

**WILLINGNESS AND PERCEPTION OF CAREGIVERS ON  
COVID-19 VACCINATION OF THEIR CHILDREN UNDER 12  
YEARS IN TERTIARY HOSPITALS IN KENYA**

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## **DECLARATION**

I declare that this dissertation is my work and has not been published or presented for a degree in any other institution.

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## **LIST OF ABBREVIATIONS**

COVID-19 - Corona virus disease 2019

KNH – Kenyatta National Hospital

LMICs – Low- and Middle-Income Countries

WHO – World Health Organization

## **DEFINITION OF TERMS**

**Hesitancy:** Delay in acceptance, or refusal of vaccines despite the availability of vaccine services.

**Willingness:** The state of being prepared to administer covid-19 vaccine to their children.

**Perception:** The way in which parents/caregivers regard and understand about Covid-19 vaccine



## **ABSTRACT**

**Background:** The Coronavirus infection (COVID-19) has resulted into high morbidity and mortality disease globally. The emergence of Covid-19 vaccination has come as a relief in alleviating adverse complications of the disease. Vaccination for children has also been prioritized with an intention to control disease transmission and spread. However, the willingness of parents/guardians in vaccinating their children has been met with varied perception with some being hesitant while others have high level of willingness.

**Objectives:** To determine caregivers' perception on Covid-19 vaccine and willingness to vaccinate their children less than 12 years in tertiary hospitals in Nairobi.

**Methodology:** The study adopted a mixed method study design utilizing both quantitative and qualitative techniques. For quantitative data, consecutive sampling technique was used to enroll 379 parents/caregivers of children less than 12 years. The parent's attitude about childhood vaccine (PACV) tool was used to assess willingness. For qualitative data, two focus group discussions consisting of individuals selected purposively were conducted in both Gertrude children hospital and Kenyatta National hospital.

**Results:** Majority of the respondents, 76% (n =288) were female, 56.2% (n =213) were aged between 31 to 40 years. Most of the respondents, 90.2% (342) were married. Regarding education level, 45.1% (n =171) had secondary level education. In addition, 68.3% (n =259) of the respondents had received Covid-19 vaccination. The willingness of covid-19 vaccine uptake for their children was low at 43.3% (95%CI: 55% to 65.1%). A bivariate and subsequent multivariate analysis found that caregivers with higher level of education (secondary level (AOR =2.29, 95%CI:1.17 – 4.48, p=0.015 and tertiary level (AOR =2.38, 95%CI:1.37 – 4.13, p =0.002), those who were vaccinated against Covid-19 (AOR=4.0, 95%CI:2.25 -7.02, p<0.001) , those who had older children (aged 3 -5 years (AOR=4.15, 95%CI:1.92 – 8.95, p<0.001), 6 -8 years(AOR =3.41, 95%CI:1.61 – 7.24, p<0.001) and presence of underlying conditions (AOR=5.16, 95%CI:3.14 - 8.47)) were associated with increased willingness to vaccinate. Common challenges to willingness included lack of knowledge on vaccination, being skeptical of the vaccine, potential side effects and hidden agenda by the government.

**Conclusion and recommendations:** The willingness to vaccinate children as reported by parents/caregivers in this population was low. Level of education, caregiver vaccination status, age of children and underlying conditions were significantly associated with increased willingness to vaccinate against Covid-19 vaccine. Thus, there is need to conduct effective vaccine campaigns to focus on risk perception and importance of the vaccine.

## **CHAPTER ONE: INTRODUCTION**

### **1.1. Background**

The Coronavirus infection (Covid-19) caused by the novel severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) is still spreading throughout the world. As of January 2022, there were more than 340 million positive cases and 5.5 million deaths globally (1). Children and adolescents under 20 years account for 17 percent of reported cases and 33 percent of the population. Children less than 12 years are not the most affected population but recently an increasing number of the pediatric group have tested positive for Covid-19 (2).

Recent clinical trials have confirmed safety and immunogenicity results in children between 5 to 11 years old. On October 29th 2021, Food and Drug Administration (FDA) approved the Pfizer-BioNTech Covid-19 Vaccine use in children between 5-11 years (3). This follows an earlier approval to vaccinate children aged 12 to 15 years in May 2021. Countries including U.S, Canada and UAE have started vaccinating children above 5 years. However, the level of hesitancy among parents and caregivers has not been fully documented in most countries (4).

The Covid-19 vaccine uptake is dependent on different factors including adequate production, availability, distribution channels as well as general acceptance. Acceptance or willingness to be vaccinated is paramount to an efficient vaccination program. In low- and middle-income countries, the willingness to take Covid-19 vaccination among adults was 64.6% compared to 80.3% in United States. The high Covid-19 vaccine acceptance was mainly due to the need for personal protection (5). However, the acceptance level varies across different countries. The varied factors that are associated with changes in the acceptance level of Covid-19 vaccine include demographic characteristics such as gender, marital status and level of education. Others include attitude towards Covid-19 vaccination, perception of the risk and the sensitivity to Covid-19 vaccine and knowledge about the vaccination (6).

Vaccination against Covid-19 is essential to develop herd immunity and protect an individual from the spread of the disease (7). Since the approval of Covid-9 vaccines in December 2020, only 51% of world population is fully vaccinated. As of January 2022, approximately 10% of the African population had been vaccinated (8). Approximately 17% of the Kenyan population had been vaccinated as of January 24<sup>th</sup> 2022 (9). The population in Kenya is comprised of around 43% (23 million) aged less than 15 years, this means that Covid-19 vaccines for children is needed for both direct and community protection. This vaccine has been met with a lot of hesitancy in adults and if factors associated with the hesitancy are not addressed, we expect worse uptake in children.

Children are at risk for SARS-COV2 infection and severe disease manifestation They also play an important role in disease transmission including the highly infectious delta variant(6). Children under 12 years are susceptible to long term effects of Covid-19 infection including long Covid-19 syndrome, social isolation, interruption of education and lack of outdoor activities (10)(11).

Vaccinating children is important in protecting them from Covid-19 infection, reducing risk of transmission, increasing population immunity levels and resumption of normal activities (12). Previous studies have shown that children are major carriers and transmitters of most of the respiratory diseases which prompts the need to ensure they are vaccinated (13). The high assertion that children are likely to be key spreaders of the Covid-19 has increased general commitment to improve vaccination among children. This is based on underlying consideration that based on literature, children have been viewed as major spreaders of respiratory viral infections. Adults infected with Covid-19 virus are infectious for up to 48 hours before the symptomatic phase. However, children are more often asymptomatic hence difficult to manage without vaccination (14).

In Kenya vaccination of children above 12 years has commenced and as of January 2023 10% of the population between 12 to 18 years had received Covid-19 vaccination. Target was more than 50% of the teenage population by end of Dec 2022 (15). This is way below the target and shows that Covid-19 vaccination acceptance is very low even in teenagers.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1. Burden of disease in children**

The proportion of severe Covid-19 infection has been generally higher in older adults compared to children and adolescents. Older children and younger adolescents aged between five and 14 years contribute to around 7% of the global covid-19 cases and subsequent 0.1% of global deaths while individuals aged between 15- and 24-years account for 15% of the global cases and 0.4 percent of global deaths (12).

Children and teenagers are less prone to incur severe problems from Covid-19 infection and are generally asymptomatic or only exhibit moderate symptoms. It is also critical to keep in mind that children under the age of five are more prone to experience other illnesses, such as pneumonia and other viral upper respiratory tract infections, that share clinical signs with Covid-19 and could result in incorrect classification. Additionally, the research has not consistently given age disaggregation, and the results of these studies are context-specific and reliant on elements like the time of the pandemic and a concentration on hospitalized patients (16). It has also been noted that children and adolescents can experience prolonged symptoms post covid-19 condition or post-acute sequelae of the covid-19 infection although the frequency of this occurrence has not been effectively identified (12).

The applicability of the following observations to low-resource settings is unknown because research in high-resource settings offer the majority of the evidence on the risk of severe Covid-19 and death in children and adolescents. One thorough review suggests that low to middle-income countries may be more affected by pediatric Covid-19-related mortality than high-income ones (16).

## **2.2.Vaccine hesitancy**

Vaccine hesitancy refers to the reluctance or refusal of individuals or communities to accept vaccines or adhere to vaccination programs. It is a complex issue influenced by a variety of factors, including social, cultural, political, and individual beliefs (4). Vaccine hesitancy has become a global challenge in recent years, posing a significant threat to public health efforts to control and eradicate infectious diseases. It refers to the reluctance or refusal of individuals or communities to accept vaccines or adhere to vaccination programs. Vaccine hesitancy is a complex issue influenced by a myriad of factors, including social, cultural, political, and individual beliefs (17).

Shen et al, in 2019 while addressing vaccine hesitancy maintained that, practical tips that can be used in addressing vaccine hesitancy include starting vaccine drive early, building trust, being honest about side effects, provision of reassurances about vaccine robust system and focus on protection of children and community (18) Controlling hesitancy is instrumental to increased vaccination although this should be based on provision of accurate information about vaccine safety and possible side effects. The findings from a systematic review established that willingness to vaccinate children was low (19). Additionally, it was found that the likelihood of high vaccine rate of vaccine. Vaccine hesitancy is a complex issue influenced by multiple factors, including safety concerns, lack of trust, misinformation, cultural beliefs, and limited awareness. Addressing vaccine hesitancy requires a multifaceted approach that involves education, building trust, empowering healthcare providers, engaging communities, and implementing effective policies (20).

A cross sectional study conducted in China by Xu et al, in 2021 revealed that given the various reasons for parental vaccine hesitancy, there is need to integrate new approaches in helping overcome the gap in knowledge and commitment to improve child health in relation to Covid-19 vaccination (20). Vaccine hesitancy in low-income countries is even higher. The situation

in Africa is dire considering the previous issues relating to vaccine uptake such as the polio boycott that occurred between 2003 to 2004 which was orchestrated by dishonest campaign approaches and misconception. Other boycotts include the polio incidence in Nigeria between 2002 - 2006 (21).

