

**COVID-19 VACCINE UPTAKE AMONG PREGNANT
WOMEN IN NAIROBI CITY COUNTY, KENYA**

BY

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ABSTRACT

The primary purpose of this research was to assess the COVID-19 vaccine uptake among pregnant women in Nairobi City County, Kenya, between September 2021 and October 2022. The research utilised mixed methods and focused on 10 out of the 17 sub-counties in Nairobi, chosen through scientific selection. Descriptive statistics such as frequency and percentages were used to summarise demographic data. Inferential statistics such as chi-square, Pearson correlation, t-test, and binary logistic regression were used for further analysis.

Several factors were identified as positive contributors to COVID-19 vaccine uptake. Nurses were found to be the most influential people in vaccine uptake due to their interactions with their patients at the antenatal clinics. Pregnant women with a high level of satisfaction with how the Ministry of Health communicated policy changes, those with higher income and those with a higher education level were more likely to get vaccinated. Pregnant women who previously had children and had them vaccinated were more open to COVID-19 vaccination. Pregnant women in the age group 18-23 demonstrated higher receptance to the vaccine. Similarly, traditional media (TV, radios, etc.) and trust in peers both positively played a role in shaping the perceptions of pregnant women towards vaccine uptake.

Social media was a source of misinformation, and in addition, pregnant women feared stigma from family members and peers if they took the vaccine. Socio-economic challenges, including low income, lack of transport, unemployment and very long queues, discouraged pregnant women from getting vaccinated. Among the unvaccinated, some chose to use alternative measures, including social distancing, wearing of masks and use of herbal medication, which was viewed as a safer option than the vaccine.

The research concluded that there was a significant association between being informed about policy changes, satisfaction with the source of information, employment status, influence of healthcare providers (particularly nurses), confidence and media, prior vaccination of children, fear of stigma and

sterilisation and COVID-19 vaccine uptake. Limited access to healthcare services, lack of adequate information, low trust level, low level of education, low income, lack of confidence and inadequate information contributed to COVID-19 vaccine hesitancy among the unvaccinated pregnant women. Misinformation circulating on social media played a significant role in undermining confidence in credible information sources related to the vaccine.

The research recommended that training healthcare workers, especially nurses, to deliver consistent and empathetic messaging during antenatal care visits is essential to build trust among pregnant women. The Ministry of Health needs to implement comprehensive community-based campaigns targeting misconceptions and misinformation about COVID-19 vaccination. Government and private institutions should collaborate in improving vaccine accessibility.

Keywords: Covid-19, Covid-19 Vaccine Uptake , Vaccine hesitancy, Pregnant Women, Trust in Healthcare Providers, Confidence , Trust, Religious Beliefs, Education Level, Socio-Economic Inequalities.

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LIST OF ABBREVIATIONS AND ACRONYMS

ANC- Antenatal Clinic

ANOVA- Analysis of Variance

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CDC- Centre for Disease Control

COVID-19- Coronavirus Disease of 2019

CREC- College of Human Sciences Research Ethics Committee

FGD- Focus Group Discussion

FIGO- International Federation of Gynaecology and Obstetrics

GBS- Group B streptococcus

GOK- Government of Kenya

HCP- Healthcare Physician

HCWs- Community Health Workers

HIV- Human Immuno-Deficiency Virus

HP- Healthcare Provider

LAC- Latin America and the Caribbean

MERS- CoV-Middle East Respiratory Syndrome

MOH- Ministry of Health

MRNA- Messenger Ribonucleic Acid

NCOC- National Command and Control Centre

NGOs- Non-Governmental Organisations

PLW- Pregnant and Lactating Women

RNA- Messenger Ribonucleic Acid

RSV- Respiratory Syncytial Virus

RT-PCR- Reverse Transcription Polymerase Chain Reaction

SARS- Severe Acute Respiratory Syndrome

SCT- Social Cognitive Theory

SEM- Social Ecological Model

SES- Socioeconomic Status

SSA- Sub-Saharan Africa

UK- United Kingdom

UNISA- University of South Africa

USA- United States of America

WHO- World Health Organisation

DEFINITION OF TERMS

Covid-19 Vaccine Uptake:- refers to the acceptance and receipt of at least one dose of the vaccine during pregnancy, influenced by access to health care services, trust in providers and availability of credible information.

Cultural practices include manifestations of behaviours, traditions and beliefs encompassing customs and social norms acting as core identifiers for ethnic groups or communities.

Vaccine hesitancy is conceptualised as delayed acceptance or non-uptake of it among the pregnant women despite availability, shaped by confidence in the vaccine safety, exposure to misinformation and socioeconomic conditions.

Pregnant Women: this refers to women attending antenatal care services during the study period (Sept 2021 to October 2022) who were eligible for COVID-19 vaccination according to national policy guidelines.

Health Information Sources: these included formal and informal channels from where pregnant women received information about COVID-19 vaccination. These included healthcare workers, mass media, and social media platforms.

Religious beliefs:- refers to divine attitudes regarding faith shaping the women's COVID-19 vaccine uptake.

Socio-economic factors: refers to a combined key factor of education, income, occupation, housing and access to healthcare that directly influences the acceptance of the COVID-19 vaccine.

Trust in Healthcare Providers: This refers to the level of confidence pregnant women placed in healthcare professionals, mainly nurses. This referred mainly to vaccine safety, policy changes and maternal health guidance.

Vaccine acceptance:-Refers to the willingness to receive the COVID-19 vaccine, usually determined by such key drivers as confidence, transparent communication and trust.

CHAPTER ONE

INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 INTRODUCTION

Global health priorities have changed drastically because of the COVID-19 pandemic, which has underscored the importance of vaccination and other preventive measures while also revealing weaknesses in healthcare systems (World Health Organisation 2025). According to empirical data by et al., Kamalrathne et al., (2024), vaccine reluctance endures and is frequently caused by false information, contradictory health advisories, and ineffective public health initiatives. The hesitation of pregnant women the world over has been connected to worries about the safety of vaccines and possible effects on foetal development (Filip et al., 2024).

Although Kenya made admirable efforts to distribute the COVID-19 vaccine, targeted programs for expectant mothers received little attention, with the majority of the focus being on the broader public. The Nairobi City County offered a special environment for researching pregnant women's vaccination uptake. Being the capital of Kenya, it is distinguished by a populace that is diverse in terms of socioeconomic, religious, and ethnic backgrounds.

Consequently, this study, concentrated on COVID-19 vaccination among pregnant women.

1.2 BACKGROUND TO RESEARCH PROBLEM

Pregnant women, new-borns and young infants are more susceptible to infections which may at time be serious and even deadly. WHO aims at reversing this by increasing the number of children born alive as well as improve antenatal care for pregnant women (Anderson, Brigden, Davies, Shepherd & Ingram, 2021). Vaccination in pregnancy is one strategy to improve health of pregnant women and their offspring. Safe and effective vaccines are already available against some diseases (tetanus, pertussis, and influenza) for use during pregnancy, and these vaccines have the potential to prevent significant

infectious disease morbidity and mortality in both the mothers and their offspring. In addition, new vaccines (e.g., RSV, GBS) are currently under development and are being tested in clinical trials, to be licensed and used in pregnant women (Mak, Mangtani, Leese, Watson & Pfeifer, 2008).

Scholarly work conducted in the US revealed discrepancies of vaccine uptake for pregnant women occasioned by insurance status, race and age (Walker et al. 2021). Pregnant women are encouraged to be vaccinated because it not only helps them but also the unborn child by inducing a vaccine-specific immune response in the mothers which is then transferred as antibodies through the placenta before the child is born and during pregnancy and through breast milk once the child is born, this helps to protect infants once they are born against specific targeted pathogens (Esposito et al., 2020). The novel COVID-19 is the abbreviation for Coronavirus disease of 2019. This name has been given by the World Health Organization (World Health Organization (WHO) 2019) and is the official name given to the disease.

Covid 19 is the disease that is caused by the novel corona virus SARS-CoV2. There have been various variants of corona virus before that have caused the common cold that is SARS in 2002 and MERS in 2012 (WHO, 2019). China had the first cases of the novel coronavirus as reported in December 2019. WHO in a press release done 11th February 2020 gave the official name to the disease as COVID-19. As at September 28th, 2021, there has been 231,703,120 cases and 4,747,620 deaths globally. As per the same date, Kenya currently has had 248,461 cases and 5109 deaths (WHO, 2021). This disease has affected all the countries across the globe, and it is a global concern. Countries worked hard in production of vaccines which have been rolled out since 2020, and vaccination is ongoing across the globe. The uptake has been different across the different countries administered (Zhu et al., 2020). Prior to vaccine roll out, there were a series of lock down and curfews imposed, companies resorted to working from home as a measure to control the disease across different borders. There was also the global campaign to wash hands, sanitize and wear face masks across the globe a practice still being encouraged by the Ministry of Health in Kenya (MOH) to date (Ministry of Health Kenya, 2020).

Being a global crisis, there were rapid response in vaccine development and as at July 2021 there were a total of 184 vaccines in different phases of development. These were broken down as below; 18 got emergency use authorization, 105 are in clinical development, 19 are in pre-clinical stage (CDC 2021). Vaccines are not a new phenomenon and have been developed since 1796 when Edward Jenner developed the small-pox vaccine (Ndwandwe & Wiysonge, 2021). In Kenya currently, the Ministry of Health has authorized the use of Astrazeneca, Moderna, Pfizer, Sinopharm and Johnson and Johnson vaccines (Ministry of Health Kenya, 2021). Having come through the challenging phase of vaccine development while other companies are busy in the development, right now countries are focusing on ensuring that there is an ongoing active campaign for vaccine acceptance (Viswanath et al. 2021: 2).

As of January 24, 2026, a total of 779,060,919 reported cases of coronavirus globally with 7,010,681 deaths, 675,619,811 recoveries and a 13.72 billion COVID-19 vaccine doses administered. In the last 28 days leading to January 24th, 2026, there has been a total of 49,665 cases reported and in the last 7 days 9,044 cases have been reported (World Health Organisation, 2024). While the numbers are not as alarming as during the peak of the pandemic, there WHO is still actively tracking cases globally as we have come into the post pandemic area but the cases are still prevalent.

For more than three years, the outbreak put humanity to the test (Cowden 2022). Pregnant women, new-borns, and young infants were more susceptible to infections which may at times be serious and even deadly. The World Health Organisation (WHO) aims at reversing this by increasing the number of children born alive as well as improving antenatal care for pregnant women (Anderson et al., 2021). Prenatal vaccination is one method for enhancing the health of expectant mothers and the babies they are carrying. Tetanus, Pertussis, and the influenza vaccination were approved to be administered for pregnant women and have a likelihood to significantly reduce the risk of mortality from transmissible illnesses in both pregnant women and their unborn children. Additionally, novel vaccines (such as those for RSV and GBS) are continually

being developed, evaluated in clinical experiments, and certified for use in women who are pregnant (Gote et al., 2023).

In light of the ambiguity regarding the advantages and risks of vaccines, numerous professional organisations have taken a favourable stance on vaccination against this virus during pregnancy (Skirrow et al., 2022). The World Health Organisation advised the approval of regenerative vaccines be approved for use in pregnant women where the advantages of vaccination surpass any possible concerns (Brillo et al., 2022). Pregnancy screenings before vaccination, nonetheless, as well as holding up or ending the pregnancy due to vaccination, are not advised by the WHO (Aly, Choi and Christy 2022).

According to the Royal College of Gynaecologists and Obstetricians, pregnant women should receive the same type of vaccination as the general public (Ward et al., 2022). The Global Federation of Women's Health states that risk-based measures in addition to vaccinations may be harmful to expecting mothers (Khodzhaeva et al., 2019). Pregnant women currently getting the COVID-19 vaccine in different nations such as the United States, Canada, Australia, Singapore, Israel, and the United Kingdom (Mohapatra et al., 2022).

Scholarly work conducted in the USA revealed discrepancies in vaccine uptake for pregnant women occasioned by insurance status, race, and age (Walker et al., 2021). The vaccination of pregnant women is advised because it benefits both the mother and the foetus. The vaccination triggers an immune response particular to the vaccine in the pregnant woman, which is subsequently passed on as antibodies through the placenta before childbirth, through pregnancy, and through the mother's milk after childbirth, protecting infants against specific focused infectious agents once they are born (Esposito et al., 2020). The recently discovered SARS-CoV2 is responsible for the development of the illness known as COVID-19. There have been various variants of the coronavirus which have caused the common cold such as SARS in 2002 and MERS in 2012 (World Health Organisation. 2021).

The condition's official name was given by the WHO in an announcement on February 11th, 2020, as COVID-19. Kenya, as of August 2nd, 2023, had

344,094 cases and 5,689 fatalities (World Health Organisation (2023)). The virus spread to every nation on earth and became a major health issue. Countries worked hard in the production of vaccines which were rolled out in 2020, and vaccination has since been ongoing across the globe. The uptake has been different across countries where the vaccine was administered (Zhu et al., 2020). Before the vaccine roll-out, there had been a series of lockdowns and curfews imposed, companies resorted to working from home as a measure to control the disease across different borders. There was also the global campaign to wash hands, sanitise and wear face masks across the globe, a practice that was also encouraged by the Kenyan's Ministry of Health (Ministry of Health Kenya, 2020).

Being a global crisis, there was a rapid response in vaccine development and as of July 2021, there were a total of 184 vaccines in separate phases of development. These were divided into the following categories: 105 were under clinical investigation, 19 were in the preliminary testing stage, and 18 received urgent usage authorisation (Upreti and Samant 2022). Since Edward Jenner created the smallpox vaccine in 1796, vaccines have existed and developed (Ndwandwe and Wiysonge 2021). As of 2021, more than 9.17 billion doses of the COVID-19 vaccine had been safely administered worldwide, and more than 3.82 billion people had been given the full recommended dose (World Health Organisation 2023). However, vaccine inequality persisted globally, especially in countries with low- and middle-income countries (United Nations 2022).

In Kenya, the Ministry of Health authorised the use of AstraZeneca, Moderna, Pfizer, Sinopharm, and Johnson and Johnson vaccines (Ministry of Health Kenya, 2021). Having come through the challenging phase of vaccine development while other companies are still busy in the development, countries focused on ensuring that there was an ongoing active campaign for vaccine acceptance (Viswanath et al., 2021). More than 340,000 people in the nation at large received a COVID-19 diagnosis (Yamey et al., 2022).

Kenya received approximately nineteen million doses of the COVID-19 vaccine, comprising both the initial and subsequent injections. As of the 17th July 2022, a significant proportion of the adults in Kenya had completed the full COVID-19

vaccination protocol. In Nairobi, about 1.5 million people had been vaccinated, representing the most recorded figure amongst Kenyan counties (Shah et al., 2022). Nevertheless, details pertaining the adoption of the COVID-19 vaccine by expectant mothers, its stifling sociocultural misconceptions, and factors related to socioeconomic status were not reported.

In Kenya, the administration of COVID-19 vaccinations to Pregnant and Lactating Women (PLW) has been carried out as part of the national vaccination program which was banned before August 2021 (Paul et al., 2022). The infection with SARS-CoV-2 in pregnancy correlated with heightened risks of parental and neonatal mortality, along with a higher number of premature deliveries. (Stock et al., 2022). Program-related data showed that administering the COVID-19 vaccine while pregnant did not raise the risk of mortality, early delivery, or other severe complications, compared to the hazards linked to the non-vaccination of women who were expecting against COVID-19.

Pregnant women were advised to receive mRNA vaccinations (Pfizer or Moderna) at any stage of pregnancy, during their first visit to an antenatal clinic (ANC), or whenever they made their first contact with medical services, according to a recommendation made by the Ministry of Health on December 24, 2021 (Haas et al., 2021). Pregnant women who used other forms of COVID-19 vaccination were advised to complete the vaccination series with that specific vaccine (Ministry of Health. 2021). The Kenyan Director General of Health sent a note to the county health directors that included information about vaccinations during pregnancy, but it made no mention of any other constraints or restrictions. (Carlsen et al., 2022). Furthermore, it was not fully understood how policy changes affected vaccination behaviours, such as those of pregnant women and vaccine uptake.

1.3 PROBLEM STATEMENT

Since the emergence of COVID-19, millions of people were infected, and hundreds of thousands perished (Chidi et al., 2021). Based on the data provided by the World Health Organisation (Sohrabi et al., 2020), symptoms of the novel coronavirus varied from mild to severe, with certain cases leading to fatalities. The elevated transmission rate of the virus was concerning because

of its considerable mortality implications (Gur-Arie et al., 2024). The significant rise in fatalities was concerning, attributed to the disease's high infectiousness rate (Hantoushzadeh et al., 2020). Because COVID-19 was a new pandemic, there was very little information from scientists about how the virus and its vaccine affected expectant women's ability to have healthy babies (Ombere 2021). Before the advent of the vaccine, it was recommended by the WHO to treat the symptoms of the disease as no vaccine or medication was available.

