median score for the survey was 20/22 regarding knowledge on vaccination indicating the participants had sufficient knowledge.

In a study by Elhadi M. *et al.*, (2022) on knowledge, attitude and acceptance, COVID -19 vaccine acceptance was at 79.6 %, this was attributed by the target population being knowledgeable.

Sources of information and vaccine acceptance

Sources of media has shown to greatly impact on the knowledge and thus vaccine acceptance in research by Ahiakpa *et al.*, (2022) internet was found to have yielded an increase in awareness, among Africans that was at 90.4%. This was in-turn associated to be among the factors that was closely related with vaccine acceptance that was cited to be at 59%. 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%.

In another study by Rahman *et al.*, (2022), the main source of information among university students in Bangladesh was at 37.74%. 58.3% of the respondents had a positive knowledge and 54% agreed that the vaccines were safe.

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

Perceptions and Acceptance

Perception involves the way in which something is regarded, understood or interpreted (oxford dictionary). It is often influenced by factors like past experiences, expectations current status, beliefs to mention but a few. An individual's perception on the vaccine will determine their acceptance or hesitancy for the same.

Perceived threats and risks caused a certain disease have seen to determine vaccination attitudes. Health behavior models, to include the Health Belief Model and Protection Motivation Theory, put perceived risk or severity of a disease as an important determinant for vaccination intentions to include other preventative health behaviors. 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 (Kerr *et al.*, 2021). 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. 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 study carried out in Malaysia on knowledge, reception and perception on COVID -19 vaccines, 55.9% of the interviewees were convinced that they were at risk of spreading the virus to other people, 30% of the respondents informed the survey that they were vulnerable of contracting a severe form of the COVID -19 vaccine 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.

In another study conducted in February 2021 among 15 African countries on COVID -19 perceptions by the African CDC, 60% of those who would reject the vaccine believed that it would not be safe compared to 16% who would accept the vaccine (Africa CDC, 2021). Demographically, those who tend to be skeptical towards the vaccine tended to be young people, those in employment or those living in cities. Women showed a higher level of vaccine confidence in general but reported being skeptical when it comes to COVID -19 vaccine. Similarly, in a large-scale study conducted between March 2020 to March 2021 by the humanitarian action that indicated 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. Respondents who don't know anyone who has tested for COVID -19 (only 4:5), this brings up the issue of the availability of the test kits (respondents in Tunisia, South Africa, Kenya and Sudan were more likely to report someone who tested positive for the disease) those who think that COVID -19 disease is exaggerated this was more prevalent in younger people (44 years and younger), and those who believed in the conspiracy theory were also more skeptical (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 as exaggerated 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. 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.

Multiple rumors, conspiracy theories, misinformation, inadequate community involvement, and social norms influence vaccine acceptance. There were some concerns that community organizations and other stakeholders were not actively involved and this made a big contribution to become one of the causes of popular mistrust of health authorities.

Theoretical and Conceptual Framework

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 behaviors of health determined by believes in some personal warning 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. With the rationale being, to maintain relations between the behavior and the constituents of the framework have a significance in the factors surrounding cross-sectional designs, it is important to presume that individuals' views of the constituents should not have been switched as at the time the behavior was assumed. Further to this, he advised that since the time one engages in a behavior, then his or her is convinced to change to become compatible 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) suggested that cross-sectional connections would be weaker. They further explained that once individuals begin to take part in 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 hurdles, advantages and vulnerability are good prognosticators of behavior however severity was not. The analysis was not a systematic review, but a sum of how often a unit was prognostic of a behavior, contrarily to

approximating mean effect sizes. Zimmerman and Vernberg (1994) described HBM as a forecast for behavior, but only unsubstantial. Harrison *et al* (1992) took up a systematic review and deduced that backdated researches bore a remarkably great impact sizes than prospective studies. Furthermore, factors associated to the last-mentioned review. Therefore, conclusions must be noted with a lot of care. To be precise, the methodology for inclusion in the analysis was very accurate and thus the effect sizes were based on the data that was collected from only 3515 respondents.

Recently, a meta-analysis of the efficacy of the HBM constituents to longitudinally forecast behavior had been done. Carpenter (2010) noted, in a review of 18 researches that benefits and barriers were recurrently the key predictors. The outcome sizes were slight for susceptibility and severity. Findings such as this will 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 cognition model (Coulson *et al.*, 2016) It was initially advised to react to the lack of a free tuberculosis (TB) health screening program me. LaMorte (2019), in his model he targeted the 6 main components, that comprised of attitudes towards a perceived threat of an infection. The main components were as follows:

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

Perceived severity – It is related someone’s feelings on the magnitude of acquiring an illness or disease (or leaving the illness or disease untreated). There was great difference in a person's feelings on the seriousness of a disease, and most often people considered the prognosis like death, disability 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 cure illness or disease). The pathway an individual considers in disease prevention (or curing) illness is determined by their reflection and analysis of the perceived vulnerability and perceived benefit, in that an individual was to agree to the recommended health action if it was perceived as beneficial.