Covid-19 vaccine coverage is low in Africa. The World Health Organization, the European Commission, and France introduced COVAX as a component of the Access to Covid-19 Tools (ACT) as a global response strategy to the Covid-19 epidemic. Only slightly more than 10% of Africans have received the entire COVAX vaccination even after its establishment (22). Mutombo et al pointed out that the gradual effort to distribute Covid-19 vaccines to LMICs is limited by vaccine hesitancy. Africa in particular has had low vaccine uptake with key concerns being safety and side effects. Lack of trust and conflicting reports about Covid-19 vaccine especially on social media have resulted to the existing hesitancy (22). Such hesitancy is likely to reflect during roll out of vaccination among children since these individuals are the same tasked with ensuring that their children are vaccinated.

A Cross sectional Study done in four counties in Kenya by Orangi et al on Covid-19 vaccine confidence among adults revealed that VH was high: 60.1% (23). Rural residence, vaccine safety concerns, religious and cultural factors as well as perceived difficulty in adherence to government regulations were associated with increased vaccine hesitancy. COVID-19 has posed significant health and socio-economic challenges worldwide, and the development and distribution of vaccines have become crucial tools in combating the pandemic. However, ensuring vaccine confidence among populations is essential for successful vaccination campaigns

### **2.3.Covid-19 vaccination among children**

World Health Organization (WHO) maintains that although majority of the Covid-19 vaccines are only approved for use among adults, there have been an increasing number of vaccines developed and authorized for use in children. Different approaches have been considered in focus to control the spread of covid-19 among children. One of the approaches that some countries have adopted is authorization of mRNA vaccines for use among adolescents between 12 and 17 years. Other vaccinations that have been authorized include BNT162b2 manufactured by Pfizer and the mRNA 1273 developed by Moderna. In November 2021, there was increased uptake of the mRNA vaccine BNT162b2 in Europe for the use in children aged 5-11 years following approval by the European Union (24).

Trials for two inactivated Sinovac-Corona Vac and BBIBP-CorV have been completed in children aged three years and they have been approved by Chinese authorities for use in children aged between 3-17 years. However, these vaccinations have not acquired the World Health Organization Emergency Use Listing Procedure (WHO UEL). A Bharat-developed adjuvant inactivated vaccine called Covaxin was given an Indian license for the 12–17 age range, although it has not yet received a WHO EUL for this age range (25). ZycovD, a novel DNA vaccine for kids 12 to 17 years old, has received regulatory approval in India but has not yet received WHO EUL. A number of Covid-19 immunizations are presently being examined in infants (as young as 6 months), but the results have not yet been made public.

Covid-19 vaccination data from adolescents show that the vaccines have been relatively safe so far (26). However, some of the issues that have risen in recent past have been safety concerns and side effects after vaccination. Common side effects that have been noted include pain at the site of injection and flu like symptoms. There have been cases of myocarditis and pericarditis although these cases have been rare. However, early vaccination in individuals over the age of 16 years in Israel have showed relative safety and efficacy (27).



#### **2.4. Willingness of parents to vaccinate their children**

The willingness of parents is associated with diverse factors. A nationwide cohort study conducted in United States by Rane et al. revealed that 48% of children aged between 12 and 15 years and 58% of children aged between 6 and 17 years reportedly had received one dose of the Covid-19 vaccine (28). Another systematic review and meta-analysis study conducted by Galanis et al in 2021 which included 17 studies identified that the proportion of parents who intended to vaccinate their children against Covid-19 was 56.8%. the willingness of parents ranged between 29% to 72.7% (29). The findings obtained in this case imply that knowledge of parental Covid-19 vaccination hesitancy aid policy makers in controlling stereotypes about the vaccine and increase the willingness.

In another online survey that was conducted among adults living in Kuwait, it was identified that, 44.2% of the parents asserted that they were willing to vaccinate their children against covid-19 disease. The findings have also showed that, the willingness is much lower compared to estimated 70% (30). The willingness was associated with child vaccination against influenza.

Goldman et al conducted a cohort study in pediatric departments across 17 centers across America and Europe showed that 54.2% of the parents were willing to vaccinate their children against the virus (20). The findings from the study have showed that changes in risk perception as a result of Covid-19 and past vaccination may influence caregivers' decisions about influenza vaccination in the subsequent season. This information can be used by public health programs to promote influenza vaccination among children. Another cross sectional study conducted in China by Wan et al. in 2021 revealed that 86.8% were willing to vaccinate their children with the Covid-19 vaccine (31).

In a survey study conducted involving data from Latin and Caribbean (LAC) by Urrunaga-Pastor et al. in 2021, secondary analysis was performed using data obtained from University of Maryland and Facebook. The findings revealed that the proportion of parents non-intention to vaccinate their children and adolescents against Covid-19 was 7.8% (32). Vaccination against Covid-19 was planned by nearly nine out of 10 parents in LAC. The findings as established present a better understanding of parents' intentions to vaccinate their children and adolescents, as well as advocate and build national immunization regimens against Covid-19.

A national survey by Szilagyi et al. in 2021 conducted in United States investigating the willingness to vaccinate children by parents revealed that, likelihood of child Covid-19 vaccination was 28 percent while 33 percent were very unlikely to vaccinate their children. The findings also revealed that 12 percent of the respondents were unsure on whether they would vaccinate their children (32). In another national cross sectional study conducted in Canada, 63% of parents were willing to vaccinate their children (33). In developed countries, where access to healthcare and vaccination services is readily available, the willingness to vaccinate children against various diseases is generally high. However, vaccine hesitancy and reluctance still exist, posing challenges to achieving optimal vaccination coverage. Trust in healthcare providers and government authorities is crucial for vaccine acceptance. Parents rely on the advice and expertise of healthcare professionals, and they look to public health agencies for accurate information and guidance. Transparent communication and maintaining trust are essential in promoting vaccination.

A mixed methods study conducted in Kenya by Osur et al. investigating Covid-19 vaccine behavior intentions. Only 42% of the youths who participated in the study were ready to be vaccinated, 52% were not ready to be vaccinated and were waiting to see what happened to those who had got the vaccine, and 6% were completely unwilling to be vaccinated, according to the findings. Lack of intention to be vaccinated was influenced by unclear understanding

about Covid-19 vaccine, conflicting information given, religious beliefs against vaccination, parent level of education and perceived risk of contracting the disease (34).

## **2.5.Factors associated with willingness**

The development and distribution of COVID-19 vaccines have played a critical role in controlling the spread of the virus and reducing its impact on public health. While much attention has been focused on vaccinating adults, the vaccination of children is also crucial for achieving population-level immunity and protecting vulnerable populations (23). However, willingness to vaccinate children against COVID-19 varies among parents and caregivers. Safety and efficacy are primary concerns for parents and caregivers when considering COVID-19 vaccination for their children. They want assurance that the vaccines are thoroughly tested, have minimal side effects, and effectively protect against the virus (12). Clear and transparent communication about vaccine safety data, clinical trials involving children, and long-term follow-up can help alleviate concerns and increase willingness to vaccinate.

According to The CHASING COVID study, a nationwide cohort study conducted in the United states by Rane et al. in 2021, found that parents who had been vaccinated were more likely to be willing to vaccinate their children (64.9 percent vs 8.3 percent for children aged 2-4 years; 77.6 percent vs 12.1 percent for children aged 5-11 years; 81.3 percent vs 13.9 percent for those aged 12-15 years; and 86.4 percent vs 12.7 percent for those aged 16-17 years; 10% of vaccine-willing/vaccinated parents would not vaccinate their children right away. Concern for vaccine long-term effect on children was the most overarching concern (34).

In a cross-sectional survey study conducted in China, Wan et al. found that parents who were female, acknowledged that their kids fell into the high-risk category, frequently followed up with information about the Covid-19 vaccine, believed in the vaccine's safety, or thought the Covid-19 vaccine could prevent Covid-19, were more likely to vaccinate their children (31).

These findings show that to ease parent's hesitation about vaccines, the concerned authorities should provide clear information about accuracy and validity of the vaccines.

Another survey study conducted involving data from Latin and Caribbean by Urrunaga-Pastor et al. in 2021 demonstrated that age and education levels above college were related to a lower prevalence of failure to vaccinate children and adolescents against Covid-19. Adherence to Covid-19 standards, having had a Covid-19 vaccination, anxiety, and the presence of comorbidities. The study also found that residence was significantly associated with non-intention to vaccinate their children (32).

Szilagyi et al. (2021) indicated that Democrats, parents with a bachelor's degree or higher education, parents who had already gotten or were likely to receive the Covid-19 vaccine, and parents of older children were more likely to vaccinate their children. There were also disparities by race and ethnicity. Parents' worries centered on the dangers and side effects of vaccines (35). The study was conducted in United States which is advanced setting with better healthcare structure and greater knowledge on the importance of health practices such as vaccination. Though, less than half of US participants say they are likely to give their child the Covid-19 vaccine, according to the research. Children's health care providers play a critical role in promoting and administering Covid-19 immunization.

Humble et al in 2021 in a national cross-sectional study conducted in Canada showed that parents with part-time jobs were less likely to want to vaccinate their kids. Children who did not receive the influenza vaccine prior to the pandemic, parents who did not intend to get the Covid-19 vaccine themselves, parents who thought the Covid-19 vaccine was harmful or unnecessary, and parents who opposed the use of the Covid-19 vaccine on children without first conducting tests were all associated with low vaccination intentions (33).