Later, vaccines were rolled out across the globe but there was not enough data to show that pregnant women could be vaccinated without harming or endangering their unborn children. According to Tefera et al., (2020), there were several reasons why it was hard to establish true foetal risk because of taking medicine during pregnancy and this included, but was not limited to, taking many different drugs. It was therefore difficult to pin down which one was the cause of severe disease amongst women. There was a general fear of taking any kind of medication and most women resorted to natural remedies and herbal medicine (Marbán-Castro et al., 2020).

Empirical evidence from Vora et al., (2020) indicated that congenital malformations were most likely to be present during the beginning of the pregnancy in the first trimester as the body organs were starting to form. It was obvious that women then needed to be concerned as the disease was increasing in number daily across the globe. As of April 2, 2023, Kenya had administered 23,750,431 vaccine doses, covering 44 per cent of the population with all the recommended doses (Muchiri et al., 2022).

During the early stages of the global pandemic in Kenya, the Ministry of Health (MOH) recognized pregnant women as a high-risk group and recommended the suspension of routine vaccination for this population. As a result, vaccinations for this demographic were provided exclusively on a case-by-case basis. The COVID-19 pandemic revealed a significant gap in knowledge regarding the effects of policy changes on vaccination behaviours and uptake among pregnant women. Despite the urgency and significance of vaccinating this vulnerable population, there was lack of research regarding what influenced pregnant women to follow recommendations to receive the COVID-19 vaccine.

Ensuring the safety of vaccinations for pregnant individuals was critically important. Investigations by Limaye et al., (2022) highlighted a substantial misunderstanding and inadequate awareness of national policies among both politicians and medical professionals. This uncertainty might have influenced vaccine uptake and impact of making decisions regarding COVID-19 vaccination among pregnant women. This, therefore, had yet to be investigated. The uptake may also have been affected by policy because the Kenyan government vaccination program prioritised healthcare workers, teaching and non-teaching staff, police, military, prison officers, immigration officers, anyone above 58 years old, and instructors in religious institutions (Ministry of Health Kenya, 2020). In the second phase, it included frontline workers and anyone above 18 years of age but mostly those with comorbidities, and in the final phase, it targeted adults aged 18 and above. In Kenya, pregnant and lactating women became eligible for COVID-19 vaccinations. The Ministry of Health recommended that women in these categories receive mRNA vaccines, specifically Pfizer or Moderna, at any stage of pregnancy, starting from their initial visit to an antenatal care clinic (Ministry of Health Kenya, 2021). It was not well understood, though, how policy changes affected pregnant women's vaccination habits and uptake which necessitated this research study. This research sought to address the knowledge gap by systematically analysing COVID-19 vaccine uptake in pregnant women.

1.4. PRIMARY OBJECTIVE

The primary objective was to examine the COVID-19 vaccine uptake among pregnant women in Nairobi City Country in Kenya. To have a clear understanding, this primary objective was investigated using both pregnant women who took vaccines and those that did not.

1.5 SPECIFIC OBJECTIVES

The specific objectives were:

- 1) To assess pregnant women's awareness of and satisfaction with government communication regarding changes in Kenya's COVID-19 vaccination policy in Nairobi City County.

- 2) To examine the sources the Ministry of Health used to communicate vaccination policy changes to pregnant women in Nairobi County.
- 3) To examine the influence of socioeconomic factors on the uptake of COVID-19 vaccine among the pregnant women in Nairobi City County;
- 4) To determine the ways in which cultural attitudes and practices influence the willingness to accept COVID-19 vaccine;
- 5) To identify alternative methods employed by unvaccinated pregnant women in Nairobi County, Kenya, to protect themselves against COVID-19; and
- 6) To assess the level of trust and confidence that pregnant women have in the efficacy of COVID-19 vaccine and how it shapes their decision-making.

1.6. RESEARCH QUESTIONS

1. To What extent were pregnant women in Nairobi City County informed about changes in Kenya's COVID-19 vaccination policy , and how satisfied were they with the Ministry of Health communication.
2. What sources did the Ministry of Health use to communicate COVID 19 vaccination policy changes to pregnant women in Nairobi County? What was the impact of socioeconomic factors (such as income, education, and healthcare access) on the acceptance of the COVID-19 vaccine among pregnant women in Nairobi City County?;
3. How did cultural attitudes and traditional practices influence the acceptance or reluctance of pregnant women towards the COVID-19 vaccine in Nairobi City County?;
4. What alternative methods did unvaccinated pregnant women in Nairobi City County use to protect themselves from COVID-19?; and
5. How did the level of trust in the vaccine's efficacy influence pregnant women's decision-making regarding vaccination?

1.6.1 Null Hypotheses

The statements of the null hypotheses were built from each of the research questions due to the fact that each question encompassed multiple variables.

H01: There was no significant association between women's awareness of and satisfaction with government communication and COVID-19 vaccine uptake among pregnant women.

H02: There was no significant association between the sources the Ministry of Health used to communicate vaccination policy changes and COVID-19 vaccine uptake among pregnant women.

H03: There was no significant association between the socioeconomic factors and the uptake of the COVID-19 vaccine among pregnant women in Nairobi County.

H04: There was no significant association between cultural practices and COVID-19 vaccine uptake among pregnant women.

H05: Pregnant women who were employed and used alternative methods of COVID-19 vaccination were not significantly less likely to accept the vaccine than those who did not fear stigma.

H06: There was no significant positive relationship between the level of trust and confidence in the COVID-19 vaccine and the likelihood of being unvaccinated among pregnant women.

1.7. SCOPE OF THE STUDY

This research took place in Nairobi City County, the capital city of Kenya, characterised by a unique socioeconomic and demographic mix. Nairobi serves as a focal point for understanding the factors influencing uptake of the COVID-19 vaccine among pregnant women due to its rapid population growth, urbanisation, and cultural diversity. The county's diversified population comprises individuals from various ethnic, cultural, and religious origins, providing a substantial context for examining the influence of these characteristics on vaccine acceptance, reluctance, or outright refusal.

The study's focus on Nairobi enabled the collection of viewpoints from a varied urban demographic that encompassed Kenya's socioeconomic spectrum, from affluent individuals to residents of informal settlements. Nairobi serves as a

pivotal site for investigating public health efforts, such as COVID-19 vaccination programmes, due to its socioeconomic challenges, which encompass restricted access to key healthcare services, environmental health risks, and security concerns.

The relationship between these issues and vaccine uptake enhanced the understanding of barriers and facilitators to vaccination in pregnant women. The rapid spread of erroneous information regarding COVID-19 and vaccinations, particularly in Nairobi's densely populated areas, offered an opportunity to assess the impact of public health messaging and communication strategies on the decisions of vulnerable groups, including pregnant women.

One of the primary aims of the study was to evaluate the effectiveness of public health communication strategies in educating pregnant women about vaccinations. This entailed evaluating the communication strategies employed by the Ministry of Health and regional healthcare providers regarding the importance, efficacy, and safety of the COVID-19 vaccine in relation to pregnancy. The study examined how internet-based narratives and misinformation influenced vaccine uptake or hesitancy. The study also assessed the understanding of pregnant women in relation to vaccination guidelines, possible adverse effects, and the protective benefits for both pregnant women and the unborn child. This emphasis highlighted communication deficiencies and proposed messaging modifications to more effectively address the specific needs of pregnant women. The evaluation of Kenya's national COVID-19 vaccination initiatives and their efficacy at the county level was another significant topic of emphasis.

The study assessed the extent to which pregnant women were adequately incorporated into policy, particularly concerning the consideration of their concerns and the provision of information tailored to their medical needs. The analysis also examined the actual challenges of policy implementation, encompassing vaccination supply chain issues, prioritisation schemes, and the preparation of healthcare personnel to address the enquiries and concerns of pregnant women. The study further enquired whether these policies could be

adapted to address Nairobi's diverse socioeconomic and cultural dynamics, proposing recommendations for more inclusive policy frameworks.

The research examined the influence of religious beliefs and societal norms on the vaccination rates among pregnant women. Cultural viewpoints on healthcare interventions, including vaccines, vary significantly in Nairobi, where several ethnic and religious groups coexist. The study assessed the impact of cultural perspectives on pregnancy, medical interventions during gestation, and vaccine safety on acceptance or reluctance. Additionally, community influencers and spiritual leaders were analysed as significant factors in shaping attitudes and behaviours about vaccination.

1.8. LIMITATIONS OF THE STUDY

The overall absence of data regarding first-dose vaccines beyond a certain period, particularly for pregnant women who had their initial dose before that date, constituted another limitation. This gap in vaccination records may lead to an inadequate understanding of vaccine uptake patterns. The researcher coordinated intensively with health officials to verify and authenticate vaccination data to circumvent this issue. To enhance the dataset for analysis, the researcher incorporated data from additional sources, including adjacent health centres. The study identified data deficiencies and focused on available information, highlighting areas necessitating further investigation.

The study was subjected to recall bias, as the respondents were required to recall information received during a rapidly evolving pandemic when vaccinations policies for pregnant women were changing frequently. To mitigate this, the researcher used multiple sources to validate responses using Focus Group Discussions and Key Informant Interviews.

A further concern that arose during the investigation was the dependability of the contact information contained in patient records. A significant proportion of the provided contacts were either erroneous or inaccessible, thereby adversely affecting the quality of data collection and the response rate. The researcher adopted a proactive approach to address this limitation by recording a broader spectrum of interactions for vaccinated and unvaccinated pregnant women. To

mitigate non-responses or inaccuracies and enhance the likelihood of contacting valid participants, the study intentionally increased the sample size by 5 per cent .

Through this sample change, the researcher enhanced the total response rate and collected sufficient data for analysis, ensuring statistically valid results. Ultimately, it was challenging to reach certain pregnant women who may have been hesitant to participate in the study due to concerns over their privacy. This constraint was mitigated by ensuring that all participants were thoroughly informed about the study's objective, the confidentiality of their responses, and the voluntary nature of their participation for which they had to fill a consent form.

To cultivate community trust, the researcher employed community-based strategies, including the collaboration of local medical professionals. By encouraging participation from a diverse array of pregnant women, these strategies enhanced the sample's representativeness across the different sub-counties in Nairobi and mitigated selection bias within the scope of this study.

The study was conducted in Nairobi County, which is an urban setting with relatively higher access to healthcare services, as well as antenatal care compared to the rural areas. As a result, the findings may not be generalizable to all pregnant women in rural settings within Kenya or the world. Also, the data was collected after the peak of COVID-19 pandemic and the pregnant women's perceptions and recollections and might have been influenced with other factors such as public discourse and other evolving perceptions of risk over time.

1.9 SIGNIFICANCE OF THE STUDY

The challenge of vaccine uptake remains prevalent, with governments encouraging citizens to receive free vaccinations, especially for those who missed the second dose and booster shot as guided by the Ministry of Health. This study aims to provide long-term solutions for future vaccine programs targeting pregnant women by understanding the barriers they face, such as health risks, cultural views, and misconceptions. The study offers a

comprehensive analysis of these challenges, generating insights to enhance vaccine acceptance among pregnant women. By examining alternative strategies, such as social isolation and herbal remedies, the study helps improve hospital outreach and communication. It also evaluates cultural norms and beliefs that influence vaccination decisions, enabling the Ministry of Health and stakeholders to tailor messages that are culturally sensitive and scientifically valid.

Key stakeholders including healthcare providers, policymakers, and local governments, will benefit from the study's findings. Healthcare professionals can use this information to improve counselling and support for pregnant women. Authorities can enhance national policies and vaccination strategies, while local governments can design regional campaigns that address specific socioeconomic and healthcare access challenges.

Civil society groups, religious organisations, and NGOs can leverage these insights to promote advocacy and health campaigns. Researchers in maternal health and public health can use the study's qualitative and quantitative data to assess vaccine hesitancy and health communication strategies. The focus on Nairobi City County serves as a case study to understand urban health dynamics and the impact of healthcare access, education, and urbanisation on vaccination decisions.

The study focused on pregnant women since during the outbreak of the pandemic in Kenya, there were many vulnerable groups identified by the Ministry of Health in Kenya. However, all the vulnerable groups including the elderly, only pregnant women were at first not considered for vaccination. The study also focused on pregnant women since during pregnancy another life of an unborn child is also at risk making them extremely vulnerable.

The study identifies how exposure to misinformation, belief in vaccine efficacy, and negative narratives affect pregnant women's choices. These insights will help health professionals and communicators address concerns through trusted channels. The findings will also guide future research, identify knowledge gaps, and support the development of more effective vaccination

strategies, targeted health messages, and a deeper understanding of pregnant women's needs and fears.

1.10 STRUCTURE OF THE STUDY

This study is methodically arranged into six chapters, each focusing on a critical part of the research regarding COVID-19 vaccine uptake among pregnant women in Nairobi City County. This framework establishes a coherent structure, guaranteeing clarity and unity throughout the report. Every chapter expands upon its predecessor to thoroughly examine the research aims, methods, findings, and consequences. The study commences with a contextual introduction that examines the global and local relevance of the research issue, succeeded by a literature survey and theoretical foundations. The methodology is elaborated, specifying the research design and data gathering methods, concluding with the presentation and interpretation of findings. Ultimately, recommendations and conclusions are presented to furnish useful insights and guide future study endeavours.

1.10.1 Chapter One: Introduction and Background

This chapter lays the foundation for the study by delineating the issue and providing an overview of the pandemic while at the same time emphasising its overall effect on vulnerable populations, particularly pregnant women. It reiterates the significance of vaccine uptake in mitigating health risks and the challenges associated with vaccine hesitancy. The chapter outlines the research problem, defines the study's objectives, and outlines the research questions to guide the investigation. The background section analyses the context of vaccine distribution in Kenya, concentrating on initiatives targeting pregnant women. It provides a summary of worldwide and regional vaccination rates and analyses factors influencing vaccine uptake in brief. The chapter concludes by emphasising the study's importance in addressing gaps in understanding and promoting evidence-based approaches to improve vaccine acceptability among pregnant women.

1.10.2 Chapter Two: Literature Review

Chapter Two explores the existing evidence regarding vaccination acceptability, emphasising issues like various factors that impact vaccine uptake, especially among pregnant women. The chapter begins with an analysis of global vaccine hesitancy trends, identifying key factors such as socioeconomic status, educational attainment, cultural perspectives, healthcare access, and communication strategies. The determinants are further analysed concerning pregnant women, whose vaccination decisions are influenced by concerns about potential effects on maternal and foetal health.

This chapter identifies critical gaps in existing research, emphasising the lack of localised studies that consider the unique socio-cultural and economic context of Nairobi City County. While global studies provide valuable insights, they may not adequately capture the complexities of vaccine acceptability among specific populations. This chapter emphasises the importance of targeted research that integrates global perspectives with local contexts to inform policies and interventions. This chapter delivers a solid foundation for the objectives and subsequent chapters through a thorough analysis of relevant aspects, thereby ensuring that the research is firmly rooted in empirical evidence and theoretical understanding.

1.10.3 Chapter Three: Theoretical Underpinnings and Conceptual Framework

Chapter Three analyses the theoretical models and frameworks that establish a systematic basis for understanding the determinants affecting the acceptance of COVID-19 vaccination among pregnant women in Nairobi City County. The Theory of Planned Behaviour (TPB) is pivotal to this discourse, as it includes the effects of attitudes, social norms, and perceived behavioural control and analyses how external pressures and self-efficacy influence decision-making. The chapter also integrates the Social Cognitive Theory (SCT) and the Social Ecological Model (SEM) to examine how interpersonal interactions, societal norms, and systemic factors, including healthcare infrastructure and government laws, jointly influence vaccine behaviours. This chapter

synthesises these theories into a unified conceptual framework that connects the study's variables, namely, socioeconomic determinants, cultural attitudes, and trust in healthcare systems, with vaccination acceptance.

The framework integrates global theoretical viewpoints with local contexts to elucidate the links among individual, community, and systemic elements that affect vaccination decisions. This theoretical framework guarantees academic rigour, directing data gathering and analysis while providing practical insights for mitigating vaccine reluctance. This chapter identifies deficiencies in current research and establishes this study as a significant addition to the continuing discussion over vaccination uptake, especially among at-risk groups such as pregnant women in Nairobi County.

1.10.4 Chapter Four: Research Methodology

Chapter Four sets out the research methods utilised to systematically and comprehensively fulfil the study's objectives. The discussion begins with the research design, employing a mixed-methods approach that combines qualitative and quantitative methodologies. This dual methodology provides a comprehensive examination of the determinants influencing COVID-19 vaccine acceptance among pregnant women in Nairobi City County. This chapter explains the rationale for selecting this design, highlighting its ability to triangulate data, enhance reliability, and capture both statistical trends and detailed personal experiences.