Perceived barriers – It is one’s feeling towards barriers to conducting a suggested action of health concern. There great discrepancy in a person's feelings for hinderances, or impediments, that lead to 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 adjudication process to the acceptance of an approved 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 -Refers to the level of a one’s belief in their capability to correctly perform 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 and hesitancy. 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, conviction, or other stimulants that can utter to an individual’s acceptance to a health behavior.

The model does not consider the individuals 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 susceptibility, benefits, and barriers are often related with the coveted health behavior; perceived severity is hardly associated with the coveted health behavior. The persons establishments come in handy, depending on the health outcome that pleases an

individual, for the efficient utilization of the model it should be blended with other models which look after for the environmental context and suggest strategies for change.

During the swine flu outbreak of 2009, the Indiana State Department of Health (ISDH), that was supported by the federal government, launched an intense H1N1 vaccination campaign (Jones, 2015). The 30-second television and radio spots captured the Indiana Governor Mitch Daniels and state health commissioner Judy Monroe, who encouraged inspired Indiana citizens through messages like, “Don’t get the flu, and don’t spread the flu.” All in all, the numerous amounts of news media coverage on the H1N1 flu outbreak, campaign developers wanted to build on the pre-existing perceptions of one’s risk by placing campaign messages within the central components of the HBM (Jones, 2015). Using radio and television, the ISDH created a series of public service announcements, in both English and Spanish, geared at improving the awareness rates of the flu as well as inspiring people to get vaccinated through stressing on the benefits of vaccination, controlling vaccination barriers, and improving people’s perceptions of their own ability to be vaccinated. To assess the influence of the campaign, the assessing team tracked H1N1 vaccination behavior and encoded 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 reduce their chances of developing cancer. The paper described adult females’ reasons using the four constructs of the HBM that is: perceived susceptibility, severity, benefits, as well as barriers. Those who were worried and felt at risk of getting ovarian cancer were more likely to have an oophorectomy. The Women’s anxiety was frequently worsened by witnessing family members suffer or die from cancer. Women thought about several barriers and potential benefits towards undergoing the surgery but placed their decision on “gut feeling” and experiential factors, instead than statistical 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 care that related to risk reducing surgery in women who had high chances of developing of ovarian cancer.

Conceptual Framework

The Health Belief Model (HBM) was conceptualized in the study, it is a structure that was used to elucidate, foretell, and impact behaviors of person or groups in regard to their wellbeing. It permits scholars to elucidate and fore tell health promotion behaviors in connection with waves of believes by looking at the relationship between health behaviors and health services utilization. This model talks more about actions that are related associate with health matter require the presence of satisfactory stimulation e.g., an ailment, perceived threat, the belief of a deadly health issue or complication due to an illness, perceived benefits, the belief that adhering to guidance on wellness will be advantageous in decreasing the perceived threats, and that the benefits outweigh the costs. The HBM was initially considered to determine beliefs and opinions towards seasonal influenza and pandemic swine flu vaccine, in addition to the associations connecting perceptions and self-funded hepatitis B vaccination (Rajamoorthy *et al.*, 2018). However, few studies have looked at the various components of the HBM that can project acceptances of COVID-19 vaccine, even though there are studies that have evaluated the acceptance 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 government and public health officials in tackling vaccine hesitancy and plan appropriately to improve the COVID -19 Vaccine uptake.

Research Gaps

Existing literature indicates convincing but mixed associations between the individual characteristics, socio economic characteristics and vaccine acceptance that bring about the mixed associations seems unclear. More done on the general population to establish factors leading to reception of the vaccine of the Coronavirus disease of 2019 there seems to be very limited information on the factors that lead to the acceptance of vaccines among health care providers. Following the Ministry of Health brief by the Cabinet secretary for health in Kenya, on the November 21st 2021, no studies have so far been done to assess the uptake among health care providers especially in Busia County which was regarded among the worst performers with regard to COVID -19 vaccination.

There is no much evidence to support the health care providers perception on the COVID -19 vaccine as very limited studies have been conducted on the same, also following the announcement of the Omicron Variant , so far no studies have been conducted on the perception of health care providers , vaccine efficacy and also most

of the research work has been conducted in the public sector and to the general public thus limited knowledge can be found on the perception of the vaccine among the private populations .

Most of the studies have shown the general public to be knowledgeable (knowledge on the COVID -19 vaccine, knowledge on the vaccines to include the schedule, vaccine efficacy, mode of handling the vaccine etc.) about the COVID -19 vaccine. Is this the same case with the health care providers?

III. RESEARCH METHODOLOGY

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.

Study Area

The Study was carried out in Busia County-Kenya. Busia County is situated in the former Western province and within 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.

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 descriptive 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). A cross sectional descriptive study was used to investigate on factors that influence the reception of COVID-19 vaccine among medical care-givers in Busia County.

Target Population

On the target populations, Bryk and Raudenbush (1992) states that either the total population or a part of it is selected. The target population were all the 1475 health care providers who were licensed by their various professional bodies working in health facilities within Busia who consented to participate.