## **2.6.Perception of child vaccination**

Parent's perception on child vaccination is based on vaccine safety and side effects. In a cross-sectional study conducted in Saudi population by Altulaihi et al. in 2021 showed that 46.7% of the caregivers agreed with the statement that the vaccine is effective in protecting children and taking up vaccination for children would be fundamental in controlling Covid-19 in the country. The study further affirmed that when evaluating negative attitudes, 20% believed that the vaccine would cause side effects while 42.3 percent believe that their child is afraid of vaccination, and 11.1 percent believe that a lack of time is the main reason for not vaccinating their child with Covid-19. The overall mean score for anti-Covid-19 immunization views (36).

In a cross sectional study conducted in India investigating the perception of parents on covid-19 vaccination of their children, the findings revealed that most of the parents who were not willing was mainly attributed to concerns with the safety of the vaccine and identified side effects (37). Another national cross-sectional study conducted in Poland investigating perception with regard to vaccination of children against Covid-19, the findings revealed that mothers made up the vast majority of those who responded, and they had considerably higher positive sentiments toward immunizations than fathers. Four out of every five parents want their children to be vaccinated as soon as possible, while one out of every four parents do not want their child to be vaccinated at all. The main worries about the vaccines are that the preparation has not been well studied and is inefficient, as well as a lack of knowledge about potential future problems. The media, particularly the Internet and television, are the primary sources of information on children immunizations. Vaccinating children against Covid-19 causes many emotions and uncertainties in parents, and it is also a topic of controversy among specialists (6).

An online survey conducted by Mohamed et al. in 2021 investigating perception of covid-19 vaccination revealed that approximately 55.9% of respondents thought they could spread the

virus to others, and 30% thought they were at risk of getting a severe Covid-19 infection. Around 75% of those polled disagreed that the Covid-19 vaccine may cause illness. More than half were concerned about the vaccination's side effects, and about a third believed that frightening material regarding the Covid-19 vaccine was widely disseminated on social media (38). The perception of vaccine safety and efficacy is a significant factor influencing vaccination willingness. Parents and caregivers often seek assurance that vaccines are thoroughly tested, approved by regulatory authorities, and have minimal side effects. Confidence in the vaccine's ability to protect against diseases plays a vital role in decision-making.

A longitudinal observational cohort study conducted in Ontario, Canada by Syan et al in 2021 investigating perception on Covid-19 vaccine revealed that Age, sex, and education all played a role in how safe the Covid-19 vaccination was considered, with women, older adults, and those with less than a bachelor's degree having considerably lower perceived safety than those who received other vaccines (39). Another cross-sectional study conducted in India by Kishore et al. in a study conducted in 2020 investigating perception on covid-19 vaccine revealed that 29.55 percent were hesitant to get vaccinated against Covid-19. The study further revealed that 49.4 percent asserted that they can be protected by taking the Covid-19 vaccine while 61 percent were willing to vaccinate their children (40).

## **2.7. Conceptual framework**

### **2.7.1. Conceptual framework narration**

The study seeks to investigate the willingness and perception of parents regarding the vaccination of their children against Covid-19. Thus, in this study the independent variables that are investigated include parental demographic characteristics, clinical characteristics and child characteristics. Parental characteristics include gender, religion, residence, education level, employment status and average monthly income. Child characteristics will include gender, age, birth order and any underlying condition/comorbidities. Clinical characteristics of the caregiver will form moderating variables in this study. They include parent vaccination status, presence of underlying condition, knowledge of Covid-19 vaccines and presence of family member who succumbed from Covid-19 related complications. The outcome/dependent variable will be willingness to vaccinate their children.

### 2.7.2. Conceptual Framework Figure

Independent variables

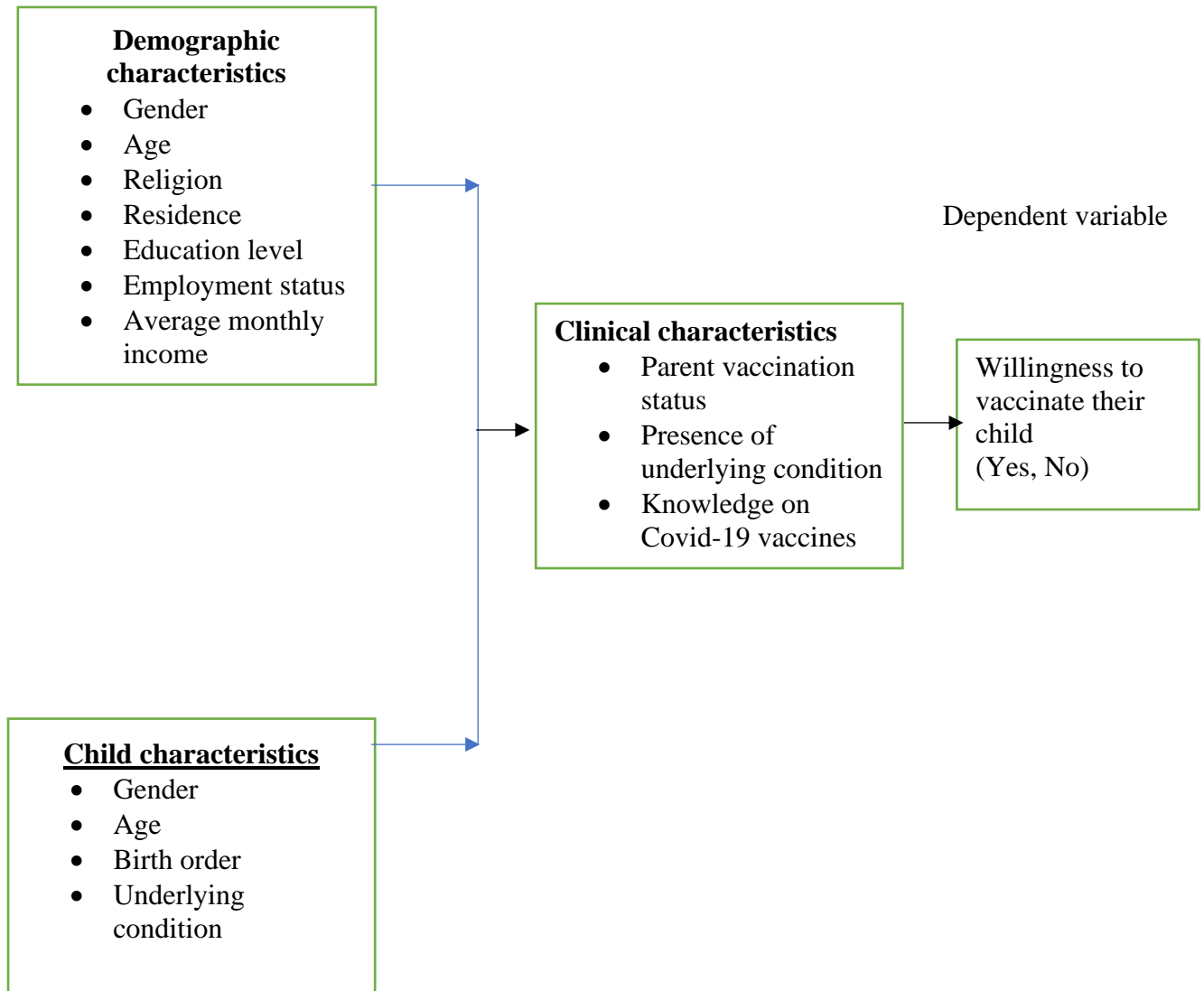


Figure 1: Conceptual Framework

Source (Author, 2021).



## **2.8.Statement of the problem**

Parents play a significant role in deciding whether or not their children will receive the COVID-19 vaccine. Given the human, societal, and economic costs of the Coronavirus Disease 2019 (COVID-19) pandemic, vaccine use remains a vital method for mitigating its effects (41). Vaccinating children against covid-19 vaccination is subject to willingness of caregiver or parent. The willingness of caregiver to vaccinate their children has been influenced by factors such as fear of adverse outcomes, safety of the vaccine as well as vaccination status of the caregiver. Within the local context, there have been challenges in the implementation of covid-19 vaccination among children with a recent High court ruling suspending the government plans to roll out covid-19 vaccination in schools. The willingness of parents or caregivers in vaccination of their children has not been fully explored in Kenya which presents the gap that this study aims to address while also understanding the perception of caregivers on covid-19 vaccination.

## **2.9.Justification**

Hesitancy and unwillingness to be vaccinated have remained major barriers to efforts to control the spread of the Covid-19 virus. Africa has the lowest vaccine status at approximately 10%. This has been mainly as a result of availability as well as limited information about the vaccine, trust in health agencies, safety concerns of the covid-19 vaccines and religious beliefs.

Vaccination of children is largely dependent on the willingness of their caregiver to vaccinate them. However, in improving the status quo regarding vaccination, African countries have joined COVAX facility which aims at equitable access to safe and effective Covid-19 vaccine globally. Aim was to vaccinate at least 20% of the Africa population by end of 2021. This was not achieved (42). In Kenya the overall goal of achieving herd immunity is vaccinating at least 30 million Kenyans before the end of 2022. In order to achieve herd immunity we need to

vaccinate the children who are vulnerable because their immune system is still developing, making them more susceptible to infections, and also there is concern that they could be major carriers of SARS-CoV2, the virus that causes COVID-19(14) .

Currently, Kenya pharmacy and poisons board has reviewed and given emergency use authorization for administration of Pfizer vaccines for all persons 15 years of age and above. There is limited research on willingness of Covid-19 vaccination among parents as well as factors associated with hesitancy.

## **2.10. Research question**

What is the willingness of caregivers to vaccinate their children and their perception on Covid-19 vaccine in children under 12 years in tertiary hospitals in Kenya?

## **2.11. Objectives of the study**

### **2.11.1. Primary objective**

To determine caregivers' willingness to vaccinate children under 12 years in tertiary hospitals in Kenya.

### **2.11.2. Secondary objectives**

- 1) To investigate factors associated with parent/caregiver willingness to vaccinate their children under 12 years in tertiary hospitals in Kenya.
- 2) To assess the perception of parents/caregivers on covid-19 vaccination in children under 12 years in tertiary hospitals in Kenya.