The document defines the target group as pregnant women accessing healthcare services in public amenities in Nairobi City County and goes on to describe the sampling methods used to achieve an accurate representation of the population. Stratified random sampling ensured representation across various socioeconomic and cultural backgrounds, with the sample size determined by statistical criteria to produce reliable outcomes. The chapter provided a comprehensive overview of the data collection methodologies employed. Structured questionnaires enabled the gathering of quantitative data, while semi-structured interviews which formed the Key Informant Interviews (KII) and focus group discussions provided qualitative insights.

Document analysis improved primary data by providing contextual insights regarding vaccine policies and healthcare practices. This chapter further outlined procedures to maintain the integrity of findings, including the pre-testing of instruments and the cross-verification of data sources to ensure dependability and validity.

Ethical considerations, including obtaining informed consent, maintaining participant confidentiality, and securing ethical approval from relevant authorities, were addressed to ensure compliance with research ethics. The chapter further outlined the employed data analysis methodologies, stipulating the use of statistical tools and thematic analysis to ensure that the findings are in alignment with the study's conceptual framework and objectives.

1.10.5 Chapter Five: Findings

A comprehensive summary and analysis of the study's findings, carefully structured according to the objectives and research questions is provided in Chapter Five. The report commences by detailing vaccine acceptance rates among pregnant women in Nairobi City County, highlighting the uptake levels and the significant demographic and socioeconomic aspects linked to vaccination.

The chapter examines the efficacy of current communication tactics, demonstrating how policy directives and public health initiatives have influenced perceptions and decision-making. It also analyses cultural and socioeconomic elements that serve as facilitators or obstacles to vaccine adoption, highlighting patterns and linkages that arise from the data. Quantitative results are substantiated by statistical metrics, whereas qualitative data offers intricate insights into the participants experiences and perspectives. Visual representations, including charts, graphs, and tables, enhance analysis by providing clear and succinct depictions of trends and correlations. This chapter synthesises these results with current literature, juxtaposing the findings against global and regional studies on vaccination acceptability.

This contextualisation emphasises the distinctive features of vaccine adoption in Nairobi County, while recognising common problems and potential avenues

for intervention. Additionally, the discourse examines possible biases or constraints in the results, so ensuring transparency and dependability. This chapter connects to the objectives while offering a thorough summary of the study's results and establishing a foundation for the subsequent actionable recommendations.

1.10.6 Chapter Six: Recommendations and Conclusions

Chapter Six draws the key conclusions and consolidates the results of the research into actionable recommendations that help in enhancing COVID-19 vaccination acceptance among pregnant women. These recommendations are designed for essential all parties involved, including politicians, healthcare providers, community leaders, and non-profit organisations. The chapter finishes by encapsulating the suggestions for further studies.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Coronavirus Disease-19 (COVID-19) is caused by the SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus), a novel strain within the coronavirus family (Ullah et al., 2024). The virus was initially found in Wuhan, China, in December 2019 and swiftly disseminated worldwide, prompting a global pandemic. SARS-CoV-2 is extremely transmissible and predominantly spread via respiratory droplets, resulting in considerable health, social, and economic difficulties globally (Foucher et al., 2021). Initial signs of COVID-19 comprise an elevated temperature, coughing, shortness of breathing, discomfort in the muscles and joints, headaches, and weariness associated with respiratory problems (Li et al., 2020). Patients with more severe forms may even suddenly lose their sense of taste or smell or have them change without any nasal obstruction (Santos et al., 2021). It may be necessary to hospitalise the patient for respiratory restoration when the virus is acting severely. Following its identification, COVID-19 has caused an estimated 7 million fatalities worldwide out of 704 million cases (Shervani, et al., 2023).

People who are sick with COVID-19 are particularly infectious since the illness spreads by proximity and tiny droplets from sneezing or coughing (Hafeez et al., 2020). By contacting an infectious surface or item and then contacting the area around your eyes, nose, and mouth with those infected hands, COVID-19 can also be transmitted. It's also important to realise that those who have the virus can distribute it to individuals regardless of when they exhibit indications (Parvin 2020). The World Health Organisation (2021) advises the use of face masks in crowded settings with a high risk of COVID-19 transmission, frequent hand washing with soap and water for at least 20 seconds, along with the use of hand sanitisers containing a minimum of 60 per cent alcohol, adherence to social distancing protocols, self-isolation upon the onset of suspicious symptoms, daily cleaning and disinfection of frequently touched surfaces, and proper etiquette for coughs and sneezes. The virus is identified using Reverse

Transcription-Polymerase Chain Reaction (RT-PCR) testing, which analyses of respiratory secretions collected through nasopharyngeal swab collection. Clinical signs and symptoms are utilised for diagnostic purposes (Falzone et al., 2021). The nasopharyngeal swab collection procedure requires placing a clean swab via the nostril along its cavity's floor for a length equivalent to the ear's outer lobe (Gallup et al., 2020). A serological test that will provide a clear picture of whether a patient has COVID-19 infection or not should be used in addition to this (Funari, et al., 2020).

The substantial decrease in preventable diseases via vaccination represents a significant milestone in population health. However, there is a relatively small but vocal minority that has chosen not to vaccinate their youngsters and is strongly opposed to any type of childhood vaccination (Larson 2018). The anti-vaccination attitude appears to have a significantly higher influence on the public's opinions than the number of people who are uncertain about receiving injections. Along with difficulties in getting children vaccinated, elderly vaccination, particularly against influenza, has a poor history. In the United States, only 45 per cent of adults receive the flu vaccine, despite significant promotional initiatives (Black et al., 2016). The issue at hand was how to encourage individuals to accept the COVID-19 vaccine, which is now available and serves as an essential measure in combating the disease outbreak. This phenomenon is attributed to low adult vaccination rates and a rise in vaccine hesitancy, rather than a pronounced anti-vaccine position. This study utilised a representative sample of pregnant women from Nairobi County, Kenya, to evaluate the efficacy of Kenya's current national policy guidelines and examine how the perceptions of COVID-19 vaccine were influenced by communication from the Ministry of Health, as well as various socioeconomic and cultural factors and the overall level of public trust.

2.2 LITERATURE SEARCH STRATEGY AND KEY WORDS

The literature search for this study was designed to be systematic, comprehensive, and aligned with the study objectives to capture both historical debates on maternal vaccination and emerging evidence related specifically to COVID-19 vaccination during pregnancy. The search was carried out between

January 2022 and December 2024, a time frame that allowed for the inclusion of previous foundational literature on maternal vaccination while guaranteeing the inclusion of peer-reviewed papers published both during and after the global rollout of COVID-19 vaccinations. Due to their extensive coverage of public health, epidemiology, health policy, and social science research, major electronic databases such as PubMed/MEDLINE, Scopus, Web of Science, ScienceDirect, Google Scholar, and Hinari were chosen. To obtain policy documents, guidelines, and reports that might not be indexed in academic databases but are crucial for comprehending policy formulation and implementation in low- and middle-income country contexts, grey literature was also methodically reviewed from reputable institutional sources like the World Health Organisation, the Centres for Disease Control and Prevention, UNICEF, and the Kenya Ministry of Health.

Boolean operators (AND, OR) were used in a structured keyword strategy to enhance sensitivity while preserving relevance. The core search terms included maternal vaccination, pregnant women AND vaccine uptake, COVID-19 vaccine AND pregnancy, vaccine hesitancy in pregnancy, health policy AND maternal vaccination, socioeconomic factors AND vaccine uptake, cultural beliefs AND vaccination, and trust in vaccines. These terms were specifically chosen to represent the multifaceted character of vaccination uptake, taking into account behavioural, cultural, socioeconomic, and policy-related viewpoints. To improve retrieval accuracy, Medical Subject Headings (MeSH) and database-specific thesaurus phrases were used as needed. To maintain uniformity in interpretation and applicability to the Kenyan context, searches were limited to English-language publications including human subjects; nevertheless, non-English regional research was acknowledged as a potential constraint.

The reference lists of all included papers were personally inspected to find additional pertinent research that would not have been found through database searches alone, strengthening the review's completeness. Finding regional and African-based studies, which are frequently under-represented in indexed databases, was made easier with the help of this snowballing strategy. The

literature on COVID-19 vaccines, proven maternal vaccinations like influenza and tetanus, and general vaccination studies were all carefully distinguished throughout the review process. Given the unique features of COVID-19 vaccines, such as their quick development, emergency authorisation, and increased public scrutiny, this intentional distinction was necessary to prevent conceptual confusion.

2.3 CONCEPTUALISING THE VACCINE UPTAKE

Vaccine hesitancy is an idea that has been explained in a number of different ways (Bussink-Voorend et al., 2022). This word can be used when people have questions and concerns about vaccinations, even if the vaccines haven't yet been given despite its availability (World Health Organisation. 2014). People are more likely to get vaccinated when they forced to in order to go to school or travel. However, some people are still hesitant. Vaccine acceptance should not be equated with vaccine uptake (Del Duca et al., 2023). Individuals or groups make the decision to either accept or decline vaccination when presented with the opportunity (World Health Organisation. 2014). Vaccine uptake refers to the percentage of a population that has been vaccinated with a specific vaccine. Vaccine uptake is not synonymous with vaccine acceptance, as it fails to account for the opportunity to either accept or decline vaccination. So, vaccine uptake rates alone cannot tell you how much people in a country or subgroup are willing to or aren't willing to get a vaccine.

Vaccination is a quick, easy, and reliable method of preventing a population from contracting a disease or diseases before they come into touch with them (Korn et al., 2020). Vaccines, which can be given orally or by injection, are merely weakened versions of bacteria or viruses that expose one to the risk of complications without actually causing the disease. The immune system is only being trained to produce antibodies in the same way that it does when it is exposed to the disease (Haynes et al., 2020). No medication, whether generic or otherwise, has yet to be effective enough to be recommended as appropriate for ambulatory care against COVID-19 (Thorakkattil et al., 2021). While at least 75 per cent of the populations in Qatar, Singapore, and the United Arab Emirates have received all advised vaccinations, more than 30 strains of

vaccines have been approved for routine and even emergency use in nations around the globe (Sam-Agudu et al., 2022).

As of early March 2021, most countries, including the United States, had approved the use of vaccines developed by Pfizer/BioNTech, Moderna, and Janssen (Anonymous 2021). It became clear after analysing the data from the Pfizer/BioNTech, Moderna, and Janssen vaccines that they are incredibly successful at shielding people with chronic illnesses from excessive COVID-19 without posing any security risks (Thanh Le et al., 2020). The three therapies were safe for pregnant women, but questions about dangers, complications, and safety have not been satisfactorily answered. To maximise the protective effects of the vaccine, both the Pfizer/BioNTech and Moderna vaccines necessitate two doses administered three to four weeks apart (Malik et al., 2020).

The newly developed Janssen vaccine, however, only needed one shot. Following vaccination, the vaccinated may experience a variety of side effects, including fatigue, muscle pains, chills, and fever, which typically subside in a few days to demonstrate that the immune system is working (Murphy et al., 2021). The COVID-19 vaccines remain relatively novel, and due to limited research on their cumulative effects on the immune system, the long-term efficacy remains uncertain (Mohammed et al., 2022; Zhuang et al., 2022). Surprisingly, people are still urged to follow the WHO guidelines for containing the virus even after getting the COVID-19 vaccines because they can still acquire the illness-causing virus and spread it to others (World Health Organisation. 2021).

2.4 GLOBAL BEST PRACTICES ON VACCINE UPTAKE

2.4.1 Vaccine Uptake Worldwide

A comprehensive analysis of research employing a large, national sample (n=58,656) was conducted to ascertain the proportion of persons who devoted to taking or oppose the vaccination against COVID-19 when it became widely accessible (Robinson et al., 2021). More than 50 per cent of the sample from 12 countries exhibited a reduction in vaccination intentions while a rise in

vaccination refusal intentions. Factors including gender, age, income level, educational attainment, and ethnic minority status were consistently linked to reduced intentions to receive the vaccine. The results indicate a global trend of reduced vaccination intentions subsequent to the introduction of the COVID-19 vaccine. With the increasing availability of vaccines, it is essential to tackle societal disparities in vaccine hesitancy to promote widespread vaccination.

Pregnant women face a higher risk regarding complications related to COVID-19 equated to the general population, potentially resulting in a greater need for intensive care and an increased mortality risk (Allotey et al., 2020). The likelihood of vaccinations was significantly predicted by the perception of COVID-19 as an infectious disease and concerns about getting pregnant during the epidemic. To protect one's unborn child from harm, getting vaccinated against COVID-19 was primarily justified. Nearly 14.9 per cent of non-vaccinated survey participants intended to get vaccinated while pregnant, 35.3 per cent afterward, and 28.6 per cent had no plans to get vaccinated, and the remaining 21.1 per cent were unsure. Fear over the side effects of vaccines served as a main resistance for people who had no intention of getting vaccinated. At the time of pregnancy (for postpartum respondents) or the expected month of birth, approximately 40 per cent of the surveyed women had been given at least one dose of the COVID-19 vaccine. The results indicate that, in the absence of explicit vaccination recommendations for pregnant women, over one-third opted to receive the vaccine.

Studies have shown that vaccination is a secure and efficient method to shield expectant mothers from the potentially harmful effects of influenza and to lower the risk of pertussis and flu in their unborn children (Goncu Ayhan et al., 2021). A notable percentage of unvaccinated women identified safety concerns as their primary rationale and reasoning for not accepting the vaccine, despite vaccinated women expressing comparable apprehensions (Ryan et al., 2020). Safety-related concerns have been identified as a significant obstacle to the acceptance of prenatal vaccinations, frequently exacerbated by media reporting. The significant barrier included a lack of trust among healthcare professionals to discuss vaccination and understanding gaps among pregnant

mothers. Across several studies, women with a history of vaccine refusal and those who believed that there was no threat of infection were both less highly probable to consent to vaccination. The results emphasise the need for more studies to investigate context-specific factors which may include HCPs' and pregnant women's absence of vaccine self-belief as well as policy and social determinants to people accepting the vaccine.

Geoghegan et al. (2022) undertook an extensive narrative synthesis to systematically examine the key drivers and constraints influencing maternal vaccination uptake across diverse global contexts, with the intention of informing future vaccine policy development for pregnant populations. The review followed a structured methodology, with comprehensive searches conducted primarily in MEDLINE and adapted for use across additional databases, alongside independent screening by two reviewers using clearly defined eligibility criteria. Data extracted from the results sections of included studies were subjected to thematic coding, allowing for synthesis of recurrent patterns related to health system factors, behavioural influences, and institutional arrangements. In total, 321 studies met the inclusion criteria, the majority of which originated from high-income regions such as North America, Europe, and parts of East Asia and Oceania. Evidence from low- and middle-income countries was notably scarce, with sub-Saharan Africa contributing only a small fraction of the included studies. The analysis identified healthcare provider endorsement, perceptions of infant safety, physical and financial access to services, and social characteristics such as race and migration status as central determinants of maternal vaccine uptake. Importantly, the authors highlighted a significant research gap regarding the underlying causes of observed racial and socioeconomic disparities, limiting the transferability of findings to settings like Kenya, where health system decentralisation and resource inequities play a critical role in policy implementation.

A global and widespread resistance to the COVID-19 vaccine for coronavirus illness is noticeable, though. Consequently, it is essential to comprehend vaccination behaviour patterns to increase vaccine coverage and thereby freshen the inflammation slope. The study by Marzo et al., (2022) examined the

attitudes of older and middle-aged individuals in six Southeast Asian countries underlying the vaccine as well as recognise the various factors that highly impact on vaccine hesitancy. The survey indicated that 81.2 per cent of participants recognised the role of vaccination in mitigating and controlling COVID-19, whereas 84.0 per cent stated their readiness to receive the vaccine if it were to become available. The study identified several key factors that primarily affect the propensity for decision making to accept the COVID-19 vaccine, endorsements from assorted healthcare professionals(83.1 per cent), ease of access to the vaccine (75.6 per cent), and the cost of the vaccine (62.8 per cent).

In a recent investigation in Romania examining vaccination rates through a sample of 404 mothers and 413 children, telephone interviews with mothers who declined vaccination were used to understand their rationale for refusal (Lova et al., 2025). The findings indicated that children of mothers who supported vaccination were more likely to have completed the full vaccination schedule than those of mothers who expressed hesitancy. Of the children who were either not fully vaccinated or had received no vaccinations, 73.08 per cent had mothers categorised as hesitant. Nonetheless, 90.05 per cent of mothers in the hesitant group proceeded to vaccinate their children with all recommended vaccinations, whereas 9.95 per cent maintained their refusal. Only 3.22 per cent of the total sample, exclusively from the GNV group, fully rejected vaccinations. Reasons for refusal primarily included concerns regarding potential side effects, lack of confidence in vaccines or the healthcare system, prior negative experiences with vaccinations, and the impact of media or social networks. While vaccination behaviours may enhance with age, a significant proportion of hesitant parents persists, resulting in suboptimal vaccination coverage. Most expectant mothers said they prefer to receive their shots within the same setting as their antenatal care.