Table 3.1 Target Population

Category	Target population	Percentage (%)
G.O.K facilities	1350	91.5
Private facilities	22	1.5
Faith based facilities	103	7
Totals	1475	100

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

Study Population

The study population is the total number of people, events or matters that interest the researcher and so they desire to probe further (Sekaran & Bougie, 2016). The target population for this study was all the professional health care providers in Busia County. Busia has a total of 1475 health care providers distributed across the 7 sub counties

Sample and Sampling Technique

Sample Size determination

The sample size was determined using the Andrew fishers formula: with the target population being 1475 (Jung 2014)

- Calculation of the sample size adopted the formula at 95% CI:
- $n = Z^2 \frac{pq}{d^2}$
- 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 population with and since it was not known *p* was set to 0.50 which was the highest variability.

- q- The proportion of the population that does not have the characteristic (E.g., 1-p)

$$n = \frac{(1.96)^2 \times (0.5)(0.5)}{(0.05)^2}$$

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

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

$$.9604 / .0025$$

$$384.16 = 385 \quad = 385 + 10\% \text{ for any refusal} = \mathbf{423 \text{ participants}}$$

Inclusion and Exclusion Criteria

Inclusion Criteria

The study participants were licensed professional health care providers working in health facilities both public and private within Busia who consented to participate. Health care providers whether vaccinated or not were eligible to participate in the study.

Exclusion Criteria

Students and health care providers on internship were excluded from the study as they are not legally registered to practice with autonomy.

Sampling technique

A sample is an impression drawn from the population 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. The various sub counties were used as strata's as they already existed and that all were eligible for the study. Since all the health facilities were also eligible to participate, they were organized in strata's depending on the level of service provision in terms of level 2, level 3, level 4 and level 5. Simple random sampling was used to select the study participants who were the health care providers. The number of health care providers to participate in the study was proportionately allocated to the number of health care providers in the Sub County.

Facilities

Serial number	Sub-county	Number of health care providers	proportions						
1	Bunyala		13.7	58					
2	Butula		13.9	59					
3	Matayos		16.7	70					
4	Nambale		13.7	58					
5	Samia		13.2	56					
6	Teso - North		13.7	58					
7	Teso - South		15.1	64					
			100	423					

Variables

Independent Variables

Perceived severity, perceived susceptibility for the COVID -19 disease, perceived barriers and benefits of the COVID -19 vaccines, level of knowledge and sources of information and their significance.

Modifying variables

Individual attributes like socio-demographic characteristics, health background

Dependent Variables

COVID -19 vaccine acceptance

Data Collection Tools and Procedures

The study utilized the primary data to get answers to the specific objectives. The data collection was done through structured questionnaires 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).

Primary data was collected using a self-administered questionnaire was delivered via a Kobo collect .The tool was preferred for use as during the period of data collection the COVID -19 cases had risen from 1% and below in February to 12.8 % by June 22nd thus making an online tool most suitable2022 (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 enabled rapid access, to accurate and reliable data (World economic forum October 2020) Data collection process involved the researcher engaging both the County health management teams and the sub county health management teams (sub county medical officers of health and the public health nurse) during their regular CHMT meeting to sensitize them on the importance of the study and for the purposes of buying in.The researcher promised to share the results findings with the teams. The county director for health went further ahead and informed the 7 sub county management teams and facility in charges on the intended survey. Before data collection the researcher trained 7 research assistants to act as team leads. The team leads were to identify active health care providers serving within the facilities, line list contacts for the active members and form a what's app group for the purposes of communication with regards to 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 indicate any form of identification on the online tool that was only accessed by the research team. 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. Airtime reimbursement worth ksh 100 was given to facilitate connectivity.

Since the researcher had the access to the online data forms, she was able to view progress on the responses. Follow up were made through phone calls and at times face to face after every 3 days to those who had not completed the tools. This was done through the sub -county team leads. A total of 423 questionnaires filled the data collection process lasted for 3 weeks.

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.

Validity and reliability

Self-administered Structured questionnaires adopted and modified from Noushad *et al.*, (2021); Raja *et al.*, (2022). This ensured validity and reliability of the tool as it had been tested before

Data Analysis technique and presentation

It is the process of inspecting; cleaning, transforming and modeling data with an objective of focusing attention to relevant information that will inform decision making (Mugenda & Mugenda 1999) data was entered in for computer storage, analysis was done by use of the statistical software program me (SPSS) version 26 and presented by means of tables, pie charts, graphs.

Grammatical errors were to be checked by use of grammar icon in the researcher's computer and corrected on spot by the researcher herself. Data has secured by a pass word only known to the researcher to avoid tampering or altering.

Ethical Considerations

Before conducting the research, the researcher sought ethical approval from the Masinde Muliro University's ethics committee. Preceding data collection, the researcher acquired an introduction letter from Masinde Muliro University that assisted in defining the main reason of the study as well as usher in the researcher to the respondents in adherence to ethical standards. The researcher then sought for permission to collect data in from the National Commission for Science, Technology and Innovations (NACOSTI). 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 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. Participants were expected to complete an informed consent prior being involved in the study, they were guaranteed of discretion and anonymity.