## **CHAPTER THREE: METHODOLOGY**

### **3.1. Research design**

This was a mixed method study utilizing both quantitative and qualitative techniques. The study investigated the willingness, associated factors and perception among parents regarding vaccination of their children against Covid-19 vaccine.

### **3.2. Study setting**

The study was conducted in pediatric department outpatient clinic at Kenyatta National Hospital and Gertrude Children's Hospital. Kenyatta National hospital has a bed capacity of approximately 2,000 with a staff number of around 6,000. The hospital being a public serves a large group of patients with most of them referral patients with low to moderate socio-economic status. The hospital has many paediatric clinics which will form the data collection points.

Gertrude's Children's Hospital is a Level 5 Healthcare Facility, a Tertiary Referral and Teaching Children's Hospital that is licensed and recognized. It is the longest serving child specialized Private hospital in Kenya. The hospital attends to approximately 300,000 outpatient children annually across its 15 settings. The hospital employs 90 doctors and 250 nurses directly and collaborates with more than 200 independent specialty consultants to provide high-quality healthcare services, with a total headcount of 750. Population that seeks services in this facility are mostly people from higher social economic status and from the urban region.

### **3.3. Study population**

The study included parents of children aged 12 years and below attending pediatric outpatient clinic. The focus on children aged 12 years and below is because in developed countries such as U.S, Canada and UAE had started vaccinating children above 5 years

### **3.4. Inclusion and Exclusion Criteria**

#### **3.4.1. Inclusion criteria**

Parents/caregivers of children aged under 12 years attending any of the paediatric clinic at Kenyatta National hospital and Gertrude's children hospital.

Parents/caregivers who consent to participate in the study.

#### **3.4.2. Exclusion criteria**

Parents /caregivers who decline consent.

### **3.5. Case definition**

Caregivers included individuals accompanying a child aged 12 years and below to paediatric outpatient clinic for care.

Willingness entailed the state of being prepared and ready to administer Covid-19 vaccine to their children.

Hesitancy was defined as unwillingness or delay in acceptance to vaccinate children against Covid-19.

### **3.6. Sample size and sampling**

#### **3.6.1. Sample size for quantitative data**

Sample size was calculated using Fisher's formula (46). The proportion used in this study was based on a study conducted in Kuwait which found that, 44.2% of the parents asserted that they were willing to vaccinate their children against covid-19 disease (30).

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

Where,

n = Desired sample size

Z = value from standard normal distribution at 95%

P = expected true proportion (estimated at 44.2% because no previous studies done in similar setting))

d = desired precision (0.05)

$$n_0 = ( (1.96)^2 \times 0.442(1-0.442)) / (0.05)^2 = 385$$

$$= ( (1.96)^2 \times 0.442 \times 0.558) / (0.05)^2 = 385$$

A Sample size of 379 parents/caregivers were recruited in the study.

The ratio of outpatient attendance at Gertrude compared to KNH were estimated at 1:2. The ratio was based on assumption of the number of children attending Gertrude and KNH where KNH was more likely to twice as many children seeking care due to its diverse nature of its patients.

Thus, 126 parents were recruited from Gertrude children's hospital and 253 were recruited from KNH.

### **3.6.2. Sample size for qualitative data**

The study included four focus group discussions which included 6 - 8 participants. GFGD 1 = Gertrude Focus group Discussion comprising willing participants, GFD2 = Gertrude Focus group Discussion comprising unwilling participants, KFGD1= KNH Focus group Discussion comprising willing participants, KFGD2 = KNH Focus group Discussion comprising unwilling participants. There were two groups in each of the study facility which included those who were willing to vaccinate their children and those who did not agree.

### **3.7.Sampling technique**

#### **3.7.1. Sampling technique for quantitative data**

A consecutive sampling technique was used to recruit study participants. From a random start point, respondents were consecutively sampled until the sample size was attained for quantitative data. This sampling technique was adopted mainly because it ensures that participants into the study are targeted as they become available in each of the facility.

#### **3.7.2. Sampling technique for qualitative data**

Purposive sampling was used to select individuals who will participate in the focus group discussions. The criteria for selection was based on their willingness to have their children vaccinated against Covid-19.

### **3.8.Data collection tool**

#### **3.8.1. Data collection tool for quantitative data**

A structured questionnaire was used in data collection. Section A of the tool included information on parent/caregiver characteristics, section B included information on demographic characteristics of the child, Section C included information on parent/caregiver willingness to vaccinate their child while section D included information on parental perception on covid-19 vaccine using the Parent Attitude about Child Vaccine tool (PACV) which was used in assessment of willingness.

#### **3.8.2. Data collection tool for qualitative data**

Qualitative data in this study was collected using a Focus group discussion guide. Those who were included in the focus group discussions were caregivers of children under 12 years accompanying their children to clinic in the facilities. The guide included open-ended questions which was used to help understand key themes in willingness to undertake Covid-19 vaccine for their children under 12 years.

### **3.9.Data quality control**

The data quality was assured in different ways including weekly review of the entered data in the questionnaires for completeness. A statistician reviewed the data to ensure high level of quality and counter any possible errors identified.

### **3.10. Data collection procedure**

#### **3.10.1. Recruitment of research assistants**

The researcher recruited two research assistants who were stationed at each of the facility. The research assistants had a minimum of diploma certificate in nursing as well as have experience in data collection in a pediatric environment.

#### **3.10.2. Consenting process**

The consenting process began after obtaining relevant approvals from ethics and review committee as well as permission from the hospitals. The recruited research assistants approached the guardians and explained the purpose of the study in respective clinics. Only those who met the inclusion criteria were targeted. An informed consent was administered where only those consented were included in the study. There was no coercion.

#### **3.10.3. Quantitative data collection**

The researcher will approach guardians at the pediatric outpatient clinic every day with the assistance of research assistants, introducing themselves and outlining the goal of the study. Parents and caregivers who consented to participate in the study were enrolled until the desired sample size was reached. To ensure that they may be used in the purposeful sampling of qualitative data to participate in the Focus Group Discussion, the respondents in the study who completed the questionnaires were each given a special identification number.

#### **3.10.4. Collection of qualitative data**

For the focused group discussion, the researcher recruits focus group participants from the population that participated in the questionnaire purposively. The willingness of participants to vaccinate their children formed the basis of grouping of individuals into the FGD groups. The participants then provide their contacts to the researcher having agreed to participate in the Focus group discussions at a conducive room in both of the study setting. The researcher as in charge of the focus group discussions.

### **3.11. Variables in the study**

#### **Independent variables**

The independent variables that included in the study include demographic characteristics (gender, age, religion, residence, education level, employment status and average monthly income), clinical characteristics (parent vaccination status, presence of underlying condition, knowledge on Covid-19 vaccines) and child characteristics (gender, birth order, underlying condition).

Dependent variable: Willingness to vaccinate their children.

#### **3.11.1. Measurement of willingness**

In assessing the willingness of parents or caregivers to vaccinate their children against Covid-19, the Parent's Attitude about Childhood Vaccine (PACV) tool was used. This tool has been validated with Cronbach alpha value of 0.77. The tool contains 13 items that measured both the willingness and perception of caregivers on child vaccine using a Likert scale.

#### **3.11.2. Measurement of perception**

Focus group discussion was employed to understand more on perception and factors associated to willingness of caregivers or parents towards Covid-19 vaccine. The focus group discussion will take approximately 30 minutes. The researcher used the Focus group discussion guide



which contained specific questions regarding perception to Covid-19 vaccine use among parents of children under 12 years. Theme were developed in the study to help understand ideology held among participants.

### **3.12. Data management**

#### **3.12.1. Data entry and cleaning**

Data was collected using questionnaire and then data entry was done using Epi-data version 3.2. Data cleaning involved ensuring that all relevant data is available and coding for ease of analysis. This was then exported into SPSS version 27 for analysis.

#### **3.12.2. Data storage**

Completed forms were kept in a locked cabinet that was only open to the principal investigator. Soft data backups were kept in Google Drive and safeguarded on a password-protected machine. The data was kept for five years, after which the hardcopy papers were torn up and the softcopy information was kept in the repository.

### **3.13. Data analysis**

Data was analyzed using both qualitative and quantitative analysis approaches.

#### **3.13.1. Quantitative data analysis**

Descriptive data was analyzed using frequencies and percentage and mean (SD).

Binary logistic regression was used to identify independent factors associated with willingness to vaccinate children. Multivariable logistic regression will be conducted to control for possible confounding variables.

#### **3.13.2. Qualitative data analysis**

Data was transcribed verbatim to capture key statements as presented by the participants. Thematic analysis was used to make sense of the data as per each objective.

### **3.14. Ethical consideration**

Ethical approval was sought from KNH-UoN Ethics Committee prior to data collection. Approval to collected data also be sought from KNH and Gertrude’s children hospital. No participant was coerced to participate in the study since participation were only be voluntary. The privacy and confidentiality of the participants was upheld. They were not be required to provide any personal identifiers during the data collection process. All covid-19 prevention guidelines were considered.

### **3.15. Study strengths and Limitation**

#### **3.15.1. Strengths of the study**

This study incorporates both quantitative and qualitative arm which allow further follow up on perception of parents regarding the covid-19 vaccine as well as the willingness to vaccinate their children.

This study focuses on key health issues especially when considering the spread of Covid-19 throughout the world and the focus on vaccination of children.

#### **3.15.2. Limitations of the study**

The study was conducted in hospitals in urban setting only which might give a different image of the findings especially when generalizing the findings.

## CHAPTER FOUR: RESULTS

### 4.1.Introduction

The study investigated the caregiver's perception on Covid-19 vaccine and willingness to vaccinate their children under 12 years in Kenyatta National Hospital and Gertrude's children hospital. A total of 379 caregivers were enrolled into the study. Out of these, 66.8% (253) were from KNH and 31.2% (were from Gertrude's Children Hospital (GCH). All the questionnaires were returned for analysis representing more than 98% response rate.