In a global mapping study by Sallam, et al., (2022), data from 114 surveys were analysed to create a narrative review aimed at understanding and addressing COVID-19 vaccine hesitancy. In East and Southern Africa (n = 9), Ethiopia exhibited the highest vaccine acceptance rate at 92 per cent , whereas

Zimbabwe the lowest at 50 per cent . In West and Central Africa (n = 13), Niger exhibited the highest rate at 93 per cent , while Cameroon the lowest at 15 per cent . In the Asia and Pacific region (n = 16), Nepal and Vietnam recorded the highest acceptance rates at 97 per cent , whereas Hong Kong the lowest rate at 42 per cent . In Eastern Europe and Central Asia (n = 7), Montenegro exhibited the highest rate at 69 per cent , followed by Kazakhstan at 64 per cent , while Russia recorded the lowest rate at 30 per cent . In Latin America and the Caribbean (n = 20), Mexico exhibited the highest vaccine uptake at 88 per cent , whereas Haiti recorded the lowest at 43 per cent . In the Middle East and North Africa (MENA, n = 22), Tunisia exhibited the highest rate at 92 per cent , whereas Iraq presented the lowest rate at 13 per cent . In Western and Central Europe, as well as North America (n = 27), Canada (91 per cent) and Norway (89 per cent) exhibited the highest acceptance rates, whereas Cyprus and Portugal the lowest at 35 per cent . In 72 of the 114 countries, vaccine acceptance rates exceeded 60 per cent , whereas 42 countries reported rates ranging from 13 per cent to 59 per cent . Vaccine hesitancy was particularly pronounced in the MENA region, Europe and Central Asia, as well as Western and Central Africa. However, the aforementioned surveys did not include the African context in their examination of public willingness to receive the COVID-19 vaccine.

In Thailand, a study examined the factors impacting pregnant women's desire to get the COVID-19 vaccine as well as the vaccine's acceptance rate (Nirunrungraung et al., 2024). Just 34 (17 per cent) of the 200 individuals in the survey indicated that they would be open to receiving a vaccination while pregnant. On the other hand, 83 per cent of individuals refused to get the vaccination. mRNA vaccinations were the most popular among those who were willing (45 per cent). The desire to safeguard the infant (72.22 per cent) and to prevent infection and lessen the severity of the condition (97.22 per cent) were among the factors driving vaccination acceptance. Some participants felt their chance of getting COVID-19 was low (21.47 per cent), and others expressed concerns about the safety of the vaccine during pregnancy (18.29 per cent). The main concerns affecting vaccine rejection were fears of injury to the baby (77.44 per cent) and to themselves (25.61 per cent). The results of

this study were based on a small sample size and did not thoroughly examine how socioeconomic variables, or cultural attitudes affect pregnant women's acceptance of vaccines.

A study examined socioeconomic disparities in influenza vaccination rates among individuals aged 15 and older across all 27 EU member states and two non-EU countries, Iceland and Norway (Jemna et al., 2024). The analysis categorised the population into four age groups including the adolescents, young adults, adults, and the elderly to examine variations in vaccination patterns among these subgroups. The findings indicated substantial socioeconomic disparities in influenza vaccination rates, with marked variations observed between countries, especially within older demographics. The research indicates that income and education serve as significant predictors of socioeconomic status associated with flu vaccination rates. The variations within each population group were influenced by geographical location and occupational status. For the elderly, variations in vaccine uptake were influenced by country-level factors, such as the healthcare system type, public funding, out-of-pocket healthcare expenses, and the accessibility of general practitioners.

In Ireland, vaccination against pertussis and seasonal flu during pregnancy is advised, and every year, nationwide promotions are held to make people aware and boost absorption. Concerning factors affecting vaccination status, a study assessed the consumption of whooping and vaccines against influenza amongst women who were pregnant in 2017–18 in Ireland (Quattrocchi et al., 2019). Both the absorption of influenza and pertussis vaccines was correlated with vaccination campaign awareness and Socioeconomic Status (SES). By level of consciousness, the relationship between SES and vaccination uptake varied. Similar to the way women with mid and low SES who were oblivious of the pertussis vaccination initiative were less likely to get immunised compared with those who were conscious and had substantial SES, these women were less probably to get immunised when they were conscious of the influenza vaccination promotion. The main justification for having received the influenza

vaccine was an overall physician's (GP) guidance (39.2 per cent), and 71.8 per cent of women's GPs strongly suggested pertussis vaccination.

In Brazil, a longitudinal study evaluated the baseline data, looked into the uptake of influenza vaccination among older people in Brazil. Seventy-three per cent of individuals received the influenza vaccine, falling short of the 80 per cent target established by the national healthcare ministry (Sato et al., 2020). The main reasons for declining vaccination included sociocultural misconceptions regarding its efficacy and apprehensions about possible side effects. The economic status did not seem to affect vaccination rates. The absence of socioeconomic disparities indicates a change in the obstacles to vaccination. The findings offer important insights for customising professional guidance and influencing public perceptions of the vaccine in the development of public health strategies.

In France, between 2015 and 2016, Descamps et al., (2020) evaluated influenza vaccination and reluctance patterns among women who were pregnant. The research analysed data from 11,752 women who delivered in March 2016, with their information assessed before discharge from the medical facility. The results indicated that merely 7.4 per cent of pregnant women reported receiving a recommendation from a physician to obtain the influenza vaccine. Factors influencing vaccine uptake included low parity, elevated education levels, employment in healthcare during pregnancy, and pre-existing risk factors for influenza. Vaccination rates increased when a medical professional acted as the primary healthcare provider. Women with medium or low educational attainment exhibited a significantly higher propensity to decline the influenza vaccine, despite recommendations from healthcare providers. France demonstrates notably low influenza vaccination rates, largely attributed to frequent refusals among women and sporadic recommendations from healthcare providers.

The German national COVID-19 vaccination plan, initiated in November 2020, mandated long-term monitoring studies for pregnant women (Pley and Kampmann 2024). However, it excluded them from clinical trials and lacked definitive strategies for facilitating early vaccine access for this group, which

was already identified as being at an elevated risk of severe illness. Despite the establishment of various networks of academic institutions and university hospitals throughout the COVID-19 pandemic, including the Collaborative Immunity Platform of the Network of University Hospitals (COVIM), which coordinated investigations into how the immune system responded to COVID-19 infection and vaccination among German university healthcare facilities, an interdisciplinary research network for clinical appointments vaccine studies, particularly concerning pregnancy, is still lacking.

An evaluation conducted in Switzerland assessed the safety and effectiveness of the Pfizer-BioNTech COVID-19 vaccine via a systematic review (Donaldson, 2024). The research identified ten cohort studies meeting the inclusion criteria, encompassing 44,883 pregnant women (mean age 30.7 years) who received one or two doses of the Pfizer-BioNTech vaccine, contrasted with a control group of 34,988 unvaccinated pregnant women (mean age 30.0 years). The findings demonstrated no adverse effects associated with the Pfizer-BioNTech vaccine at any stage of pregnancy, with only a limited number of maternal, foetal, and neonatal outcomes exhibiting a decreased risk of occurrence. The Pfizer-BioNTech vaccine is considered safe and effective for use in pregnancy. This study seeks to fill the gap in updated, localised data regarding the impact of COVID-19 vaccination on pregnant women, specifically in Nairobi City County, Kenya, where societal, cultural, and healthcare dynamics may differ from those in regions such as Switzerland.

A multi-centre investigation in India from November 2021 to June 2022, involving 172 pregnant women who attended antenatal clinics at three public hospitals in West Bengal (Khan et al., 2024). The survey gathered data regarding vaccination coverage, knowledge, intention, willingness to pay for the influenza vaccine, and factors influencing decisions related to Td, influenza, and COVID-19 vaccinations. Of the participants, 152 out of 172 (88.4 per cent) were administered the Td vaccine, 159 out of 172 (93 per cent) received the COVID-19 vaccine, 1 out of 172 (0.6 per cent) received the influenza vaccine, and none were given the Tdap vaccine. Furthermore, 10 of 168 individuals (6 per cent) had been vaccinated against Hepatitis B. The guidance provided by

community health workers significantly influenced the acceptance of the Td vaccine and contributed to the perception that the COVID-19 vaccine offered protection against the virus. A significant percentage of women lacked awareness regarding the Tdap vaccine (96 per cent), the influenza vaccine (75 per cent), and the associated risks of influenza during pregnancy and infancy (85 per cent). None of the women received recommendations from healthcare providers to obtain the influenza vaccine. Nonetheless, 93 per cent of participants indicated a willingness to receive the influenza vaccine and to pay between INR 100 and 300 (95 per cent CI: ≤ 100 to 300–500) [$\$1.3$ – 4.0 (95 per cent CI: ≤ 1.3 , 4–6.7)] for it.

A study conducted in Iran from February to August 2022 explored the factors influencing vaccine hesitancy among pregnant women in the cities of Zahedan and Tabriz (Fathnezhad-Kazemi et al., 2024). The research involved 650 pregnant women visiting multiple healthcare facilities. The researchers employed questionnaires to collect data regarding sociodemographic characteristics, knowledge, vaccine acceptance, and health-related beliefs concerning vaccination. The analysis employed descriptive and inferential statistical methods, including Analysis of Variance (ANOVA), independent t-tests, and multivariable logistic regression. The findings indicated that 47.4 per cent of participants accepted the vaccine, whereas 52.6 per cent exhibited hesitancy towards vaccination during pregnancy. The logistic regression model indicates that vaccine acceptance was more likely among employed women, individuals with higher education levels, those with increased income, and individuals with greater awareness. The likelihood of vaccine acceptance was positively correlated with higher perceived susceptibility and greater perceived benefits.

In Italy, Fallucca et al., (2024) conducted a cross-sectional study in Italy from 2021 to 2022 to evaluate the intentions of pregnant women concerning the concurrent administration of influenza and COVID-19 vaccines. This study sought to identify factors affecting vaccination attitudes through a questionnaire, utilising the Health Action Process Approach theory to analyse the cognitive-behavioural dimensions of decision-making. The study involved

120 pregnant women, with a mean age of 32 years. The research identified that the primary factors associated with the willingness to receive both vaccines included a higher level of education (OR = 13.96; $p < 0.001$), optimistic expectations regarding vaccination outcomes (OR = 2.84; $p < 0.001$), and enhanced self-efficacy (OR = 3.1; $p < 0.001$). The study recommended that effective communication strategies for promoting influenza and COVID-19 vaccinations among pregnant women should emphasise the benefits and positive outcomes of co-administration, while also ensuring that clear and adequate information is provided to the women.

A study investigated the determinants affecting vaccination uptake in pregnant women while using a longitudinal survey involving pregnant mothers and healthcare professionals to monitor prenatal vaccination rates for influenza and whooping cough vaccines (Vilca et al., 2021). In the 2018–19 season, 14.9 per cent of pregnant women were vaccinated against influenza, whereas 60.9 per cent received the pertussis vaccine. Increased vaccination rates were associated with the recognition of the flu vaccine's safety for mothers and their newborns, along with prior vaccination in the preceding flu season. Being a stay-at-home mother has been linked to lower pertussis vaccination rates, while knowledge that the vaccine is safe and beneficial for expectant mothers and infants has been linked to higher vaccination rates.

A study aimed to improve the distribution of the COVID-19 vaccine in six low- and middle-income countries by identifying behavioural factors influencing public acceptance and offering recommendations for non-invasive strategies (Davis et al., 2022). A barrier assessment approach was employed to evaluate twelve key behavioural predictors of vaccine acceptance across Bangladesh, India, Myanmar, Kenya, the Democratic Republic of the Congo (DRC), and Tanzania. A total of 542 interviews were conducted across six countries, averaging 45 interactions with individuals intending to receive the vaccination. The results indicated a strong correlation between attitudes towards societal norms, perceived benefits and drawbacks, risk evaluations, trust, and expected personal experiences with the vaccine and vaccine acceptance in Bangladesh, Kenya, Tanzania, and the DRC. Additionally, research indicated that in

Myanmar and India, factors including self-image, trust in governmental communications regarding COVID-19, belief in divine intervention, and perceptions of the vaccine's effectiveness as a preventive measure significantly influenced behavioural attitudes toward vaccination. Otieno et al., (2020) investigated the views of pregnant women in Nairobi, Mombasa, Marsabit, and Siaya, Kenya, regarding influenza knowledge and vaccination.

In order to evaluate the prevalence of pertussis vaccination during pregnancy and to pinpoint knowledge gaps, attitudes, and vaccine barriers, an online survey in Italy revealed 37.4 per cent of the 404 moms whose babies were younger than a year old had not been vaccinated against pertussis while pregnant (Poeta et al., 2025). Misinformation (59.6 per cent), safety concerns (15.2 per cent), and previous vaccination or infection (7.3 per cent) were the main reasons given for not getting vaccinated. Furthermore, 9.4 per cent of individuals did not know that vaccinations may prevent pertussis. Regional differences in vaccine coverage were notable, with northern Italy showing greater vaccination rates (72.6 per cent) than southern Italy (49.7 per cent). Being from southern Italy, receiving false information, and being afraid of side effects were among the factors that contributed to missed vaccinations. While this study focused on pertussis vaccination, it does not address COVID-19 vaccination, or the specific challenges faced by pregnant women in Italy to it. The representativeness of the sample may have been limited by the online survey approach used in the study, which might have eliminated some groups of women without internet access. Prior research has mostly concentrated on other vaccinations or various geographical areas, paying little consideration to the socioeconomic, cultural, and communication aspects that affect vaccine adoption in this specific setting.

2.4.2 Vaccination in the United States of America

Wales et al. (2020) explored determinants of maternal Tdap vaccination through a retrospective review of prenatal and delivery records at a tertiary healthcare facility in the United States. The analysis revealed that just under two-thirds of pregnant women received the vaccine, typically during the third trimester. Factors positively associated with vaccination included receiving a

direct recommendation from a healthcare provider, availability of the vaccine within the facility, and prior acceptance of other maternal or infant vaccinations. Although socioeconomic variables were not explicitly measured, the findings indirectly point to the influence of healthcare system organisations and service integration on vaccine uptake. The study's single-center design and limited sample size restrict broader generalisation, particularly in low-resource settings. Additionally, the focus on a routine vaccine limits its applicability to COVID-19 vaccines, which face greater public scepticism. Despite these limitations, the study reinforces the importance of provider engagement and service accessibility as key facilitators of maternal vaccination.

In a national online dataset analysis comprising a representative sample of 1,012 Americans to investigate the socioeconomic factors influencing COVID-19 vaccine uptake (Viswanath et al., 2021), the results indicated that 68 per cent and 65 per cent of participants strongly endorsed vaccination for personal benefit and for the protection of individuals under their care. The perception of risk, encompassing both the severity and susceptibility to COVID-19, exhibited a significant positive correlation with increased vaccination rates. Non-Hispanic Black individuals and those with lower educational attainment exhibited lower vaccination rates for themselves and their children. The research identified multiple factors affecting vaccine acceptance, including ethnicity and race, risk perceptions, access to COVID-19 information via media, political beliefs, and trust in researchers.

Razzaghi (2023) analysed national survey data from the United States to assess coverage and hesitancy related to influenza, Tdap, and COVID-19 vaccinations among pregnant women during the 2022–2023 influenza season. The findings revealed moderate uptake of routine maternal vaccines but substantially lower receipt of COVID-19 booster doses. Over successive seasons, reported vaccine hesitancy increased, particularly among women who did not receive provider recommendations. Although the study did not directly investigate alternative preventive behaviours, rising levels of hesitancy suggest that unvaccinated women may rely on non-pharmaceutical strategies to reduce infection risk. The consistent influence of healthcare provider advice highlights

the importance of trusted communication in shaping vaccine confidence. The absence of data on alternative protective practices represents a notable gap, reinforcing the relevance of the present study's focus on how unvaccinated pregnant women in Nairobi seek to protect themselves against COVID-19.

In the USA, the ongoing vaccination for COVID-19 has demonstrated effectiveness in curbing virus transmission. Nonetheless, this study emphasised that, in specific contexts, the cost of the vaccine significantly impacts its adoption (Gutierrez et al., 2022). Low vaccine likelihood was shown to be associated with racial and ethnic background, schooling completed, annual income of the household, relationship status, and the geographic area of the USA. Non-Hispanic Black individuals had 1.83 times the adjusted the probability of indicating a low probability as non-Hispanic White individuals. Amongst those who were expectant or had just given birth, lactation activity was the most reliable indicator.