IV. RESULTS

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 providers regarding the vaccine, and acceptance of vaccines among medical caregivers. Later the factors associated with vaccine acceptance were determined using logistic regression.

Response Rate and Population Characteristics

A total of 423 responded to the self-administered Kobo collect based questionnaire were reached. The response rate achieved for the study was 100%, and it was found to be sufficient to proceed to the next stage of analysis by utilization of Statistical Package for Social Sciences (SPSS) software. The minimum response rate recommended for data analysis is 80.0% (Saunders, Lewis, & Thornhill, 2009). 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 care providers 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. Respondents were well distributed across the sub-counties as depicted in Figure 4.1 and table 4.1.

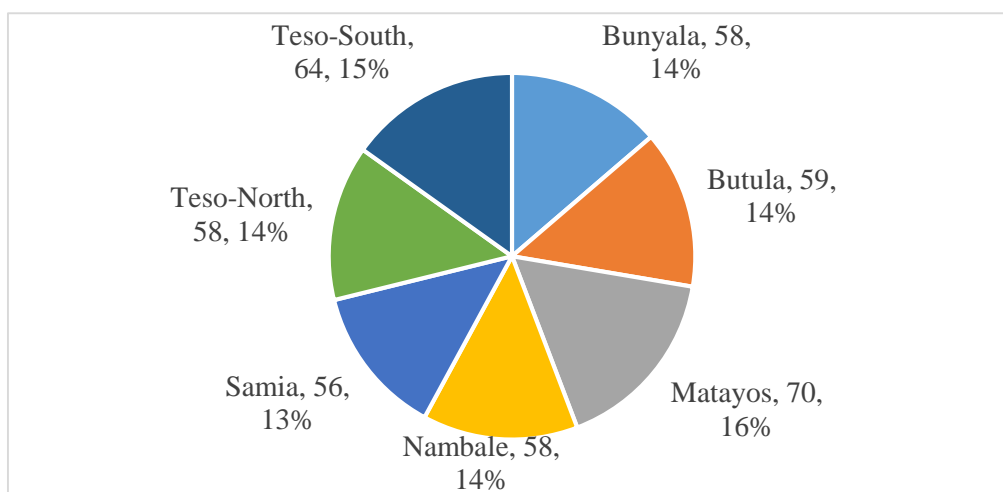


Figure 4.1: Sample size distribution per sub county

Table 4.1 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

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.

Individual characteristics

Socio- demographics of respondents

Participants characteristics are shown in Table 4.2. 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 4.2: 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.	59	13.9

From the table 4.2, Nurses were the majority (72.1%) of the respondents as they constitute more than half of the health care providers workforce in Busia County and due to their nature of training, and also the level of time they dedicate in service delivery, most of them run the private hospitals and faith-based organisations.

Health background of respondents

Table 4.3 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 4.3: 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, Goitre, 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

Knowledge on who is eligible for COVID-19 vaccination

Healthcare providers' knowledge on who is eligible for COVID-19 vaccine was assessed and results reported in Table XX. 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 4.4 : 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
COVID19 Vaccine Eligibility			
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

Attitude of respondents towards prevention of COVID-19 prevention

Figure 4.2 displays results on respondents' attitude towards COVID-19 prevention. Slightly more than two-thirds (67.6%) agreed that hand hygiene is key in COVID-19 prevention. Over three-quarters (77.5%) also agreed that social distancing and masking are vital in COVID-19 prevention.

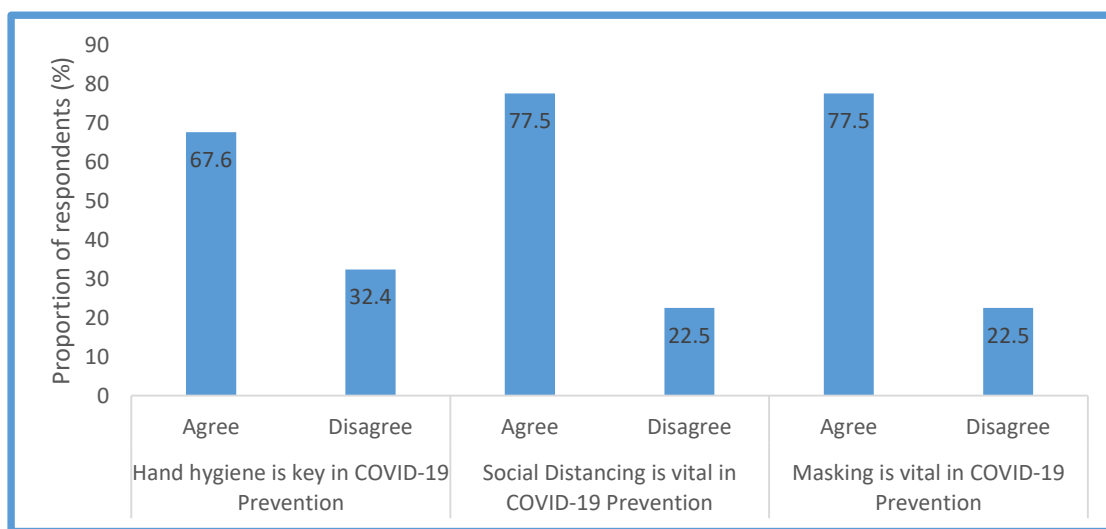


Figure 4.2: Attitude of respondents towards prevention of COVID-19 prevention

Perceived susceptibility and severity

Perceived susceptibility to COVID-19 infection

Figure XX 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.