Majority of the respondents, 76% (288) were female, 56.2% (213) were aged between 31 to 40. Most of the respondents, 90.2% (342) were married and 45.1% (171) had secondary level education. In addition, 68.3% (259) of the respondents had received Covid-19 vaccination as shown in Table 1.

Table 1: Parent/Caregiver demographic characteristics

	Total n(%) N=379	KNH n(%) N=253	Hospital GCH n(%) N=126
<b>Gender</b>			
Male	90(23.8)	48(19.0)	42(33.3)
Female	288(76.2)	204(81.0)	84(66.7)
<b>Age in years</b>			
20 – 30	143(37.7)	93(36.8)	50(39.7)
31 – 40	213(56.2)	137(54.2)	76(60.3)
41 – 50	23(6.1)	23(9.1)	0
<b>Marital status</b>			
Single	38(10.2)	32(13.1)	6(4.8)
Married	333(89.8)	213(86.9)	120
<b>Religion</b>			
Christian	354(93.9)	242(96.4)	112(88.9)
Muslim	23(6.1)	9(3.6)	14(11.1)
<b>Education level</b>			
Primary level or lower	71	61(24.1)	10(7.9)
Secondary level	134(35.4)	119(47.0)	15(11.9)
Tertiary	174(45.9)	73(28.9)	101(80.2)
<b>Employment status</b>			
Employed	150(39.6)	75(29.5)	75(59.5)
Self employed	120(31.7)	84(33.2)	36(28.6)
Unemployed	109(28.8)	94(37.2)	15(11.9)
<b>Monthly income</b>			
<=20,000	110(29.0)	98(38.7)	12(9.5)
Ksh.20,001 - 50,000	102(26.9)	71(28.1)	31(24.6)
Ksh.50,001 - 100,000	60(15.8)	45(17.8)	15(11.9)

More than 100,000	107(28.2)	39(15.4)	68(54.0)
<b>Residence</b>			
Rural	81(21.4)	66(26.1)	15(11.9)
Urban	298(78.6)	187(73.9)	111(88.1)
Yes	259(68.3)	182(71.9)	77(61.1)
No	120(31.7)	71(28.1)	49(38.9)

#### 4.1.1. Characteristics of children attending paediatric outpatient clinic

The characteristics of children attending paediatric outpatient clinic were investigated as shown in Table 2. More than half, 53%(201) of the patients were female with 42.7%(162) of them aged between 3 and 5 years. Further, 45.9%(174) of the respondents had underlying conditions which included hypertension, asthma, diabetes and cancer.

Table 2: Characteristics of children attending paediatric outpatient clinic

	Total n(%) N=379	KNH n(%) N=253	GCH n(%) N=126
<b>Gender of child</b>			
Male	201(53.0)	135(53.4)	66(52.4)
Female	178(47.0)	118(46.6)	60(47.6)
<b>Age of child in years</b>			
0 - 2 years	110(29.0)	75(29.6)	35(27.8)
3 - 5 years	162(42.7)	103(40.7)	59(46.8)
6 - 8 years	38(10.0)	35(13.8)	3(2.4)
9 - 12 years	69(18.3)	40(15.8)	29(23.0)
<b>Presence of underlying condition</b>			
Yes	174(45.9)	128(50.6)	46(36.5)
No	205(44.1)	125(49.4)	80(21.1)

#### 4.2. Caregivers' willingness to vaccinate children under 12 years in tertiary hospitals in Kenya.

One hundred and sixty-four (43.3%) were willing to vaccinate their children against Covid-19, (95%CI: 38.2% - 48.4%) . The willingness to vaccinate their children was higher in GCH, 46.8%(59) compared to KNH, 41.5%(105) as shown in Figure 1. The difference was statistically significant (p =0.003).

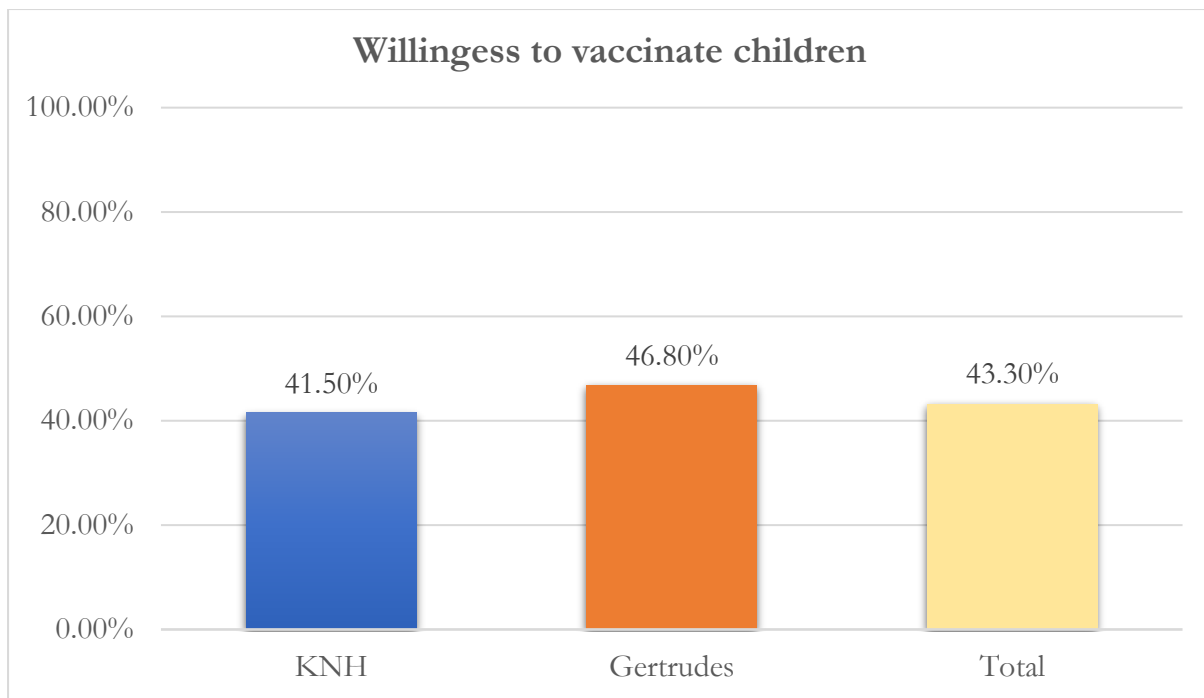


Figure 1: Caregiver willingness to vaccinate their children against Covid-19

#### **4.3.Factors associated with parent/caregiver willingness to vaccinate their children under 12 years in tertiary hospitals in Kenya.**

Binary logistic regression was used to investigate factors associated with willingness to vaccinate children among caregivers. Female caregivers were two times more likely to be willing to give Covid-19 vaccine compared to male, OR =2.01, 95%CI:1.22 – 3.33, p = 0.006. Those who had secondary level (OR =1.99, 95%CI:1.13 – 3.50, p =0.018) and tertiary level (OR =2.27, 95%CI: 1.43 – 3.62, p =0.001) were more likely to given their children Covid-19 vaccine compared to those who had primary or lower level of education. Caregivers who had received Covid-19 vaccination were three times more likely to vaccinate their children, OR =2.55,( 95%CI:1.60 – 4.06, p<0.001). Caregivers who had female children were twice more likely to give Covid-19 vaccination to them as compared to those who had male children, OR =2.19, 95%CI: 1.45 – 3.31, p<0.001. Increasing age was associated with increasing likelihood of willingness to vaccinate their children. The odds of caregivers of children having underlying

conditions vaccinating their children against Covid-19 were 5.3 times higher compared to those without underlying conditions, OR =5.32, 95%CI:3.42 – 8.27, p<0.001 as shown in Table 3.

Table 3: Factors associated with parent/caregiver willingness to vaccinate their children under 12 years in tertiary hospitals in Kenya.

	Willingness		OR(95%CI)	P-value
	Yes N=164	No N = 215		
<b>Gender</b>				
Male	28(17.1)	63(29.3)	Ref	
Female	136(82.9)	152(70.7)	2.01(1.22 - 3.33)	0.006
<b>Age in years</b>				
20 – 30	83(50.6)	60(27.9)	1.54(0.64 - 3.68)	0.333
31 – 40	71(43.3)	142(66.0)	0.56(0.23 - 1.35)	0.196
41 – 50	10(6.1)	13(6.0)	Ref	
<b>Marital status</b>				
Single	17(10.4)	20(9.3)	1.13(0.57 - 2.23)	0.731
Married	147(89.6)	195(90.7)	Ref	
<b>Religion</b>				
Christian	157(95.7)	199(92.6)	1.80(0.72 - 4.49)	0.278
Muslim	7(4.3)	16(7.4)	Ref	
<b>Education level</b>				
Primary level or lower	26(15.9)	45(20.9)	Ref	
Secondary level	45(27.4)	89(41.4)	1.99(1.13 - 3.50)	0.018
Tertiary	93(56.7)	81(37.7)	2.27(1.43 - 3.62)	0.001
<b>Employment status</b>				
Employed	65(39.6)	85(39.5)	0.92(0.56 - 1.52)	0.742
Self employed	54(32.9)	66(30.7)	0.86(0.51 - 1.45)	0.571
Unemployed	45(27.4)	64(29.8)	Ref	
<b>Monthly income</b>				
<=20,000	47(28.7)	63(29.3)	0.90(0.53 - 1.55)	0.704
Ksh.20,001 - 50,000	48(29.3)	54(25.1)	0.76(0.44 - 1.31)	0.317
Ksh.50,001 - 100,000	26(15.9)	34(15.8)	0.88(0.46 - 1.67)	0.692
More than 100,000	43(26.2)	64(29.8)	Ref	
<b>Residence</b>				
Rural	41(25.0)	40(18.6)	1.46(0.89 - 2.39)	0.164
Urban	123(75.0)	175(81.4)	Ref	
<b>Vaccination status</b>				
Yes	130(79.3)	129(60.0)	2.55(1.60 - 4.06)	<0.001
No	34(20.7)	86(40.0)	Ref	
<b>Presence of comorbidity</b>				
Yes	40(24.4)	56(26.0)	0.92(0.57 - 1.46)	0.723
No	124(75.6)	159(74.0)	Ref	
<b>Child characteristics</b>				
<b>Gender of the child</b>				
Male	69(42.1)	132(61.4)	Ref	
Female	95(57.9)	83(38.6)	2.19(1.45 - 3.31)	<0.001