The adverse consequences keep affecting our community if high COVID-19 vaccination rates are not achieved. Moreover, getting the recommended vaccination coverage is significantly hampered by vaccine fear. Following an analysis of the relationship between COVID-19 vaccination and vaccine hesitancy, a study explored whether social variables were also linked to both effects (Khairat et al., 2022). The research project developed and evaluated a longitudinal county-level variety of information that included demographic information from 3142 US regions, vaccination uptake including refusal levels, and vaccination rates. The research results showed that COVID-19 vaccine reluctance and vaccination uptake percentages had an important inverse association. Their research showed that the three main significant variables associated with a low vaccination threshold in highly fearful communities were low educational attainment, vaccine phobia, and poor accessibility.

In the quest to determine whether Americans would get vaccinated against COVID-19, researchers considered unpredictability, homogeneity among participants, and the interrelations between both the vaccine and individual qualities using community logistic regression models (Vásquez and Trudeau 2021). The cost of the vaccine results in a decrease in COVID-19 vaccination

rates. Providing the COVID-19 vaccine at no cost may encourage many individuals to obtain it; however, a strategy that emphasises only the financial aspect of vaccination may not be adequate to reach the necessary vaccination rate thresholds. Therefore, we must implement a multifaceted approach that addresses psychological, social, and cultural factors that influence individuals' vaccination decisions. Public health programs can create a more welcoming environment that encourages people to get vaccinated by combining financial incentives with targeted communication campaigns and community involvement.

Getting the COVID-19 vaccine is a key part of improving worker health and the economy's recovery after the COVID-19 illness epidemic (Burch et al., 2021). The findings revealed that respondents (N=946) who showed increased vaccine intention were male, older, and had higher income and education levels. Educational materials designed for population characteristics with low vaccination uptake should indeed emphasise the higher standard of transmissibility associated with COVID-19. These results are consistent with the findings of a study, which found that 60 per cent of older individuals indicated they would ultimately "certainly" or "probably" partake in the COVID-19 vaccine if it were currently available (Diesel et al., 2021). This finding highlights the importance of targeted communication strategies that address specific concerns and misconceptions prevalent in these demographics.

The first wave of the disease outbreak was the subject of this cross-sectional online survey, which included 6697 participants from 20 different nations (Enea 2023). According to the results, motivations to be vaccinated against COVID-19 were revealed positively by 72.9 per cent of respondents. Country-level factors, such as dimensions of a culture of idealism and authority distance, had no massive effect on vaccination motivations. Vaccine hesitancy is likely to impact the acceptance of the vaccine. The social, information-sharing, and independent determinants of vaccination uptake were examined by Viswanath et al., (2021). The information used in the research, which was done before vaccinations were widely available, came from a nationwide web probability-based panel of 1012 relevant Americans. Members of minority groups and the

official poverty line were regularly sampled. The probability of individuals receiving vaccinations themselves and the probability of vaccinating those in their care, such as children, which examined actual behaviours, were the primary outcome factors of interest. The findings indicate that 68 per cent and 65 per cent of survey participants respectively expressed willingness to receive vaccination for themselves and those under their care. The likelihood of vaccinating oneself or one's children is lowest among Republicans, "conservative" news consumers, and people who lack faith in scientists. Black people who were non-Hispanic and had less education had a lower likelihood of receiving vaccinations for themselves or those under their care. The danger to the world's economy and public health could grow and be prolonged if acceptance of COVID-19 vaccines are rejected. A crucial first step in understanding and removing the obstacles to vaccine acceptance is the identification of predictors of behaviour.

Getting a vaccine is a safe as well as an effective approach towards the protection of pregnant women from the complications of flu and lower the risk of whooping cough in their unborn children (Qiu, Bailey and Thorne 2021). From a maternal and general healthcare physician (HCP) perspective, we will delve into the findings of the latest studies conducted in countries with substantial incomes and economies, focussing on the use of flu and pertussis vaccinations in pregnant women, the reasons behind vaccine scepticism, and the difficulties faced by users. Concerns about health and safety are a well-known obstacle to pregnant women receiving vaccines (Rottenstreich et al., 2022). A big problem was that many healthcare professionals didn't trust each other to explain vaccinations, and pregnant women didn't have enough information. This lack of trust and communication led to a lot of confusion and false information, which made it harder for people to get vaccinated.

2.4.3 Uptake of Vaccine in the United Kingdom

Walker et al. (2021) utilised a national population-based cohort design to investigate how social and demographic factors influence influenza and pertussis vaccination uptake during pregnancy in England. The study analysed linked electronic health records from primary care and hospital databases,

covering over 200,000 vaccine-eligible pregnancies. Substantial variation in uptake was observed across geographic regions, with particularly low coverage in London and the Northeast. Socioeconomic deprivation emerged as a strong predictor, with women in the most deprived areas exhibiting significantly lower vaccination rates compared to those in more affluent settings. Lower uptake was also consistently associated with younger maternal age, higher parity, and belonging to ethnic minority groups, particularly women of Black ethnicity. These associations remained stable after multivariable adjustment, indicating that each factor independently influenced vaccination behaviour. While the study's scale and methodological rigour enhance its internal validity, its relevance to Nairobi is constrained by differences in health system organisation and access. Nonetheless, the findings demonstrate that vaccine uptake is deeply embedded within broader patterns of social inequality, highlighting the need for similar analyses in African urban contexts.

A comprehensive nationwide study in Scotland provided extensive data to classify COVID-19 vaccine uptake as well as its counterpart in the influenza family SARS-CoV-2 infection rates among pregnant women (Stock et al., 2022). The Scottish COVID-19 vaccination lobbying began on December 8, 2020, and ended on October 31, 2021, with 18,457 expectant women receiving 25,917 dosages of the vaccine during that time. When compared to the broader female demographic of 18–44 years, pregnant women had considerably reduced vaccination rates. The extended perinatal mortality risk for infants born to mothers diagnosed with COVID-19 within 28 days of delivery was 22.6 per 1,000 infants. Pregnant women vaccinated at the time of diagnosis accounted for 77.4 per cent of SARS-CoV-2 cases, 90.9 per cent of related hospitalisations, 98 per cent of emergency room admissions, and all infant deaths. Addressing the low vaccination rates among expectant women is essential to ensure the safety of both the women and their unborn children during the ongoing global pandemic.

In the UK, Pakistani children of all ages during each of the study's years had higher vaccination uptake than White British children (Santorelli et al., 2020). Children of White British mothers who were raised abroad had a higher

likelihood of receiving some vaccinations than White British moms who were brought up in the UK, but kids of Pakistani mothers who had been brought up abroad had a higher likelihood of receiving a full vaccination than Pakistani children with mothers who were born in the UK. In both ethnic backgrounds, restricted vaccination was linked to socioeconomic and social situations like being one parent, receiving assistance that was subject to means testing, smoking during pregnancy (only in White British women), and possessing more kids residing in the home. The danger varied depending on the children's age and ethnicity, however, and was particularly high among White British youngsters. There was no evidence of a relationship between vaccination uptake and scholastic achievement. Religion was more important to HCWs from Pakistan and Africa than it was to White and Chinese communities. While female sex and older age both had numerous indirect impacts on hesitation, younger age had a direct impact (Mcmanus et al., 2021).

The likelihood of receiving the COVID-19 vaccine is high, as indicated by the VAX scale, which reflects minimal vaccine hesitancy (Stoeckel et al., 2022). Additional examination of the VAX scale's contributing factors indicated scepticism and apprehensions about the vaccine's possible adverse effects on children. Despite the recommendation for COVID-19 vaccination during pregnancy in the UK, a limited number of pregnant women opted to receive the vaccine. Skirrow et al., (2022) examined the acceptability of the COVID-19 vaccine among pregnant women, non-pregnant women, and their unborn children. A significant proportion of women surveyed (81.2 per cent) indicated that they would "definitely" or were "starting to lean towards accepting" the COVID-19 vaccine, irrespective of their pregnancy status. However, the reception of the COVID-19 vaccine during pregnancy and its implications for children was notably less favourable.

A study in the UK examined attitudes on the COVID-19 vaccine during pregnancy, with an emphasis on underserved groups and people with complex medical or social issues (Dasgupta et al., 2024). A total of 40 women, 15 partners, 21 healthcare professionals, and 20 policymakers from throughout the United Kingdom participated in 96 semi-structured interviews as part of the

study to share their experiences and opinions regarding COVID-19 vaccination during pregnancy. Three primary themes emerged from the study: (1) the social and historical background of suspicion regarding pregnancy-related drugs, (2) the dissemination of information and advice, and (3) the responses to the information that was accessible. Participants voiced worries about unclear advice for expectant mothers and missing, contradictory, or inaccurate information on COVID-19 vaccinations. The study's sample was restricted to the United Kingdom, and its emphasis on underrepresented groups might not accurately reflect the wider range of expectant mothers. Furthermore, it didn't investigate how well communication tactics work to alter vaccine hesitancy in these groups.

A review analysing the vaccine rates among pregnant women in European countries from August 2020 to May 2022 identified factors that affected their acceptance of the vaccine (Tsiaousi et al., 2024). The review indicated significant variation in vaccine uptake across Europe, with vaccination rates for at least one dose ranging from 21.3 per cent to 87 per cent, and for two doses from 29.5 per cent to 82.7 per cent. Higher vaccination rates were positively correlated with several factors, including elevated maternal education levels, advanced maternal age during pregnancy, previous influenza and pertussis vaccinations, favourable attitudes toward vaccines, and a history of vaccine acceptance in prior pregnancies. Building on these findings, a recent study examined the experiences of midwives in the UK concerning their discussions regarding vaccinations with pregnant women and their perceived influence on vaccine acceptance indicating that highlighting the significance of vaccinations, alongside standard information on vaccine availability and timing, may assist pregnant women in making more informed vaccination decisions (Grimley et al., 2025). Nonetheless, the reviewed studies mostly used single research approaches thus the findings are not consistent and validated using variety of research tools.

2.4.4 Uptake of Vaccine in China

The adoption of the vaccine and the various factors contributing to its resistance were studied in China, highlighting key influences on an individual's intention to

get vaccinated (Zheng et al., 2021). A total of 1295 participants were recruited, representing an absorption of 8.7 per cent . Vaccination as a form of self-protection and having faith in household medical advances were the two main justifications for getting vaccinated. Participants declined vaccination for the top two reasons: fear of negative side consequences and denial of HIV infection. Men exhibited significant scepticism regarding the efficacy as well as assorted outcomes associated with the vaccine and demonstrated increased resistance to the vaccine.

The international outbreak of COVID-19 has significantly raised awareness of asthma and vaccines for influenza. A study in China assessed the coverage and factors influencing the uptake of influenza and respiratory infection vaccinations in the years after the COVID-19 pandemic (Gong et al., 2021). The findings indicated a significant rise in the distribution of influenza and pneumonia vaccines, as well as an increase in the number of individuals seeking vaccine-related information online after the initial COVID-19 outbreak. The sample as a whole had a vaccination rate for influenza of 12.5 per cent , while a family vaccination rate for bacterial meningitis was 21.5 per cent . A small number of participants (15.9 per cent) and COVID-19 (6.7per cent) thought they were strongly or very highly vulnerable to the flu. The uptake of influenza and pneumonia vaccinations was correlated with a variety of socioeconomic variables and perceived COVID-19 susceptibility.

The COVID-19 vaccination rate among HIV-positive men was comparatively low. Analysing the factors influencing vaccine hesitancy in this demographic and applying focused strategies to mitigate these issues would improve the efficacy of COVID-19 vaccination. A series of theoretical decisions and estimates of the respondents' preferences for various vaccine characteristics were required based on the Chinese population (Dong et al., 2020). The assessment included 1236 respondents who gave valid responses, according to the outcomes. Significant public support was given to the vaccine's elevated level of efficacy, successful completion of protection, paucity of side effects, and foreign manufacturing. Price was the less crucial factor in determining the general public's choice for the COVID-19 vaccine.

2.4.5 Uptake of Vaccine in Pakistan

The National Command and Control Centre (NCOC) in Pakistan implemented provincial regulations for vaccine distribution while managing the national COVID-19 vaccination initiatives. This initiative was implemented after the acquisition of 500,000 doses of the Sinopharm vaccine from China (Ali et al., 2022). The Pakistani National Coordination Committee (NCC), which reports to the country's prime minister, and the provincial health authorities are both key partners for NCOC. By the last week of July 2021, more than 6 million of the 20 million Pakistanis had received the recommended vaccinations. The COVID-19 vaccine developed in Russia, Sputnik V, which had a USD 20 market price but was sold for more by Pakistani manufacturers and distributors, was the vaccine that started the debate over the cost of privately purchased vaccinations (Siddiqui et al., 2021). Sputnik V vaccines had a trying-to-land cost of USD 45 (for two doses), which is considered to provide the chain's expenses and the percentages of the agents serving as intermediaries between both the producer and the importer.

The Sputnik V vaccines had a cover price of USD 80 for two doses, with 40 per cent of the profit going to distributors, hospitals, logistics companies, and infrastructure (Winch et al., 2021). According to the distribution companies, the Sputnik V vaccines have to be kept at 18°C in the chain of the supply, which raises the price. The court invalidated the state's cap on the price of the Sputnik V vaccine (USD56 for two doses), enabling buying and sale of the vaccine for USD80 for two doses. Consequently, if the administration does not supply the COVID-19 vaccines at no cost, they are probably out of the financial reach of the sample group.

A study investigated the influence of information on healthcare beneficiaries' perceptions regarding the severity of COVID-19 and their willingness to receive the vaccine (Park et al., 2021). The likelihood of accepting the COVID-19 vaccine and preconceived notions about the severity of the illness was lower among those who consulted non-official sources of information than among those who listened to conventional news outlets or official advice. The smallest levels were found among those who primarily used digital platforms.

Additionally, individuals who depended on medical professionals exhibited a lower likelihood of receiving the COVID-19 vaccine. The relationship between the source of COVID-19 information and the probability of vaccine uptake persisted, even when controlling for perceptions of COVID-19 severity.

2.4.6 Uptake of Vaccine in Sub-Saharan Africa

Nigussie et al. (2021) conducted a systematic review and meta-analysis to quantify tetanus toxoid vaccination coverage among women of reproductive age in Ethiopia and identify factors associated with adequate vaccination. The authors synthesised evidence from 14 primary studies published between 2010 and 2020, drawing data from multiple electronic databases, including PubMed, ScienceDirect, Hinari, and Google Scholar. Using a random-effects modelling approach, the study estimated national-level coverage of at least two tetanus toxoid doses and examined associated predictors. The pooled coverage was found to be just over half of the target population, reflecting persistent gaps in maternal vaccination. Factors positively associated with uptake included attendance at antenatal care, exposure to media, proximity to health facilities, and educational attainment of both women and their partners. Despite the robustness of the analytical approach, substantial heterogeneity was observed across studies, and most included designs were cross-sectional, limiting causal inference. Moreover, the singular emphasis on tetanus toxoid, a well-established vaccination, limits the relevance of the findings to newer vaccines, such as those for COVID-19, which are accompanied by heightened uncertainty and misinformation. Nevertheless, the research offers helpful information about structural and socioeconomic influences that are likely to similarly shape COVID-19 vaccine uptake among pregnant women in urban Kenyan settings.

Bishop et al. (2021) assessed the effectiveness of an enhanced influenza vaccination initiative targeting pregnant women across 27 antenatal clinics in two provinces of South Africa over a four-year period. The intervention integrated increased vaccine supply with routine antenatal services and daily health education sessions, allowing vaccination to occur at the point of care. Data were collected on all women attending antenatal clinics during vaccine availability periods, and multivariable logistic regression was used to compare

characteristics of vaccinated and unvaccinated women. High overall coverage was achieved among participating clinics, demonstrating the potential effectiveness of policy-aligned service delivery when logistical and organisational support is adequate. However, there were big differences between provinces, and running out of vaccines was the most common reason for not getting vaccinated. A substantial proportion of women also declined or delayed vaccination, suggesting that informational interventions alone may not sufficiently address vaccine hesitancy. The substantial sample size enhances the reliability of the findings; however, the lack of qualitative data constrains comprehension of women's interpretations of vaccine risk and policy messaging. The study underscores that the success of policy relies on both the reliability of the supply chain and communication that is sensitive to context.