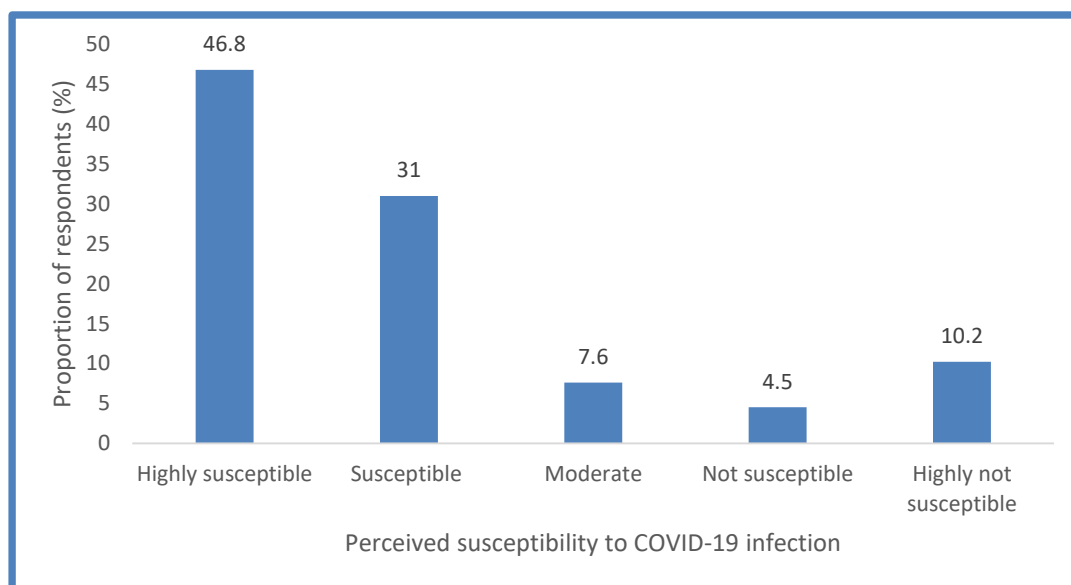


Figure XX: Perceived susceptibility to COVID-19 infection

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

Figure XX 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.

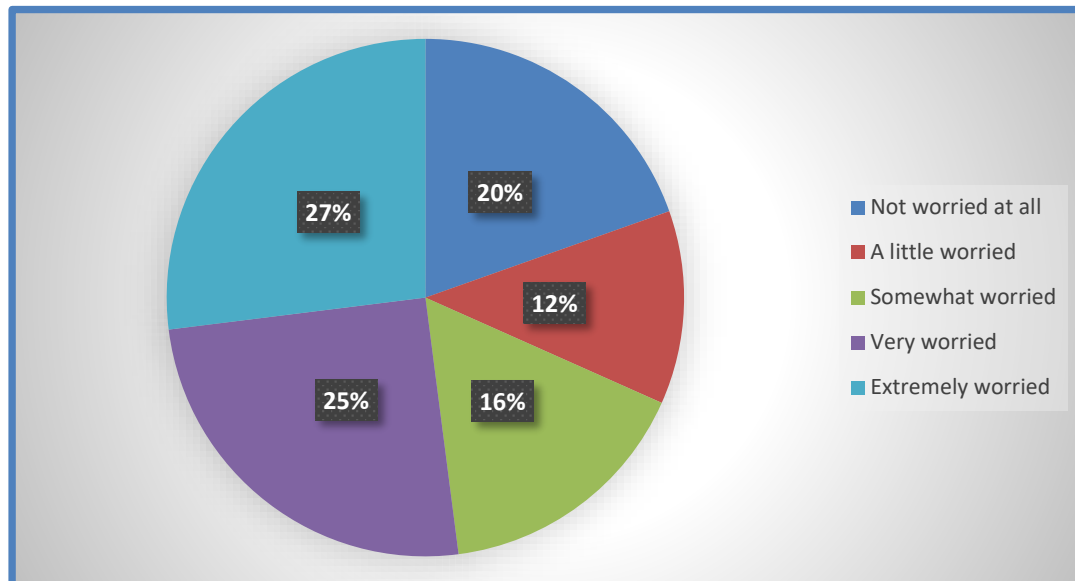


Figure XX: Rating of how much worry respondent experienced over the past 2 weeks about transmitting the COVID19 infection to the family