<b>Age of the child</b>				
0 - 2 years	36(22.0)	74(34.4)	Ref	
3 - 5 years	61(37.2)	101(47.0)	1.62(0.72 - 3.65)	0.245
6 - 8 years	21(12.8)	17(7.9)	3.11(1.83 - 5.99)	<0.001
9 - 12 years	46(28.0)	23(10.7)	4.11(2.17 - 7.79)	<0.001
<b>Presence of underlying condition</b>				
Yes	112(68.3)	62(28.8)	5.32(3.42 - 8.27)	<0.001
No	52(31.7)	153(71.2)		
<b>Hospital</b>				
KNH	105(41.5)	148(58.5)	0.81(0.52 - 1.24)	0.579
GGCH	59(46.8)	67(53.2)	Ref	

#### 4.4. Multivariable analysis of factors associated with parent/caregiver willingness to vaccinate their children under 12 years in tertiary hospitals

Variables that were significant under bivariable analysis were subjected to multivariable analysis. The findings revealed that female caregivers were three times likely to be willing to vaccinate their children against covid-19 compared to male caregivers, AOR=3.01, 95%CI:1.23 – 8.44, p =0.010. Those who had secondary level (AOR =2.29, 95%CI:1.17 – 4.48, p=0.015 and tertiary level (AOR =2.38, 95%CI:1.37 – 4.13, p =0.002. Caregivers who were vaccinated against Covid-19 were four times likely to be willing to vaccinate their children, AOR=4.0, 95%CI:2.25 -7.02, p<0.001. Caregivers who had children aged 3 -5 years (AOR=4.15, 95%CI:1.92 – 8.95, p<0.001), 6 -8 years(AOR =3.41, 95%CI:1.61 – 7.24, p<0.001 were more likely to be willing to vaccinate their children against Covid-19 as shown in Table 4.

Table 4: Multivariable analysis of factors associated with parent/caregiver willingness to vaccinate their children under 12 years in tertiary hospitals

	AOR(95%CI)	P-value
<b>Gender of caregiver</b>		
Male	Ref	
Female	3.01(1.23 - 8.44)	0.010
<b>Education level</b>		
Primary level or lower	Ref	
Secondary level	2.29(1.17 - 4.48)	0.015
Tertiary	2.38(1.37 - 4.13)	0.002

<b>Vaccinated against Covid-19</b>		
Yes	4.0(2.25 - 7.02)	<0.001
No	Ref	
<b>Gender</b>		
Male	0.72(0.42 - 1.22)	0.216
Female	Ref	
<b>Age of child</b>		
0 - 2 years	Ref	
3 - 5 years	4.15(1.92 - 8.95)	<0.001
6 - 8 years	3.41(1.61 - 7.24)	0.001
9 - 12 years	1.78(0.69 - 4.63)	0.235
<b>Presence of underlying condition</b>		
Yes	5.16(3.14 - 8.47)	<0.001
No	Ref	

#### **4.5.The perception of parents/caregivers on covid-19 vaccination in children under 12 years in tertiary hospitals in Kenya.**

##### **4.5.1. Parent Attitudes about Childhood Vaccines assessment among caregivers of children attending paediatric clinic**

In assessing the perception of parents on covid-19 vaccination the PACV was utilized where the scores were transformed to range between 0 and 100%. Thus, vaccine hesitant patients were scored between 50 – 100 while non-hesitant were scored between 0 – 49 percent. The findings from present study established that 60.2% (228) of the caregivers were hesitant on giving their children Covid-19 vaccine as shown in Figure 2.



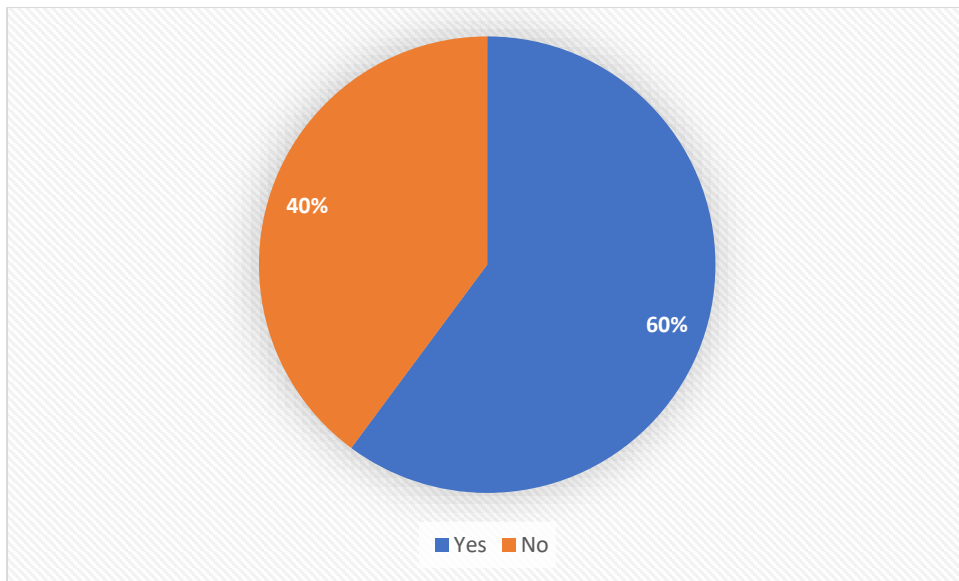


Figure 2: Hesitancy to provision of Covid-19 vaccine to their children

### Themes from the focus group discussions

Qualitative analysis was performed to investigate the perception of parents/caregivers of children 12 years and below regarding Covid-19 vaccination. A total of four focus group discussions which included 6 - 8 participants. GFGD 1 = Gertrude Focus group Discussion comprising willing participants, GFGD2 = Gertrude Focus group Discussion comprising unwilling participants, KFGD1= KNH Focus group Discussion comprising willing participants, KFGD2 = KNH Focus group Discussion comprising unwilling participants. Three major themes and six sub-themes were identified. The themes included conceptualization, barriers to vaccine uptake and facilitators to vaccine uptake. The themes and sub-themes are summarized as shown in Table 5.

Table 5: Theme

Theme	Sub-theme
Theme 1: Conceptualization of Covid-19 vaccine	<ul style="list-style-type: none"> <li>• Valuable perception</li> <li>• Sceptical perception</li> </ul>
Theme 2: Barriers to covid-19 vaccine uptake	<ul style="list-style-type: none"> <li>• Lack of knowledge on vaccine</li> <li>• Side effects of covid-19</li> <li>• Perception of hidden government agenda</li> </ul>

Theme 3: Facilitators to covid-19 vaccine uptake	<ul style="list-style-type: none"> <li>• Stakeholder involvement</li> </ul>
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## **Theme 1: Conceptualization of Covid-19 vaccine**

The participants were asked whether they believed that covid-19 vaccine protects them and their children from serious infection and whether they think children should be vaccinated against Covid-19. The results showed mixed reactions where some of the participants considered the vaccine as valuable while some were still sceptical about covid-19 vaccine.

### **Valuable perception**

Some of the participants affirmed that Covid-19 vaccine was valuable and should be given to all. It is important in preventing serious infection and severe medical complications. Some of the participants asserted that, *“I think Covid-19 vaccine is important since it was adopted in many countries, the rates of Covid-19 have really dropped which is something worth noting”*

**GFGD 1 Participant 2.** Similarly, another one stated that, *“Of course, the vaccine is helpful, sometimes it is good to be cautious rather than deal with a tragedy”* **GFGD 1 Participant 3.**

Another one noted that, *“The vaccine just like the other vaccines that we use, they are helpful”*

**KFGD 1 Participant 5.**

### **Sceptical perception**

Some of the participants declined Covid-19 vaccination while others were unsure on the exact need of the vaccination. One of the participants stated that, *“I heard from some people close to me who developed complications such as headache and numbness of the hand which made me fear taking the vaccination.”* **GFGD 2 Participant 4.** Another one affirmed that, *“There was*

*a lot of talk and issues that surrounded Covid-19 vaccine with many people who did not believe that it was developed for the purpose of controlling severe Covid-19 complications. These people and ideas swayed my thinking and I developed negative attitude towards Covid-19 vaccine.”* **KFGD 2 Participant 3.** Further, *“The government was just pushing us to get vaccinated but they did provide reasons why we should.”* **KFGD 2 Participant 6.**

*“I don’t think children should be vaccinated because we do not know the long-term effects of the vaccine”* **GFGD 2 Participant 7.**

## **Theme 2: Barriers to Covid-19 vaccine uptake**

The participants were also asked to identify common issues pertaining Covid-19 vaccination. The results revealed three major issues of note. These included lack of appropriate knowledge about covid-19 vaccine, side effects associated with the covid-19 vaccine and perception of hidden government agenda.