A thorough review of literature from 2020 to 2022 was conducted to examine the individual, social, and structural challenges and facilitators of COVID-19 vaccination in Africa, with the objective of improving health promotion strategies to enhance vaccine uptake (Naidoo et al., 2023). The data were systematically categorised into themes and summarised utilising a standardised data extraction template in Microsoft Excel. Forty academic publications ($n = 40$) were analysed, with the majority of studies from Nigeria ($n = 10$), followed by Ethiopia ($n = 5$) and Ghana ($n = 4$), while the remaining studies were from other African nations. The intention to receive vaccination varied between 25 per cent and 80.9 per cent, with an average uptake intention rate of 54.2 per cent, indicating suboptimal levels of vaccine intent across the continent. Factors that promote vaccine acceptance include trust in the safety of the vaccine and the motivation to safeguard others. Age, educational attainment, and gender were recognised as significant determinants of vaccine acceptance. Numerous barriers to vaccine uptake were identified in Africa, including concerns regarding potential side effects, scepticism about vaccine effectiveness, lack of sufficient information, and accessibility challenges. A notable correlation exists between female gender and vaccine hesitancy. Mass and social media served as the primary sources of information regarding vaccines. Governments were encouraged to address misinformation via community-driven initiatives,

creating messages that extend beyond the mere provision of factual information.

In a review, a comprehensive search of five bibliographic databases from 2000 to 2023 was performed, along with an additional search on Google Scholar (Ekezie et al., 2024). Only studies that provided data on vaccination communication and uptake in English were included. A narrative synthesis of the data was conducted, with findings displayed in textual and tabular formats. The findings indicated that mass vaccination campaigns and capacity-building initiatives for public health personnel were the predominant strategies, whereas community-based approaches employing social mobilisation proved effective in augmenting other communication methods. Following the implementation of vaccination communication strategies, there was an increase in vaccination uptake across all countries. Barriers to effective communication comprised insufficient vaccine information, accessibility challenges, and elevated costs. This reviewed study, however, primarily concentrated on generalised population-level findings and do not specifically consider pregnant women, who may encounter distinct challenges and considerations related to COVID-19 vaccine uptake. This present study aimed to fill the existing gap by examining pregnant women in Nairobi City County, Kenya, employing a targeted sample size and methodology to elucidate the specific barriers and facilitators influencing COVID-19 vaccine uptake in this population.

An assessment on the social and economic determinants affecting vaccination rates in Sub-Saharan Africa searched the literature using the PubMed and Embase databases for papers referencing socioeconomic requirement predictors for vaccine uptake that were released between 2000 and 2019 (Van Heemskerken et al., 2022). Ninety editorials met the criteria for inclusion in total, with the majority originating from Kenya ($n = 11$), Ethiopia ($n = 17$), and Nigeria ($n = 23$). It was revealed that motherly independence and the advantages caretakers believe vaccinations provide exercise their effect over many other factors through several feedback mechanisms, affecting the prompt and thorough administration of regular vaccinations. Health service usage (supply-related), as well as knowledge exchange (demand-related), have been thought

to be significant control mechanisms. Maternal independence and value perception have a shaky scientific basis, according to measurement.

An online survey was used to collect data from 776 adult Nigerians (over the age of 18) living in 36 states and the state capital (Oluwatemitope Olomofe et al., 2021). Most participants (58.2 per cent) expressed support for receiving a potential COVID-19 vaccine, while 19.2 per cent were against it, and 22.6 per cent remained uncertain. Results showed that 53.5 per cent of respondents preferred to receive just one COVID-19 shot. The two variables that were favourably linked with vaccination uptake for the upcoming COVID-19 vaccine were gender ($p=0.002$) and the notion that "Getting a vaccination is satisfying" ($p=0.001$). When they classified as men and believed that "vaccination is satisfactory", Nigerians were considerably less inclined to be ready to get a potential COVID-19 vaccine. It is necessary to defend disadvantaged people, restore socioeconomic status stability, and achieve birth-rate health and safety through immunogenicity, COVID-19 vaccines must be accepted.

Morhason-Bello et al. (2022) analysed factors associated with antenatal tetanus toxoid vaccination among first-time mothers in Nigeria using data from the 2018 Demographics and Health Survey. The study included over 3,600 participants and applied both univariate and multivariable analyses to identify predictors of receiving the minimum recommended vaccine doses. Uptake remained below optimal levels, with pronounced regional disparities, particularly between northern and southern regions. Patterns of antenatal care attendance, geographic location, mobile phone ownership, and household wealth were significantly associated with vaccination status. Among married women, family structure—especially polygamous arrangements—also influenced uptake, reflecting underlying cultural and social dynamics. While the large sample size strengthens the study's representativeness, the quantitative design limits deeper exploration of cultural beliefs and decision-making processes. The authors therefore recommend mixed-methods approaches to better understand motivations behind maternal vaccine acceptance. This study underscores how cultural norms intersect with socioeconomic and institutional

factors, offering relevant insights for examining COVID-19 vaccine acceptance in African settings.

A study investigated the prevalence and determinants of reluctance towards the vaccine in South Africa, with the objective of formulating strategies to mitigate this concern (Cooper, van Rooyen and Wiysonge 2021). Another objective was to improve public perceptions of vaccine hesitancy and possibly increase vaccination rates during and following the pandemic. The research findings suggest that some pertinent variables including age, race, education level, political affiliation, and employment prospects may affect vaccine refusal in South Africa. The research highlighted that communication strategies aimed at promoting COVID-19 vaccines must integrate into wider initiatives to foster trust, emphasising relationships, transparency, community engagement, and equity, rather than solely disseminating information. The pandemic presents a distinct opportunity to address and potentially mitigate broader trends of vaccine hesitancy in South Africa and other regions.

In Nigeria, a study examined the knowledge regarding the Malaria vaccine and the factors affecting mothers' willingness to receive it (Chinawa et al., 2024). This cross-sectional study involved 491 mothers from nine hospitals in Enugu metropolis, South-East Nigeria. A pre-tested questionnaire, administered by an interviewer, was utilised for data collection. The results indicated that 72.1 per cent of participants were aware of the Malaria vaccine, while 83.1 per cent demonstrated a willingness to receive it. Furthermore, 92.9 per cent of mothers expressed a willingness to vaccinate their infants with the Malaria vaccine, while 81.1 per cent indicated a willingness to vaccinate both themselves and their infants. The influence of socioeconomic status was substantial, as mothers in the lower socioeconomic group were five times less likely to vaccinate themselves and their children compared to those in higher socioeconomic groups. Additionally, mothers possessing substantial knowledge of the Malaria vaccine exhibited a 3.3-fold increased likelihood of vaccinating both themselves and their infants in comparison to those with limited knowledge.

In Zambia, a study was done to examine the knowledge, attitudes, acceptance, and perceived risks associated with the COVID-19 vaccine among pregnant

women receiving antenatal care at the Women and Newborn Hospital in Lusaka (Mudenda et al., 2024). This cross-sectional study was conducted from August to October 2023 and involved 300 pregnant women. Chi-square tests were employed to analyse the relationship between the dependent and independent variables. The findings indicated that 62.0 per cent of participants fell within the age range of 24 to 34 years, while 61.5 per cent recognised the recommendation of the COVID-19 vaccine during pregnancy. Among the participants, 94.7 per cent demonstrated good knowledge of the vaccine, 86.0 per cent exhibited a positive attitude, and 62.0 per cent reported having been vaccinated. Notably, 17.5 per cent of unvaccinated individuals indicated a willingness to receive vaccination. The results demonstrated that although the majority of participants exhibited a positive attitude and adequate knowledge, the level of vaccine acceptance was lower than anticipated.

A cross-sectional survey in Libya sought to evaluate the knowledge, attitudes, and acceptance of the COVID-19 vaccine among individuals aged 18 and older from May to September 2023 (Shembesh, et al., 2025). The survey comprised 1,043 respondents and addressed socio-demographic data, COVID-19 vaccination status, and attitudes regarding vaccination. The findings indicated that 56.6 per cent of participants had received vaccinations, whereas 43.4 per cent had not. Age, educational level, employment status, history of COVID-19 infection, and source of information were significantly correlated with vaccination status. Regarding knowledge, 63.7 per cent concurred that vaccines are an effective method for preventing and controlling infectious diseases, while 76.6 per cent believed they can prevent disease and death. Only 48.4 per cent of respondents believed that the benefits of the COVID-19 vaccine outweighed the risks, while 40.8 per cent considered the vaccine to be unsafe or only slightly safe. The acceptance rate of the COVID-19 vaccine was 57.2 per cent, demonstrating a significant correlation between vaccine acceptance and the source of information. The research revealed a discrepancy in the perception of the COVID-19 vaccine relative to other vaccines, underscoring the necessity for a more thorough health policy in Libya. Previous research primarily concentrated on broader populations or distinct

groups, resulting in limited data regarding vaccine acceptance among pregnant women in this region.

2.4.7 Uptake of Vaccine in Kenya

In May 2022, Kenya received more than 32 million doses which were enough to cover approximately 58.7 per cent of the adult population (Herman-Roloff et al., 2022). Nearly 9.3 million adults, constituting 35 per cent of adults in Kenya received full vaccination by July 31, 2022, (UNICEF. 2022). This number is attributed to vaccine delivery, access, eligibility, and general vaccine behaviours which are controlled by vaccine policy. According to Muchiri et al., (2022), Kenya's COVID-19 vaccination coverage in December of 2021 was 16.70 per cent on a national and subnational basis. At the national scale, more than 17.2 million individuals had not received vaccinations by the end of March 2022, despite predictions that 30.75 per cent (8.1 million) would. The failure to reach hard-to-reach people and regional differences in vaccine coverage was held responsible for the delayed uptake of the COVID-19 vaccine.

In Kenya, pregnant women frequently give their permission for maternal vaccination (Sauer et al., 2025). The majority of the women agreed that vaccinations during pregnancy were safe and therefore would protect the mother and unborn child. If given the option, the majority of expecting women would probably be open to receiving the vaccination. The perception of mothers of the beneficial role of influenza vaccinations during pregnancy was a factor in their readiness to accept the vaccine. However, this study had a drawback in that it was entirely qualitative and only covered influenza vaccination. The findings provide important baseline evidence to the present study on cultural and attitudinal factors influencing maternal vaccination in Kenya, offering a useful point of comparison for understanding responses to COVID-19 vaccines introduced under emergency conditions.

Otieno et al. (2020) investigated pregnant women's knowledge and perceptions of influenza and influenza vaccination in Kenya through a facility-based survey conducted in four counties. The study enrolled over 500 women attending antenatal clinics, many of whom had limited formal education. While general

awareness of influenza was moderate, perceptions of vaccine safety and effectiveness were strongly associated with willingness to accept vaccination if offered. Trust in healthcare workers and beliefs about maternal responsibility for infant protection played a central role in shaping attitudes. Despite high stated willingness, the study assessed hypothetical acceptance rather than actual vaccination behaviour, as influenza vaccines were not routinely available. The convenience sampling strategy further limits generalisability. The researcher noted that despite the study by Otieno et al., (2020) on the perceptions and attitudes, whooping cough and influenza are vaccines that have existed for many years, and their efficacy and safety have been proven unlike the COVID-19 vaccine which was still relatively new.

A study assessed the impact of the lack of clear national policy recommendations on COVID-19 vaccination on the behaviours of pregnant and lactating women in Kenya (Zavala et al., 2022). Qualitative interviews with people living with HIV (PLW), healthcare workers, and policymakers revealed significant concerns, including confusion regarding vaccine eligibility, safety issues, and the insufficient prioritisation of PLW in Kenya's national COVID-19 vaccine policy. The study indicated confusion surrounding vaccine eligibility, safety concerns, and the prioritisation of pregnant and lactating women (PLW) within Kenya's national COVID-19 vaccination policy. Health professionals faced difficulties stemming from ambiguous policy guidelines, which affected PLWs' understanding of their eligibility and their readiness to receive the COVID-19 vaccine. Furthermore, due to the evolving nature of Kenya's policy during the study period, data regarding the use of vaccines during pregnancy and breastfeeding were gathered both prior to and following the implementation of the updated policy.

A study assessed the determinants influencing the adoption of the COVID-19 vaccine in Kenya and Hungary using a cross-sectional methodology and an online survey (Macharia et al., 2022). The study included concepts such as awareness of COVID-19, potential exposure, reasons for vaccine hesitancy, vaccination decision-making, demographic factors, and vaccine availability. The findings showed that more population in Hungary were willing to be

vaccinated than in Kenya. Nevertheless, due to their lack of connectivity to the internet, several remote and interior parts of the countries were left out of this investigation. The study was solely focused on participants' willingness to adhere to WHO requirements despite their current vaccination status, which made it difficult to personally follow up with participants on social media networks. This current study aimed to enhance the current understanding of COVID-19 vaccine acceptance among pregnant women in Nairobi County, Kenya, addressing a notable gap in the literature on this subject.

Otieno et al. (2021) examined the processes underpinning the introduction of maternal vaccines in Kenya through a qualitative inquiry involving policymakers and vaccination stakeholders at both national and county levels. Using purposive sampling, the researchers conducted 29 in-depth interviews with officials from the Ministry of Health, the National vaccination Technical Advisory Group, and county health departments. While respondents generally demonstrated awareness of formal policy development pathways, disparities in knowledge were evident, with county-level actors reporting limited involvement in guideline formulation. Participants noted that healthcare decentralisation introduced both opportunities and challenges, but coordination gaps and communication breakdowns often undermined implementation. External influences such as rumours, sociocultural beliefs, and organised anti-vaccine messaging were also identified as barriers to effective policy execution. Importantly, the study highlighted that pregnant women were more receptive to vaccination when information was delivered clearly and consistently by trusted healthcare providers at the facility level. Although the study offers critical insight into institutional dynamics, it does not capture women's lived experiences of policy communication, a gap that the present study seeks to address in the context of COVID-19 vaccination in Nairobi City County.

The goal of maternal vaccination is to safeguard expectant mothers and their unborn children (Karafillakis et al., 2021). Specifically, in Siaya, Nairobi, Mombasa, and Marsabit. Nganga et al., (2019)'s, latest localised investigation that took place in Kenya was focused on investigating the influence of healthcare provider connections on maternity vaccine uptake. For the

vaccinations to be approved, women who are expecting in Kenya must have faith in their healthcare professionals (HCPs). In Kenya, patients' faith in their doctors plays a significant role in helping expectant mothers receive the vaccine (Otieno et al., 2020). Both parties voiced responsibility over the regular employing of trustworthy strategies by the service providers, who sometimes vaccinate before giving data to the women as well as a consequence of this faith (Jaffe et al., 2020).

2.5 CHALLENGES AND LESSONS FROM OTHER MATERNAL VACCINATION PROGRAMS

The most significant vaccination challenges among pregnant mothers in Brazil were identified and classified as factors affecting vaccination coverage (Guzman-Holst et al., 2020). Only a small amount of available research on vaccination barriers is available for many other Latin America and Caribbean nations. The acquiescence of vaccinations is frequently cited as being hampered by unfavourable socioeconomic, low levels of education, ignorance of illnesses and their vaccines, and cultural and religious belief systems. Working mothers with higher educational levels, parents of children attending public schools, and people involved in the health system all acknowledged vaccination. The younger generation of childhood vaccines (meningococcal or pneumococcal vaccines), as well as studies directed at pregnant women and adolescents, were, however, only partially supported by tangible evidence.