Cue to action: Source of information 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 4.5 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 4.5 : Cue to action: Source of information 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

Levels of COVID-19 vaccines acceptance

The reception rate for the disease’s vaccine was 94.3% of the sampled health care workers with 86.5% of those who had been vaccinated receiving more than one dose. A quarter of those vaccinated had received up to 3 doses as at the time of the interview. Laboratory technicians and health records officers sampled had the highest acceptance rates of 100% followed by nurses at 95.1% and public health officers at 92.3%. Medical doctors sampled had acceptance rate of 85.7%, registered clinical officers 87.1% and pharmacists 81.8%. This high rate of acceptance could be attributed to the great impact the virus had on health care workers in the county where 2 of their colleagues lost their lives on covid related complications. there has also been an increased awareness among the health care providers through workshops, continuous medical education and the Numerous campaigns that the county has undertook.

Table 4.6: Distribution of acceptance across sociodemographic characteristics

Characteristic	Grouping	Has ever been vaccinated against COVID19		Total
		Yes (%)	No (%)	
Overall Acceptance (N=423)		399(94.3)	24(5.7)	423
Age Grouping	20-35 Years	189(90.9)	19(9.1)	208(100)
	Above 35 Years	210(97.7)	5(2.3)	215(100)
Gender	Female	233(96.3)	9(3.7)	242(100)
	Male	166(91.7)	15(8.3)	181(100)
Employer	Government	364(94.8)	20(5.2)	384(100)
	Non-Government	35(89.7)	4(10.3)	39(100)
Marital status	Married	314(96.3)	12(3.7)	326(100)
	Not married	85(87.6)	12(12.4)	97(100)
Living arrangement	Lives alone	69(86.3)	11(13.8)	80(100)
	Lives with others	330(96.2)	13(3.8)	343(100)

Types of COVID-19 Vaccines received

Figure XX shows type of COVID-19 received by respondents. The leading type of vaccine received was AstraZeneca (n = 224; 56.1%) followed by Pfizer and AstraZenec (n = 46; 11.5%), Johnson & Johnson (n = 38; 9.5%) and Moderna (n = 35; 8.8%). Some got as many as three vaccines such as Pfizer, Covishield, AstraZeneca (1.5%) and Covishield, AstraZeneca, Moderna (0.5%).

The common vaccine that was dominant among the healthcare providers was AstraZeneca that accounted for 58.1%, followed by Pfizer (18.9%) then lastly Sinopharm (0.7%).

This is because during the vaccine deployment AstraZeneca was the only available vaccine in the country for over 6 months before the introduction of the other antigens. This also made AstraZeneca to be a common vaccine among the health care providers. Having been “tested” on other pioneer health care providers then most of the fraternity found some confidence in the vaccine unlike the other types. The types of COVID-19 vaccines received were as distributed as shown in Table 4.4.

Table 4.7 types of vaccines administered

Vaccines received by HCP	Frequency	Percent
AstraZeneca	246	58.1
Pfizer	80	18.9
Moderna	55	13.0
Johnson & Johnson	39	9.3
Sinovac	3	0.7
	423	100.0

COVID-19 vaccination status and perceptions

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

Table 4.8 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. The was the group that was operationalized as those who had an acceptance vaccination for 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 4.8: 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

Perceived barriers to getting vaccinated against COVID-19

Table 4.9 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 4.9: 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

Associations for acceptance for COVID-19 vaccines

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 4.10). 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 4.10: 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, Divorced, Widow	97	78.3	21.7			
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, Faith-based, NGO	39	76.9	23.1			
Cadre	Nurse	305	91.8	8.2	2.0	1.1 – 3.8	0.03
	Clinical Officer	118	84.7	15.3			

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

Table 4.11 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 4.11: 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			

Association between healthcare provider attitude, knowledge, benefit, susceptibility, psychological effect and acceptance of COVID-19 vaccines

Table 4.12 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 4.12: Association between healthcare provider attitude, knowledge, benefit, susceptibility, psychological effect and acceptance of COVID-19 vaccines.

Independent variable	Categories	n	COVID-19 vaccine acceptance		OR	95% CI	P value
			Yes	No			
Attitude	Positive	253	90.5	9.5	1.2	0.6 – 2.3	0.57
	Negative	170	88.8	11.2			
Perceived benefit	Yes	32	84.4	16.6	0.6	0.2 – 1.6	0.35
	No	391	90.3	9.7			
Knowledge Level	Good	176	88.6	11.4	0.8	0.4 – 1.5	0.49
	Poor	247	90.7	9.3			
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			

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

Table 4.13 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 4.13: 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
	No	92	84.8	15.2			

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 4.14: Determinants of COVID-19 vaccine acceptance among healthcare providers

Determinants	Categories	Estimate	AOR	95% CI	P value
Age group	20 – 29 vs ≥ 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