### **Lack of knowledge on Covid-19 vaccine**

Majority of the respondents showed little or lack of knowledge on Covid-19 vaccine. One of the participants stated that, *“I was not even following on Covid-19 development, I just heard that people were being vaccinated but I had no idea about the whole thing.”* **KFGD 1 Participant 4.** Another one affirmed that, *“Up to now I have little knowledge about Covid-19 vaccine, even though I took a jab. I don’t think I would expose my kid to something that myself I have no idea.”* **KFGD 2 Participant 1.**

Some of the participants were not aware that there was Covid-19 vaccine for children. *“Do you mean there is vaccination for children as well, if there is one very little has been said about it which strengthens the existing notion that these vaccines are not good.”* **GFGD 2 Participant 3.** Another participant noted that, *“I am not aware that children can be vaccinated, but even if children were being vaccinated, I would not take my child to be vaccinated.”* **KFGD 3**

**Participant 4.** Additionally, *“There are many vaccinations that we give our children when we go to the clinic that we don’t question, I would do the same for Covid-19 vaccine.”* **GFGD 1**

**Participant 7.**

### **Side effects**

Many of the participants were worried about the side effects of Covid-19 vaccine hence they assumed that the effect could be severe for children. One of the participants stated that, *“I am not willing to vaccinate my children because of research that I have read about people developing serious side effects like blood clots and heart attack.”* **GFGD 2 Participant 3.**

Another one affirmed that, *“There were some reports that people had died after taking Covid-19 vaccine and developing complications.”* **KFGD 2 Participant 5.** Additionally, another one added that *“The side effects of Covid-19 vaccine have been linked to infertility and miscarriages and she will not want to put her child at risk if that is a potential side effect of the vaccine.”* **GFGD 2 Participant 3.**

### **Hidden government agenda**

Many of the respondents asserted that they had a feeling that the government was not being honest on how they were pushing the agenda for Covid-19. One of the participants stated that, *“There is a strong feeling that not all information about Covid-19 is true, the government must be having some hidden things they are not telling us.”* **KFGD 2 Participant 5.** Another participant said *“the government wants to control population and that is why these vaccines were introduced.”* **KFGD 2 participant 2.** Another participant stated that, *“from the word go, it looked fishy especially on how the government has been handling the whole process, they have been forcing people to take vaccines by attaching them to key services.”* **GFGD 2 Participant 1.**

## **Facilitators to Covid-19 Uptake**

Participants were asked on different ways that can help improve vaccine uptake. There were several suggestions that were identified. However, the most efficient approach was multcentred approach which integrate all the stakeholders involved in vaccination process.

## **Stakeholder involvement**

Majority of the respondents identified that the government needs to provide more information to limit any possible propaganda that might spread regarding its activities. One of the participants affirmed that, *“The thing is, the government should be more proactive in communicating its agenda to gain public trust.”* **GFGD 1 Participant 5.** Another one suggested *“use of social media to spread positive messages about the importance of Covid -19 vaccination in children.”* **GFGD 2 Participant 3.** Another one noted that, *“everyone needs to be involved in and understand what the vaccine is about, benefits and side effects so that everyone can make a choice”* **KFGD 2 Participant 6.**

## **CHAPTER FIVE: DISCUSSION**

### **5.1.Caregivers' willingness to vaccinate children under 12 years in tertiary hospitals in Kenya**

The present findings established that 43.3% of the parents/caregivers were willing to vaccinate their children against covid-19. These findings are comparable to those from a meta-analysis by Galanis which found that the willingness to vaccinate children against Covid-19 ranged from 29% to 72.7% across different parts of the world (43). A study conducted in Turkey by Akarsu et al. found comparable findings where 41.5% of parents/caregivers were willing to vaccinate their children against Covid-19 (44). Similar findings were also found in a study conducted in Saudi Arabia by Temsah et al who found that 47.6% of parents/caregivers were willing to vaccinate their children against Covid-19. The willingness as observed in the present study and comparable studies is less than half which illustrate that there are still major issues surrounding covid-19 vaccination especially for children where majority of parents/caregivers as still unwilling or unsure of what decision to take due to existing issues and stereotypes surrounding the vaccine.

However, in studies conducted in developed countries, willingness has been significantly higher compared to other parts of the world. A recent study in Italy among 5000 families in Bologna by Motalti et al. established that 60.4% of the parents/guardians were inclined to vaccinate their children while 29.6% were still considering the opportunity (45). Additionally another study in the United States utilizing a non-hospital approach investigating willingness to vaccinate children revealed that 55.5% of parents/caregivers of children aged less than 12 years were willing to vaccinate their children against covid-19 (46). A multicontinental study done in six countries by Goldman et al. established that 65.3% of caregivers/guardians of children were willing to vaccinate their children against Covid-19 disease (20). The high level of willingness to vaccinate against Covid-19 in developed countries compared to low resource

settings could be due to a number of issues including trust in the healthcare system. Developed countries have well-established healthcare systems with clear guidelines that many people trust. The high confidence in healthcare system makes it more likely for people to follow the advice of healthcare professionals. Higher access to accurate information is also a key aspect. In developed countries, there is easy access to information about vaccines and their safety and efficacy. This information is widely available through government websites, healthcare providers, and the media. People are therefore better informed about the benefits of vaccination and are more likely to make informed decisions (47). In settings where people are more likely to see vaccination as a way to protect not just themselves, but also their communities. This sense of responsibility can lead to higher levels of willingness to vaccinate (48).

## **5.2. Factors associated with parent/caregiver willingness to vaccinate their children under 12 years in tertiary hospitals in Kenya.**

The current study revealed that female caregivers were more likely to vaccinate their children against Covid-19. This is consistent with those from a study in Poland which found that mothers made up the vast majority of those who responded, and they had considerably higher positive sentiments toward immunizations than fathers. Four out of every five parents want their children to be vaccinated as soon as possible, while one out of every four parents do not want their child to be vaccinated at all (6).

However, these findings are inconsistent with those from other studies which have showed that female patients were more unwilling to vaccinate their children compared to male parents/caregivers (45)(49). This difference in present study could be explained by gender roles within the local culture. In many cultures, women are traditionally responsible for taking care of children's health, which may lead to a greater sense of responsibility for their children's well-being, including their vaccination status. Additionally, women tend to have more frequent interactions with healthcare professionals, which may lead to greater trust in their

recommendations. Women may therefore be more likely to follow the advice of healthcare professionals to vaccinate their children.

Higher level of education was also associated with willingness to vaccinate children against Covid-19. These findings are in line with those from a study conducted in Bologna by Motalti et al. Who found that low level of education was associated with higher level of vaccine hesitancy (45). Further, a survey study conducted involving data from Latin and Caribbean by Urrunaga-Pastor et al. revealed that a lower prevalence of non-intention to vaccinate children and adolescents against Covid-19 was linked to age and education attainment above college (35). In addition, Szilagyi et al. (2021) also found that higher level of education and those who had received covid-19 vaccine previously were associated with willingness to vaccinate their children (35). Those with higher education level are perceived to be more knowledgeable and thus have ability to discern information they get and make informed decision regarding the wellbeing of these children.

Vaccinated parents and caregivers were more likely to agree to vaccinate their children. These findings are consistent with those from Lam et al. in the United States which found that parental vaccination status was significantly associated with their willingness to vaccinate their children. Parents who have received vaccines themselves are more likely to have confidence in the safety and efficacy of vaccines. They have first-hand experience with the benefits of vaccination, which can positively influence their willingness to vaccinate their children. This confidence stems from their personal health outcomes and the trust they have in the healthcare system. In addition, parents who have been vaccinated often have established relationships with healthcare providers. These relationships foster trust and open communication, enabling healthcare providers to provide accurate information and address concerns regarding childhood vaccinations. Trust in healthcare providers can significantly influence parental decisions to vaccinate their children (3).



Parents who had children with underlying conditions were more likely to be willing to vaccinate their children. These findings were comparable to Lam et al. in United States which revealed that parents who were worried that their children are highly exposed to Covid-19 virus were more willing to vaccinate their children (3). Children diagnosed with chronic conditions are at increased risk of severe illness if they contract Covid-19. Guardians may want to protect their children from the potential complications and hospitalization associated with the virus by getting them vaccinated (44).

### **5.3.The perception of parents/caregivers on covid-19 vaccination in children under 12 years in tertiary hospitals in Kenya.**

The findings from the present study established that respondents had mixed perception regarding vaccination of their children against Covid-19. Majority of the respondents were skeptical mainly due to major conspiracy theories surrounding covid-19 pandemic and subsequent vaccination. Some of the respondents were unwilling because of reported adverse side effects of the vaccines. These findings are in line with those from Saudi Arabia which found that many of the parents were skeptical of vaccinating their children for fear of side effects (36). Similar findings were found by Babicki et al. in a study conducted in Poland which revealed that the main worries about the vaccines are that the preparation has not been well studied and is inefficient, as well as a lack of knowledge about potential future problems. The media, particularly the Internet and television, are the primary sources of information on child immunizations. Vaccinating children against Covid-19 causes many emotions and uncertainties in parents, and it is also a topic of controversy among specialists (6). Comparable findings in Malaysia by Mohamed et al revealed that more than half were concerned about the vaccination's side effects, and about a third believed that frightening material regarding the Covid-19 vaccine was widely disseminated on social media. Most people believed that the

vaccine would protect them as well as other people who had not received it. Almost half were neutral on vaccine cost and safety (38).

## **CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS**

### **6.1.Conclusion**

1. The willingness of covid-19 vaccine uptake was low at 43.3%.
2. Factors associated with increased willingness to vaccinate against Covid-19 included higher level of education, caregivers who were vaccinated against Covid-19, age of the child, having a female child and presence of underlying conditions.
3. Common challenges to willingness included lack of knowledge on vaccination, decreased perceived risk of covid-19 infection, hidden agenda by the government and potential side effects and unknown long-term effects.

### **6.2.Recommendations**

1. Different strategies should be employed to address parental Covid-19 vaccine hesitancy.
2. To conduct effective vaccine campaigns to address parental concerns and increase public awareness on the importance of this vaccination.
3. Utilize mainstream media to articulate true information about the Covid-19 vaccine and focus on commonly asked questions by citizens.
4. Integrate new educational programs involving covid-19 vaccination for children to increase uptake especially those with chronic conditions.