Table 2.1: Summary of Literature and Gaps

Author	Area of study	Key finding	Gap/weaknesses	What the current study seeks to fill
Robinson et al., (2021)	Worldwide estimates of COVID-19 uptake and hesitance	Gender, educational status, and income status influence COVID-19 vaccine uptake	A global study that covers only 12 developed countries; the finding cannot be a representative of a developing country settings	Intends to establish the contribution strength of gender, educational status, cultural beliefs and income status in a different setting
Khairat et al., (2022)	COVID-19 uptake factors: a case study of US neighbourhoods Khairat et al., (2022)	Low level of education, fear of vaccine, and poor accessibility were the two main significant predictors linked to a low vaccination threshold	Focuses only on hesitant communities in general without specifying a population group	Seeks to examine social factors and integrating with policymakers to combat unfavourable preconceptions of the vaccine among pregnant women
Vásquez and Trudeau (2021)	Determining the uptake of COVID-19 rates under the conditional circumstances.	There is a significant link between vaccine uptake and income status and cost	▪ Utilised online survey as the main data collection approach ▪ Concentrated on COVID-19 cost as the only variable	Utilised both questionnaires, FDGs and interviews to enhance credibility of the findings

Zheng et al., (2021)	A cross-sectional study determining the uptake of COVID-19 rates under the conditional circumstances of HIV infection in China	The primary reason for the uptake of the COVID-19 vaccine was anxiety and dread of the side effects.	Study based on COVID-19 uptake with respect to HIV-infection among men as the only group	Focused on pregnant women. The question is, is there a discrepancy in findings if different group of population is targeted?
Stock et al., (2022)	Rates of COVID-19 vaccination among expectant Scottish mothers	The highest vaccination rate was affected by critical care-related SARS-CoV-2 infections and hospital admissions.	The study was based on observational approach rather than quantitative	Sought to integrate the findings using both qualitative and quantitative approaches
Oluwatemitope Olomofe et al., (2021)	Factors influencing adult vaccination against COVID-19 in Nigeria	The reluctance to use COVID-19 is strongly predicted by gender and belief.	Findings primarily based on: - A simple scale of satisfactory levels of 1-5 - General population in Nigeria	Sought to establish findings based on comprehensive structured questionnaire in the setting of Nairobi City County
Sato et al., (2020)	Influenza vaccine uptake among older people in Brazil is influenced by socioeconomic and preventive policy factors, among other things.	- Socioeconomic factors had no impact on vaccination coverage - Age, smoking habit, and chronic illness all had a favourable correlation with the	Study based in Brazil Study focuses on influenza vaccine	concentrated on expectant women's use of the COVID-19 vaccine

		influenza vaccine uptake.		
Davis et al., (2022)	Pregnant mother's knowledge and attitudes on their uptake of influenza vaccine in Kenya	There was high correlation between cultural rules and COVID-19 perception among Kenya, Tanzania and the Democratic Republic of Congo	Entirely qualitative	The currently embraces such behavioural constructs as risk perception, confidence, perception, and expected direct exposure to COVID-19 vaccines
Otieno et al., (2020)	Pregnant mother's knowledge and attitudes on their uptake of influenza vaccine in Kenya	Mothers' perception of the beneficial role of was a factor in their readiness to accept the vaccine	Did not collect socio-demographic data on all pregnant women and covered only the influenza vaccine.	Considers socio-demographic data significant in COVID-19 vaccine uptake

2.6 SUMMARY

Several studies related to the research topic were reviewed and it was clear that there are several factors associated with vaccine uptake across the world. These factors range from gender, educational status, income status, cultural beliefs, and general perceptions of the participants. However, the amplitude of these factors may vary, not only because of varied socio-demographic and diverse cultural backgrounds, but also due to changes that would have taken place over time from the COVID-19 outbreak to post-COVID-19 management. Additionally, some studies were carried out prior to, during, and following the vaccine's clearance. For instance, during the height of the pandemic, fear, religious considerations, and differing opinions among medical experts may have an impact on vaccine uptake.

CHAPTER THREE

THEORETICAL AND CONCEPTUAL FRAMEWORK

3.1 INTRODUCTION

The Social Ecological Model (SEM), the Theory of Planned Behaviour (TPB), and the Social Cognitive Theory (SCT) serve as the cornerstones of this study's theoretical and conceptual framework. The principles of these theories, their applicability in comprehending pregnant women's adoption of the COVID-19 vaccine in Nairobi City County, and the criticisms levelled at its implementation are all critically examined in this section. Individual, interpersonal, community, organisational, and policy-level factors all interact to shape health-related behaviours, according to the Social Ecological Model (SEM). The relevance of these theoretical perspectives lies in their capacity to provide an all-inclusive lens through which vaccine acceptance behaviours can be analysed. For example, the SEM elucidates how structural barriers such as healthcare access and socio-cultural norms impact vaccine uptake. The TPB aligns with the study's aim of examining subjective influences like trust and efficacy perceptions, while SCT bridges the gap between individual cognition and societal influences.

3.2 SOCIAL COGNITIVE THEORY (SCT)

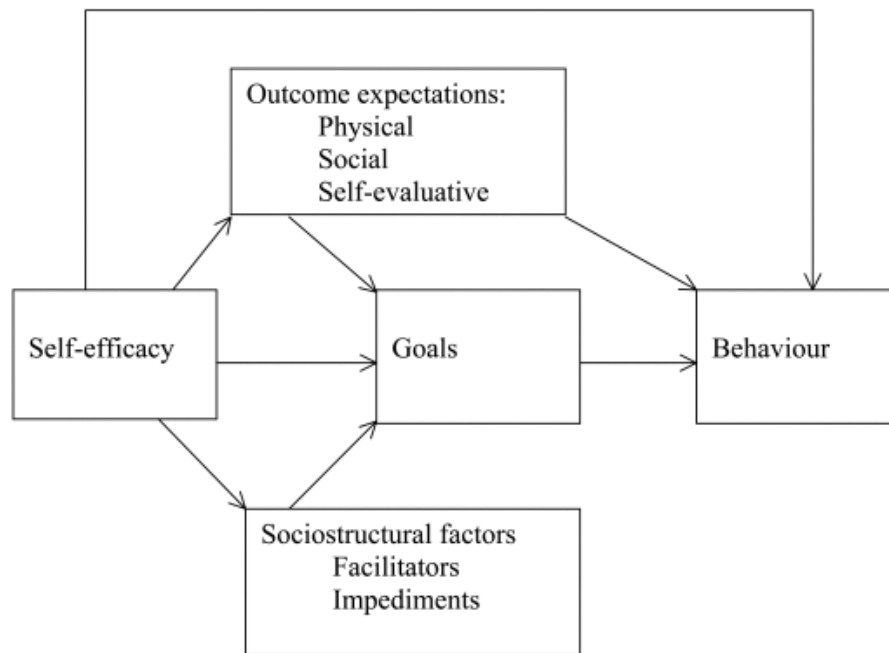
Personal control is at the Centre of Social Cognitive Theory (SCT) which denotes that behavioural change exists if we have a profound sense of personal control. The theory believes that the levels of commitment are based on the simple belief that they have the capability to take certain actions to solve problems. The theory is anchored on individuals having a perceived self-efficacy which regards to having the ability to take personal control for actions which gives them a deep sense of determination as well as control to act on their beliefs. Self-efficacy has an impact on people's feelings, thoughts, and behaviours (Bandura 1977). In line with the SCT theory, those with prominent levels of self-efficacy have excellent social integration, whereas those with low levels may feel helpless. The SCT has another major construct expectancy,

which focuses on results on engaging in certain actions. This theory evaluates aspects of physical, social and self-evaluation. One must not only think of the consequence of their actions and how that affects them, but one also looks at how their actions elicit responses from other people and how those actions make one feel about themselves. The theory states that all human actions and motivations are normally guided by elevated levels of forethought. Therefore, prior to taking certain actions, people must think of the result of their actions. The theory summarised the following as principal factors that influence behaviour; self-efficacy, focusing on one's belief as to whether they are able to act in ways that will yield the results they want to attain. Outcome expectations focus on how people believe the results will be for undertaking certain action. Other cognitions of the Social Cognitive theory include existing opportunity structures and goals and perceived impediment.

The Social Cognitive Theory (SCT) has several drawbacks. The idea frequently appears to be far too broad, which is one of its drawbacks. The idea was questioned by other scholars due to the absence of a comprehensive framework (Xie et al., 2002). Another drawback is that it ignores the direct influence that genetic differences have on cognition and behaviour (Burnett 2016). To comprehend social behaviour, the social cognitive theory neglects to take lifespan development into account. The social cognitive theory has numerous advantages, yet some limits must be ignored (Young et al., 2014). Additionally, it may be applied fast and simply. The fact that the theory was quite thorough is yet another strength. For instance, it considers all aspects of human behaviour, cognition, and the environment. The other advantage is that it discusses personality, desire, and how someone works to achieve their objective along with punishments and reinforcements. The last positive aspect is that it emphasises self-control and development. Therefore, by helping the researcher comprehend how pregnant women adhere to the COVID-19 vaccination programs, SCT offers a thorough theoretical framework for this investigation. This is determined by the two self-efficacy constructs, which will serve as a guidance for the pregnant woman's capacity to get the COVID-19 vaccine or not. The theory also helps us to explain their actions as one construct looks at the consequences of undertaking certain actions. This may vary from

how society or the people around them view if they take the vaccine or if they do not that is the responses from other people and how that influences their decisions. This theory is illustrated as Figure 3.1 below:

Figure 3.1: Social Cognitive Theory



Source: Adapted from Bandura (1986)

3.3 SOCIAL ECOLOGICAL MODEL

Five levels that make up the Social Ecological Model's (SEM) core values policy, community, institutional, interpersonal, and intrapersonal levels are the focus of this research. Negative vaccine safety beliefs can act as a barrier, but if favourable, can encourage vaccination. Trust in government and past vaccine uptake correlates with vaccine uptake. According to research from Australia, France, and the US, Kumar et al., (2012) contends that there is an association between routine or recent seasonal flu vaccination uptake and both H1N1 vaccination absorption and motivation to acquire the vaccination during the 2009 pandemic. Understanding the problem could have a significant interpersonal relationships impact on behaviour. In the event of vaccine scarcity, vaccination uptake may be impacted more by assumed involvement in a category than by actual participation (Ali et al., 2022). The relational level

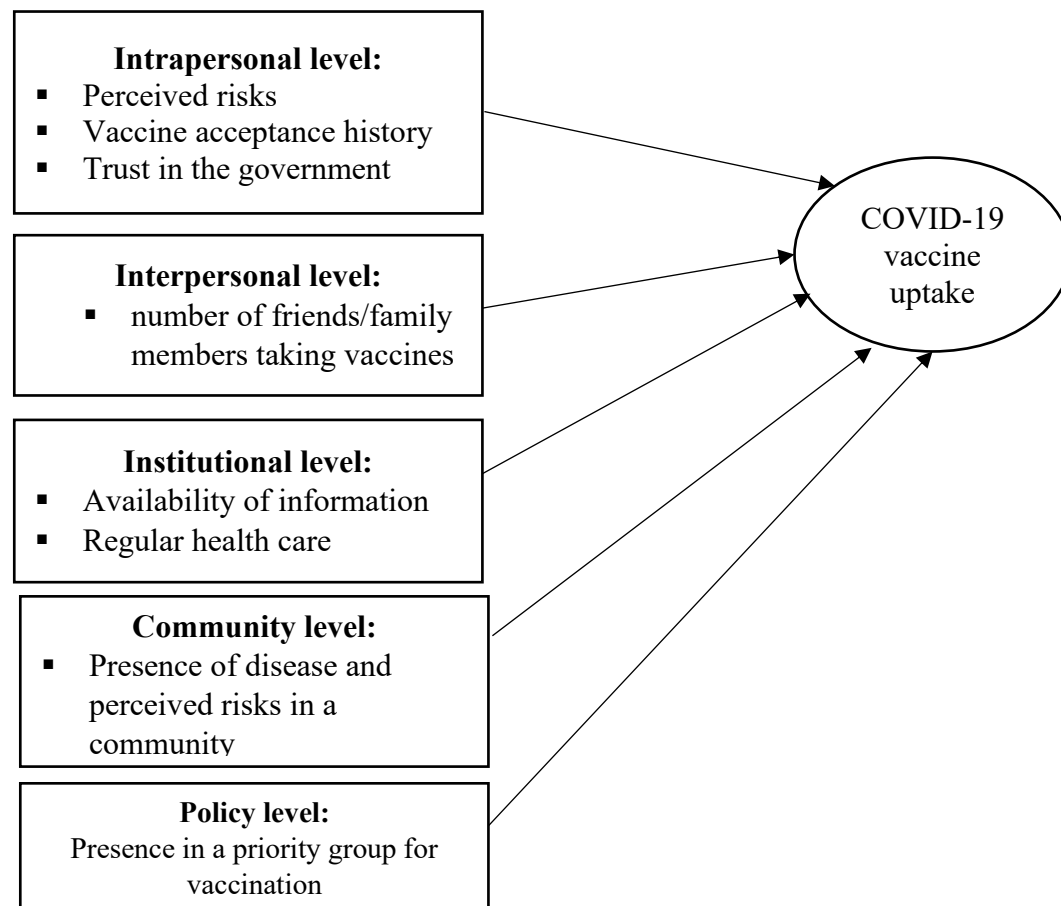
includes social standards within social networking sites as well as social conditioning from friends and relatives. Interpersonal interactions have a significant impact on health-related habits, such as screening and seeking medical advice (Fleury 2006). Additionally, vaccination uptake rises when more people are given the vaccine in one's surroundings, reflecting the community standard (Bell et al., 2022).

Institutional level health-care groups that give details on influenza and vaccinations encompass everything from general practitioners to healthcare facilities. Numerous research has revealed that doctor advice boosts vaccine compliance (Nyambe et al., 2016). This element necessitates communication with and access to a frequent primary care physician, an opportunity that is not evenly distributed based on race and ethnicity, revenue, and academic achievement (Baral et al., 2013). One of the variables that may affect vaccine uptake at the neighbourhood level is the illness frequency in a person's neighbourhood. Although it is commonly ignored, the societal setting of assessing risk is unquestionably important for infectious illnesses since individuals can be concerned about both being sick individually and disseminating the sickness to others. The social amplification of risk framework affirms the significance of social dynamics at the community level in influencing risk perception. We will examine how such risk affects vaccination uptake (Steinmetz et al., 2016).

Membership in a priority group for vaccination and healthcare is covered at the level of the institution. Government demands medical coverage may affect vaccination rates considering health insurance is a reliable indicator of vaccine uptake (Shin and Hancer 2016). Some claim that deciding whether or not to buy health insurance is a personal choice and shouldn't be viewed as a matter of access. Policies regulating the availability of health insurance generally influence vaccination decisions, thus explaining why they are essential. Therefore, we predict that health coverage would not be a barrier to vaccination if people had heard about the vaccine's simple availability and were prepared to get vaccinated at specific locations during the outbreak. This research evaluated the significance of variables in each level of the SEM by taking a look

at both behaviour and behavioural intent during the pandemic in order to predict the uptake of the COVID-19 vaccine. The Social Ecological Model is summarised in Figure 3.2.

Figure 3.2: Social Ecological Model



Source: Author's Conceptualization based on the Social Ecological Model (McLeroy et al., 1988)

The Social Ecology Model aids in understanding why we act in the manner that we do, yet the model is not without flaws. The model might be able to explain why a specific situation, like COVID-19 uptake hesitation, occurs. The approach, meanwhile, is unable to reveal how big of an impact one factor has on another (Lopez-Neyman and Warren 2016). On the other hand, environmental and behavioural change can be integrated using Social Ecological Theory. The theory enables consideration of the interaction of personal factors and the environment. The theory makes it possible to consider

how environmental and personal variables interact. Based on the findings of this study, the theory can assist researchers and other individuals in comprehending how to maximise environmental and individual factors to encourage secure and healthy living among underprivileged people, particularly pregnant women (Walker et al., 2021). A helpful framework for comprehending the variety of elements that affect health and well-being is the ecological point of view (Cumming 2014). It is a paradigm that can help give a comprehensive understanding of the elements influencing behaviour, including the social and cultural influences on health-related behaviours. Therefore, ecological models include principles of other models and theories, ensuring the creation of a holistic approach to health improvement.

The SCT implicitly incorporates the Social Ecological Model (SEM). SEM recognizes that cultural, interpersonal, community, and individual factors are among the many layers of influence that determine health habits. SEM improves knowledge of how the social environment, cultural norms, and institutional support help or hinder pregnant women's acceptance of the COVID-19 vaccine in the setting of this study. By explicitly considering these ecological levels, the study gains a more holistic perspective, aligning with the overarching principles of SCT. Using the ecological levels described in SEM, a subset of physicians and nurses participated in focus groups and in-depth interviews as part of the qualitative approach to investigate their perspectives, experiences, and contextual elements affecting vaccine decision-making. A deeper comprehension of the social, cultural, and structural factors influencing vaccination uptake was made possible by the use of thematic analysis or a grounded theory technique to find emerging themes and patterns in qualitative data.

3.4 THEORY OF REASONED ACTION

Ajzen and Fishbein (1975) created the Theory of Reasoned Action (TRA) to clarify how human behaviour can be anticipated and predicted by purpose (Hagger et al., 2022). Two key tenets serve as the foundation for the theory. It assumes that people typically behave rationally and utilise all available knowledge. According to the notion of reasoned action, the fundamental factor

that influences if a behaviour will take place, is the person's intention. The magnitude of the purpose influences how likely a behaviour is to take place (Xiao and Wong 2020). In accordance with TRA, people who regard the prescribed behaviour as a beneficial one (attitude) and think others want them to do it experience greater incentive (motivation) and are more probable to engage in it (subjective norm). The other two parts of the purpose are opinions regarding behaviour and subjective standards. Subjective standards are exact estimations of how people feel about a product's ability to assist them reach their goals, while attitude can be characterised as positive or negative feelings surrounding accomplishing a goal (Nabeel et al., 2022).