V. DISCUSSION OF THE FINDINGS

Introduction

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

Acceptance of COVID -19 Vaccine

The acceptance rate for COVID-19 vaccine was 94.3% of the sampled health care workers with 86.5% of those who had been vaccinated receiving more than one dose. 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). A 82.5 % acceptance was reported in a study done in Malawi on a similar population (Moucheraud *et al.*, 2022). In a similar study in Ethiopia 74.5% (n = 332) of the health care workers accepted a COVID-19 vaccine which is significantly lower than the previous two studies but similar to a study in the USA that showed that 76.98% of healthcare workers accepted the COVID-19 vaccine (Shekhar *et al.*, 2021; Yilma *et al.*, 2022). A study 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. The results in the Malawi study may be more precise since the study was based on health workers being offered the vaccine while the current study used a self-reported acceptance. 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 to promote it acceptability worldwide more so in Africa as has been recommended (Ackah *et al.*, 2022). The higher acceptance rate in the study could be attributed to the vaccine availability that is in constant supply and also due to the gradually increasing in knowledge and trust of the vaccine unlike at the beginning of the vaccine rollout when former studies were conducted (Noushad *et al.*, 2022). The main reasons cited for vaccine acceptance were for personal reasons such travel, and others for protection from COVID -19 infection, a finding similar to the Ugandan, Egyptian, and Polish studies (Kanyike *et al.*, 2021; Saied *et al.*, 2021; Szmyd *et al.*, 2021).

The hesitancy to consent and receive the COVID-19 vaccine among medical caregivers was found to be at 6.6%. This is comparable with those reported in studies in Nigeria (8%), Poland, and India (10.6) (Jain *et al.*,

2021; Nomhwange *et al.*, 2021; Szmyd *et al.*, 2021). The findings are lower than those reported in Egypt (47.1%) (Saied *et al.*, 2021) The main reasons for vaccine hesitancy among health care workers were concerns related to vaccine safety, and effectiveness, adverse events as shown in table 4.12. this is consistent with the bulk of literature as reported in similar studies from Egypt, (Saied *et al.*, 2021; Kanyike *et al.*, 2021). 79.2% of the vaccine hesitant group were generally against the vaccine, while 21/24 (87.5 %) of them had had the COVID -19 infection prior thus thought that there was no need for vaccination as their immune system had already been activated. 22/24 (91.7%) vaccine hesitant health care providers were concerned about the prior adverse events following immunization, thus making them have reservations for taking up the vaccine. Apart from the above, there were concerns on lack of confidence in the vaccine and this led to deferral of vaccination.

Individual Characteristics and vaccine acceptance

Laboratory technicians and health records officers sampled had the highest acceptance rates of 100% followed by nurses at 95.1% and public health officers at 92.3%. Medical doctors sampled had acceptance rate of 85.7%, registered clinical officers 87.1% and pharmacists 81.8%. This is unlike in the Malawi study where the clinical health workers (Doctors and Nurses) and USA study where direct health caregivers exhibited higher vaccine reception rate (49%) had a higher acceptance rates than that of lay workers (health records officer and community assistants) (Moucheraud *et al.*, 2022; Shekhar *et al.*, (2021). It is unfavorable since the clinical staff are considered the most informed group and whose decisions regarding health issues have a greater impact on the general population.

The likely hood to accept vaccination was lower among the younger respondents (90.9%) than for those above 35 years of age (97.7%) which is similar to that of Malawi (74.2% of those aged 20–29 years vs >85% among respondents aged >30 years) (Moucheraud *et al.*, 2022; Yilma *et al.*, 2022). The study demonstrated a 10.6% comorbidity rate among the respondents which was similar by a study done in Ghana which reported a rate of 9.4% but lower than that of 18.4% reported by a Malawian study. This is key since several studies have reported a significant influence of comorbidity on vaccine acceptance (Dzieciolowska *et al.*, 2021; Ye *et al.*, 2020).

There was a twofold likelihood for female health care workers to be vaccinated than their male counterparts. This is unlike similar studies done in Ethiopia, Ghana and China which suggested that the male increase chances of accepting the COVID -19 vaccine. These regional differences can be attributed to cultural differences which may influence decision making across the gender divide. Marital status was shown to influence acceptability of COVID Vaccine with those married being more likely to. 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.

The level of knowledge and information sources on COVID -19 vaccine among health care providers and vaccine acceptance

Level of knowledge on COVID -19 vaccine was high at 90.5 % which is favorable considering knowledge has been shown to influence decisions on taking a preventive action against a disease before (Saah *et al.*, 2021). This was slightly higher than in another study done in Ethiopia that reported knowledge levels of 62.5% (Adane *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). The least knowledgeable cadre concerning COVID -19 vaccine was the laboratory technologists (86%) and the most knowledgeable cadre being public health officers (100%) which differs from a study done in Canada that reported higher level of education among physicians (Dzieciolowska *et al.*, 2021). COVID -19 being a public health issue, it is perfectly understandable that, public health officers who are in the forefront fighting the disease in the current setting be highly knowledgeable and willing to accept the vaccine. In the current study, age, gender, employer, being a doctor marital status and living arrangements were significant determinants of level of knowledge which agrees with Shekhar *et al.*, (2021). This is in agreement to the earlier findings that demonstrated that these factors affected the level of acceptability alongside knowledge. This implies a need for these sociodemographic factors to be considered when planning for efforts to increase knowledge levels in similar populations and in turn sustain an optimum acceptability rate for the vaccine.