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## **APPENDICES**

### **Appendix I: Consent Form for Questionnaire and FGD**

The Study Title: **CAREGIVERS PERCEPTION ON COVID-19 VACCINE AND WILLINGNESS TO VACCINATE THEIR CHILDREN UNDER 12 YEARS IN TERTIARY HOSPITALS IN KENYA**

#### **Introduction**

My name is Dr. Zeinab Ahmed A Registrar, Department of Pediatrics and Child Health, University of Nairobi. I am carrying out a study on **Caregivers Perception on Covid-19 Vaccine And Willingness To Vaccinate Their Children Under 12 Years In Tertiary Hospitals In Kenya.**

#### **The purpose of the study**

This study seeks to investigate the willingness on covid-19 vaccination and perception among caregivers of children under-12 years.

#### **Participation in the study**

Your participation in this study will be on a voluntary basis, and you may decide to withdraw from the study at any stage without any penalty. The study is purely descriptive, non-invasive, and will not attract any cost to your part.

#### **Study Approval**

This study is being conducted with the approval of the UoN Department of Pediatrics and Child Health and KNH-UoN Ethics and Review Committee. Approval No.....

#### **Study Procedure**

I, the principal investigator, together with my research assistants, will give you a full explanation of the procedure before you participate in this study. You will be required to answer the questions as asked in the questionnaire. The research assistants will help in making any clarifications regarding the questions. The completion of this questionnaire will take approximately 10 minutes of your time.

#### **Confidentiality**

Your identity will be protected with utmost confidentiality during the study. There are no identifiers that you will provide.

#### **Risks and or discomforts**

There are no known risks in the participation in the study. You are encouraged to discuss any discomfort or distress with the research assistant openly.

#### **Benefits during the study**

There will be no monetary benefit to you for participating in the study but the results will be helpful in policy making.

#### **Harm during the study**

The study is purely descriptive and will not cause any physical harm to you.

**For Focus group Discussion (only)**

The focus group discussion that will be conducted will be audiotaped and stored for future reference. However, the researcher will assign all the participants letters which will be used to identify them and hide their personal information. No personal information will be recorded.

**Communication**

In case of any clarifications or queries during and after the study, you are free to contact me on 0717459100 or my Supervisor Prof. Dalton Wamalwa on 0721239493 or Email at [dalton.wamalwa@uonbi.ac.ke](mailto:dalton.wamalwa@uonbi.ac.ke) or the Chair, KNH-UoN Ethics at 254 721 257746, (020) 318262 Ext.28250. Fax: 254 (020) 338688 or email at uonknh\_erc@uonbi.ac.ke.

Thank you

**Participant statement of consent**

I confirm that the researcher has fully explained the study purpose, aims, benefits and risks involved and I have decided to voluntarily agreed to participate in this study without any form of coercion.

Signature

(Participant) ..... Date.....

**Researcher statement of consent**

I confirm that I have clearly explained to the participant the nature of the study and the contents of this consent form in detail, and the participant has decided to participate voluntarily without any coercion or undue pressure.

Signature (Researcher).....Date.....

**Appendix II: Questionnaire**

**Section A: Parent/Caregiver demographic characteristics**

1. What is your gender

Male [ ] Female [ ]

2. What is your age?.....

3. What is your marital status?

Single [ ] Married [ ] Divorced [ ] Separated [ ]

4. What is your religion?

Christian [ ] Muslim [ ] Hindu [ ]

5. Others (Specify).....

6. What your level of education?

Primary level [ ] Secondary level [ ] Tertiary level [ ]

7. What is your average monthly income? (Ksh).....

8. What is your place of residence?

Rural [ ] Urban [ ]

9. Have you been vaccinated against Covid-19?

Yes [ ] No [ ]

10. Do you have any underlying medical condition e.g hypertension?

Yes [ ] No [ ]

11. If yes (Specify) .....

**Section B: Demographic characteristics of the child**

1. What is the gender of the child

Male [ ] Female [ ]

2. What is the age of child?.....

3. Presence of any underlying condition e.g congenital disorders?

Yes [ ] No [ ]

4. If yes (Specify).....

Willingness to vaccinate

5. Will you be willing to vaccinate your child against Covid-19?

Yes [ ] No [ ]

6. If no, what are the reasons for unwillingness?

.....

**Section C: Perception on Covid-19 Vaccination (PACV Survey)**

1. Have you ever delayed having your child get a vaccine for reasons other than illness or allergy?

Yes [ ] No [ ] I don't know [ ]

2. Have you ever decided not to have your child get a vaccine for reasons other than illness or allergy?

Yes [ ] No [ ] I don't know [ ]

3. How sure are you that following the recommended vaccine schedule is a good idea for your child? Rate from 0 -10 where 0 is the lowest and 10 is the highest [ ]

4. Children get more vaccines than are good for them

Strongly disagree [ ] Disagree [ ] Neutral [ ] Agree [ ] Strongly agree [ ]

5. I believe that many of the illnesses that vaccine prevent are severe.

Strongly disagree [ ] Disagree [ ] Neutral [ ] Agree [ ] Strongly agree [ ]

6. It is better for my child to develop immunity by getting sick than to get a vaccine.

Strongly disagree [ ] Disagree [ ] Neutral [ ] Agree [ ] Strongly agree [ ]

7. It is better for children to get fewer vaccines at the same time.

Strongly disagree [ ] Disagree [ ] Neutral [ ] Agree [ ] Strongly agree [ ]

8. How concerned are you that your child might have a serious side effect from Covid-19 vaccine?

Not at all concerned [ ] Somewhat concerned [ ] Concerned [ ] Very concerned [ ]

9. How concerned are you that Covid-19 vaccine might not be safe?

Not at all concerned [ ] Somewhat concerned [ ] Concerned [ ] Very concerned [ ]

10. How concerned are you that Covid-19 might not prevent serious disease?

Not at all concerned [ ] Somewhat concerned [ ] Concerned [ ] Very concerned [ ]

11. If you had another infant today, would you want him/her to get Covid-19 vaccine if recommended?

Yes [ ] No [ ] I don't know [ ]

12. Overall, how hesitant about Covid-19 vaccine in children would you consider yourself to be?

Not at all hesitant [ ] Somewhat hesitant [ ] Hesitant [ ] Very hesitant [ ]

13. I trust the information I receive about shots.

Strongly disagree [ ] Disagree [ ] Neutral [ ] Agree [ ] Strongly agree [ ]

14. I am able to openly discuss my concerns about Covid-19 vaccine with my child's doctor.

Strongly disagree [ ] Disagree [ ] Neutral [ ] Agree [ ] Strongly agree [ ]

15. All things considered, how much do you trust your child's doctor?

Rate from 0 -10 where 0 is the lowest and 10 is the highest [ ]

### **Appendix III: Focus group discussion questions**

1. What do you know about Covid-19 vaccination?
2. Do you think that Covid-19 vaccination is able to protect you from serious disease?
3. Do you think that children should be vaccinated against Covid-19?
4. What are some of the concerns that you have pertaining Covid-19 vaccination in children?
5. What are various ways that you think Covid-19 vaccination willingness can be improved?



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Ref: KNH-ERC/A/282

20<sup>th</sup> July, 2022

Dr. Zeinab Ahmed  
Reg. No. H58/38656/2020  
Dept. of Paediatrics and Child Health  
Faculty of Health Sciences  
University of Nairobi



Dear Dr. Ahmed,

**RESEARCH PROPOSAL: WILLINGNESS AND PERCEPTION OF CAREGIVERS ON COVID-19 VACCINATION OF THEIR CHILDREN UNDER 12 YEARS IN TERTIARY HOSPITALS IN KENYA (P193/03/2022)**

This is to inform you that KNH-UoN ERC has reviewed and approved your above research proposal. Your application approval number is P193/03/2022. The approval period is 20<sup>th</sup> July 2022 – 19<sup>th</sup> July 2023.

This approval is subject to compliance with the following requirements;

- i. Only approved documents including (informed consents, study instruments, MTA) will be used.
- ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by KNH-UoN ERC.
- iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to KNH-UoN ERC 72 hours of notification.
- iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH-UoN ERC within 72 hours.
- v. Clearance for export of biological specimens must be obtained from relevant institutions.
- vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
- vii. Submission of an executive summary report within 90 days upon completion of the study to KNH-UoN ERC.



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

Yours sincerely,



**DR. BEATRICE K.M. AMUGUNE**  
**SECRETARY, KNH-UoN ERC**

c.c. The Dean, Faculty of Health Sciences, UoN  
The Senior Director, CS, KNH  
The Chairperson, KNH- UoN ERC  
The Chair, Dept. of Paediatrics & Child Health, UoN  
Supervisors: Dr. Beatrice Mutai, Dept. of Paediatrics & Child Health, UoN  
Dr. Lawrence Owino, Dept. of Paediatrics & Child Health, UoN  
Dr. Maureen Kinge, Dept. of Paediatrics & Child Health, UoN

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## Appendix IV: Similarity report

### WILLINGNESS AND PERCEPTION OF CAREGIVERS ON COVID-19 VACCINATION OF THEIR CHILDREN UNDER 12 YEARS IN TERTIARY HOSPITALS IN KENYA

#### ORIGINALITY REPORT

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#### PRIMARY SOURCES

<b>1</b>	<a href="http://www.ncbi.nlm.nih.gov">www.ncbi.nlm.nih.gov</a> Internet Source	<b>1%</b>
<b>2</b>	RD. Goldman, RJ. Hart, JN. Bone, M. Seiler et al. "Willingness to Vaccinate Children against COVID-19 Declined During the Pandemic", Vaccine, 2023 Publication	<b>1%</b>
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<b>5</b>	Madhura S. Rane, McKaylee M. Robertson, Drew A. Westmoreland, Chloe A. Teasdale, Christian Grov, Denis Nash. "Intention to Vaccinate Children Against COVID-19 Among Vaccinated and Unvaccinated US Parents", JAMA Pediatrics, 2022 Publication	<b>1%</b>