Martin *et al.*, (2021) 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. These resonates with the findings of the current study where 90% of the respondents cited social media as the major source's information. 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 and this had don't been elicited in the reviewed studies. Further this study has

shown the those who considered government agencies as ideal sources of information had a 3-fold positive influence on their level of knowledge reinforcing the authenticity of these information sources.

Perceptions towards COVID -19 Vaccinations and vaccine acceptance

At least 65% of the staff interviewed perceived being at risk due to exposure since they had closely and physically interacted with a COVID-19 patient. This is relatively high compared to a perceived risk by 27% of respondents in another study in Saudi Arabia (Alkhalidi *et al.*, 2021). This could be attributed to the fact that when the latter study was done the pandemic was still evolving. The high perceived risk is favorable since perceived risk has been lauded to influence acceptability of COVID vaccination as demonstrated by the current study and previous ones (Martin *et al.*, 2021; Yilma *et al.*, 2022) . Those who were rated as being knowledgeable about COVID -19 vaccine were 5 times more likely to have a positive perception than those rated as not knowledgeable. This is agreeable since knowledge of COVID -19 causation enables one to perceive risk and as result may want to take action like accepting to be vaccinated.

Perceptions on severity and susceptibility were shown to have a positive influence on vaccine acceptability unfortunately there was scanty literature to support or dispute this finding in the context of COVID -19 vaccine acceptability. This provides opportunity for more study to ascertain this finding.

The most cited barrier to vaccine acceptance by the respondents was lack of information on vaccine safety which was in tandem with a several studies in Africa systematically reviewed by Ackah *et al.*, (2022). Good number were concerned with the vaccine safety as was also reported by Ackah *et al.*, (2022) and Martin *et al.*, (2021). 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). The acceptance rate among those who had a chronic medical condition was significantly low and thus unfavorable since this particular population has been prioritized for receiving vaccination. Previous exposure to COVID -19 was shown to have a negative effect on vaccine acceptability which is different from results reported in a study in Saudi Arabia which suggested an increased acceptability of vaccination among those who had been diagnosed with COVID -19 before (Noushad *et al.*, 2022).

Perceptions on the ability of COVID -19 to prevent disease was shown to have eleven-fold influence on acceptability of the vaccine. This is similar to findings reported by Yilma *et al.*, 2022)

VI. CONCLUSIONS AND RECOMMENDATIONS

Introduction

The chapter covers conclusions, recommendations and further research studies made by the researcher.

Conclusions

The study objectives were met. The level of knowledge of health care workers on COVID -19 vaccine was high, 90.5%. The least knowledgeable cadre was the laboratory technologists. Age, gender, type of employer, marital status and living arrangement were factors that influenced knowledge. Information from government agencies and discussions among peers were significant determinants of how knowledgeable a health care worker was about COVID -19. The overall positive health care workers' perception towards COVID -19 vaccination was 69%. Factors that influenced perception towards COVID -19 were marital status, living arrangement and level of knowledge on the vaccine.

This study was able to estimate COVID -19 vaccine reception level among medical caregivers in Busia County, and further elucidate some of the factors that contributed to it. 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 reduce rates of positivity reported in Kenya in recent times.

The rate of acceptance was higher among lay health workers like health records officers than among clinical health workers like nurses and doctors. 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. Being married increased chances of accepting the vaccine in this population. 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.

Knowledge on COVID -19 and its vaccines was high at 90.5%. The public health officers were well informed while laboratory technicians were the least informed. Age, gender, employer, being a doctor, marital status and living arrangements were significant determinants of level of knowledge. Knowledge was key influencer of vaccine acceptability since those found knowledgeable had a 16-fold likelihood to accept the vaccine.

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 69% of the health providers had a positive attitude towards vaccination against COVID -19. The health workers who were married and were living with their loved ones had a higher regard for vaccination. 65% of the health providers perceived themselves to be at risk of acquiring the disease. Perceptions on risk was influenced by level of knowledge and had a 5-fold influence on acceptability. Interestingly those who reported having been diagnosed with COVID -19 before had a lower acceptance rate. 97.6% of the health providers perceived the vaccine as being beneficial in protecting them from COVID -19 infection. These perceived benefits were shown to have a more than 11fold increase in acceptability of the vaccine. 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.

Recommendations

Recommendations for Policy and Practice

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

To policy

- Sustain the current efforts in encouraging vaccination uptake and intensify them among the youthful health providers and more so in Men
- Plan for increased medical education among cadres like laboratory technicians and during deployment of vaccines it is important for the 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.
- Sustain Social marketing of the covid vaccine to increase positive attitude.

Recommendation for Research

- More studies done 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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