The advantage of a reasoned action technique is that it explains how several underlying factors link (or do not relate) to a particular behaviour. When individuals take activity based on judgments they have made regarding a course of action, but not constantly they are acting appropriately. For example, a person with a nervous disposition might secure his room door if he suspects his fellow workers of attempting to assault him. This person acts logically based on their belief, even though others would find it illogical. Once developed, beliefs serve as the cognitive foundation from which conduct can rationally follow, regardless of whether they are illogical, inaccurate (based on faulty information), or spiritually biased. The main issue with the idea of reasoned action is that it struggles to explain situations where one's actions don't line up with one's intentions (Cordina et al., 2021). The assumption that someone will behave without limitation after they decide to do so is another restriction.

In actuality, the liberty to act will be constrained by factors including limited capacity, time, ecological or organisational restrictions, and psychological tendencies. The TPB addresses this restriction. The theory, however, falls short in explaining how emotions affect people's behaviour. Furthermore, the hypothesis does not account for other widespread behaviours like habits (Quinn 2016). According to the Theory of Reasoned Action, one of the main factors influencing action is behavioural intention, which is impacted by a person's attitude toward the conduct as well as subjective norms, or the perceived social pressure to engage in or abstain from the behaviour. The TRA provides

important insights on how pregnant women's attitudes regarding getting the vaccine, as well as the impact of social norms from their close social circles, influence their desire to get vaccinated in the context of COVID-19 vaccine acceptance.

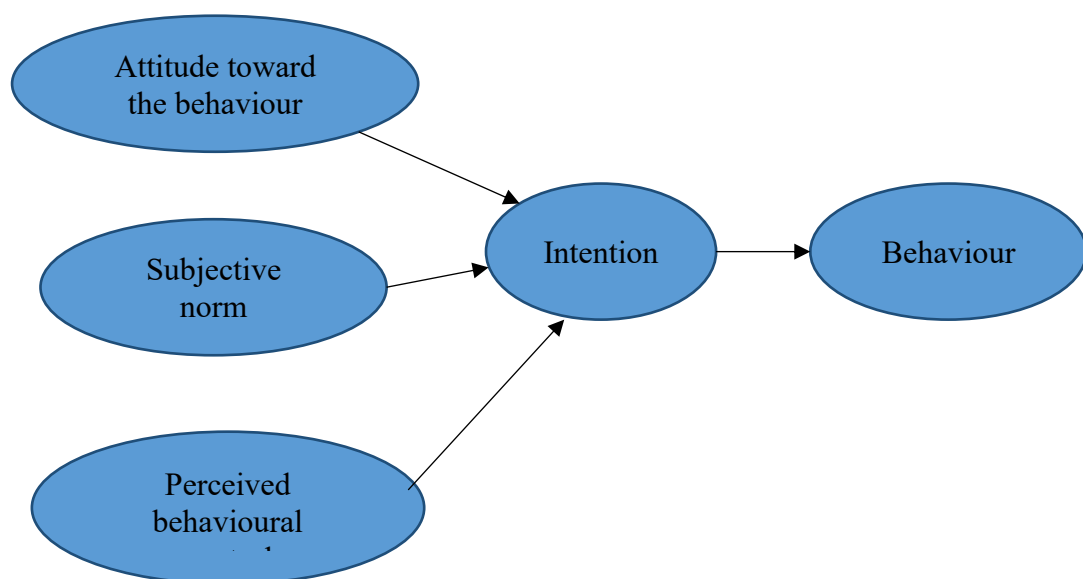
By incorporating TRA into the theoretical framework, the study gains a more nuanced understanding of the cognitive processes that shape decision-making regarding COVID-19 vaccination. Attitudes towards the vaccine, formed by beliefs about its efficacy, safety, and perceived benefits, become pivotal in predicting behavioural intentions. Additionally, the influence of subjective norms elucidates the effect of social and cultural factors on the decision-making process.

3.5 THEORY OF PLANNED BEHAVIOUR

In order to predict a person's behaviour at a specific time and location, the Theory of Reasoned Action (TRA) was renamed the Theory of Planned Behaviour (TPB) in 1980 (Twum et al., 2021; Yang et al., 2022). The planned behaviour hypothesis is based on the supposition that people typically act consciously most of the time. They analyse the data that is relevant and, whether openly or unconsciously, think about the effects of their decisions (Ajzen 2020). According to Ajzen's (2020) hypothesis, Individuals are more likely to act in alignment with their goals when they perceive that they have control over executing the behaviour. According to the idea of planned behaviour, there are three main factors that influence intents: personal, social influence and social pressure, and control issue-related nature. The participant's perceived behavioural control is the personal aspect. This attitude is the person's assessment of whether they think engaging in the targeted behaviour is a good or bad idea. A personal standard, which is described as a person's perception of social pressure to engage in or abstain from the behaviour in question, additionally established reason to do a behaviour. The third factor that affects intent is one's belief in their capacity to carry out their desired behaviour, also known as imagined planned behaviour (Amoako et al., 2020).

In essence, people want to engage in a behaviour when they assess it favourably, feel pressure from others to engage in it, and think they have the resources and chances to do so (Ajzen 2020). These three factors aren't always equally significant; for certain purposes, psychological factors are particularly important than typically relates, and for others, it's the other way around. Subjective inadequacies and constantly shifting can intrude with the achievement of any behaviour. These variables reflect people's actual authority or their lack of power over a behaviour. The Theory of Planned Behaviour, according to Ajzen (2020), does not directly address how much control a person actually possesses in a given circumstance. Instead, this theory looks at potential impacts of perceived behavioural control on the accomplishment of behavioural goals. Ajzen further states that intentions can indirectly affect behaviour through perceptions of behavioural control.

Figure 3.3: Diagrammatic Presentation of Theory of Planned Behaviour



Source: Ajzen (2020)

A major criticism of the theory is that it lacks theoretical and empirical supply of the explanatory framework. Nevertheless, this fact would be nowhere near remarkable in a deeper context since the new context is only marginally covered. Social factors are restricted through perceived behavioural management and individual standards. The concept of planned behaviour only

considers how the individual subjectively characterises their situation on a cognitive level. Due to this, it overlooks the reality that behaviour is always incorporated into a social definition of the circumstance in which it is conducted. This encompasses many cultural standards, laws, codes, social conventions, and collective schema that have an impact on a circumstance where behaviour is present and consequently on the behaviour itself.

Somewhat more, it is an estimation of behaviour. He also emphasises that the strength of the Theory of Planned Behaviour' lies in its relative simplicity and lack of complexity. Within Ajzen's (2020) view, the reasoning behind choosing a behaviour in favour of or against another behaviour (the mechanism of action) is likewise unclear. It is also challenging to determine when a component begins to influence an agent's behaviour, even though the notion of planned behaviour may be connected to predictors of intents (Guerin and Toland 2020). The Theory of Reasoned Action (TRA) was renamed the Theory of Planned Behaviour (TPB) in 1980 to predict an individual's behaviour at a given time and place (Twum et al., 2021).

The TPB has many shortcomings one of which is the presumption that a person has the possibilities and assets required to be effective in the type of conduct they want, regardless of desire (Hossain 2021). Even while it considers norms impacts, it fails to take into consideration economic or external variables that might impact a person's decision about participating in an activity (Dou et al., 2022). Due to the ambiguity in the notion of perceived behavioural control, there are also assessment concerns. Investigation has shown that the time delay between the assessment of the purpose and the execution of the action will alter how well a desire forecasts future actions. The longer the gap between intention and behaviour, the more likely it is that an intention may change as a consequence to new information (Pillai 2022).

The theory of planned action relies on an ideal scale wherein attitude intensity was evaluated utilising a 7-point evaluation scale of good-bad range and evaluated using a point visual scale of likely-unlikely (Holbrook et al., 1977). However, the theory offers no guidance to the study as to whether reactions to these measures ought to be evaluated in a unilateral way (ranging from 0 to 6

or from 1 to 7) or in a bipolar manner way (ranging from -3 to +3). As a result, there is no logical previous standard that can be used to determine how the notion and assessment measures deserve to be rated (Schmidt and Stenger 2021).

The Theory of Planned Behaviour allows us to comprehend the manner in which individuals behave in diverse circumstances and happenings (Hagger et al., 2022). By gaining access to information based on views regarding actions, standards, and what is considered behavioural control, professionals and marketers can see barriers and gain insight into how to encourage an alteration in behaviour. Due to the distinction between behavioural, conventional, and regulative kinds of views made by Theory of Planned Behaviour, it is feasible to combine every thought about a certain behaviour into an all-encompassing summation to get a measurement of the overall behavioural propensity. By adding the concept of perceived behavioural authority to the basic framework of reasoned action, the theory has become more amenable to the addition of additional variables. With its emphasis on attitudes, subjective norms, and perceived behavioural control, the Theory of Planned Behaviour can be easily incorporated into the SCT framework. The TPB sheds light on the mental processes that affect a person's decision to carry out a specific conduct. TPB adds a useful layer of insight to the larger SCT framework by illuminating the impact of attitudes regarding vaccination, social influences, and perceived barriers or facilitators in the context of COVID-19 vaccine uptake.

The study was heavily informed by the aforementioned theories, including the Social Cognitive Theory (SCT), Social Ecological Model (SEM), Theory of Reasoned Action (TRA), and Theory of Planned Behaviour (TPB). First, SCT clarified how personal beliefs, self-efficacy, and observational learning affect pregnant women's choices about COVID-19 vaccination within the study's framework. Thus, pregnant women may observe and model the vaccine uptake behaviour of their peers, healthcare providers, or trusted sources in their social networks. Second, the intricate network of factors influencing pregnant women's adoption of the COVID-19 vaccine was clarified by the Social Ecological Model (SEM). Individual-level elements like attitudes and

knowledge, interpersonal elements like peer pressure and social support, community-level elements like healthcare availability and social norms, and societal elements like laws and cultural values can all be included in this.

The Theory of Reasoned Action elucidated the views of pregnant women towards the COVID-19 vaccine and their perceptions of social norms which affected their intentions to get vaccinated. By understanding the cognitive and normative processes underlying vaccine decision-making, interventions can be tailored to address specific attitudinal barriers and social influences. The Theory of Planned Behaviour (TPB) helped to clarify how pregnant women's attitudes, subjective standards, and feelings of control over the COVID-19 vaccination affect their intentions and actual vaccination uptake. By addressing factors related to perceived control, such as access to vaccination services, logistical barriers, and confidence in vaccine safety and efficacy, interventions can enhance pregnant women's capacity to make informed decisions and follow through with vaccination.

Using the constructs of SCT, TRA, and TPB as a guide, a large sample of pregnant women were given questionnaires to quantitatively evaluate their attitudes, beliefs, perceived self-efficacy, social norms, and intentions toward the COVID-19 vaccination as part of the qualitative approach. The associations between these factors and vaccination uptake intentions or actual behaviour were investigated using statistical techniques, such as binary logistics regression models. In addition to offering insights into the prevalence and distribution of attitudes and behaviours within the study population, this quantitative technique enabled the identification of specific determinants of vaccine uptake.

Using the ecological levels described in SEM, a subset of physicians and nurses participated in focus groups and in-depth interviews as part of the qualitative approach to investigate their perspectives, experiences, and contextual elements affecting vaccine decision-making. A deeper comprehension of the social, cultural, and structural factors influencing vaccination uptake was made possible by the use of thematic analysis or a

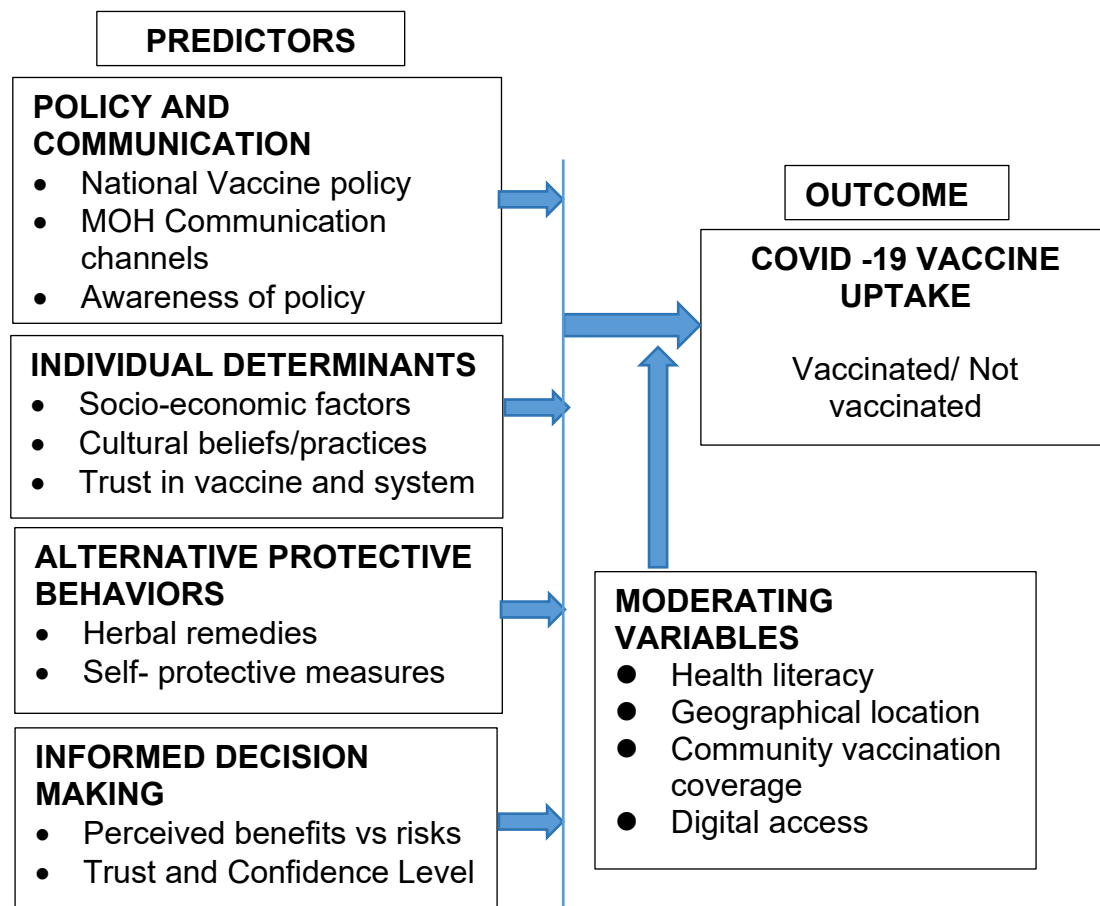
grounded theory technique to find emerging themes and patterns in qualitative data.

A more thorough understanding of pregnant women's absorption of the COVID-19 vaccine was made possible by the triangulation of the quantitative and qualitative data, which enabled a more reliable interpretation of the findings. The results of the quantitative analysis, which were influenced by SCT, TRA, and TPB, can be used to measure the relationships between a variety of variables and vaccination uptake intentions or behaviour. Qualitative insights, informed by SEM, can complement quantitative findings by providing contextual explanations and deeper insights into the mechanisms through which social, environmental, and individual-level factors influence vaccine decision-making. Combining quantitative and qualitative data improved the study's validity and reliability, giving researchers a more comprehensive picture of pregnant women's uptake of the COVID-19 vaccine and guiding the creation of focused interventions and regulations to encourage vaccine acceptance in this demographic. Although SCT is the study's fundamental framework, SEM and TPB are not included inside it; rather, they are carefully combined to enhance the understanding of pregnant women's uptake of the COVID-19 vaccination. This method acknowledges the complex nature of health decision-making within Nairobi County's sociocultural setting by enabling a thorough investigation of individual, interpersonal, and environmental components.

3.6 CONCEPTUAL FRAMEWORK

Figure 3.4 elucidates the researcher's comprehension of the problem and visually or narratively associates the independent variables, dependent variable, and any mediating or moderating elements grounded in established theory and empirical data. The framework provides the basis for formulating research questions, hypotheses, data collection instruments, and analytical procedures, ensuring logical consistency throughout the study. The conceptual framework gives the anticipated association among variables, clarifying assumptions, operationally defining constructs, and guiding the interpretation of data within a broader theoretical and contextual framework of COVID-19 vaccination uptake.

Figure 3.4: Diagrammatic Presentation of the Factors Influencing Vaccine Uptake



Source : Mabonga (2025)

3.7 SUMMARY

The study was informed by the Social Cognitive Theory (SCT), Social Ecological Model (SEM), Theory of Reasoned Action (TRA), and Theory of Planned Behaviour (TPB). Together, these theories offered a multidimensional perspective for examining the behavioural, social and contextual determinants of COVID-19 vaccine uptake among pregnant women in Nairobi City County, Kenya. First, SCT clarified how personal beliefs, self-efficacy, and observational learning affect pregnant women's choices about COVID-19 vaccination within the study's framework. The next chapter focuses on the methodology applied by the researcher in the study.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 INTRODUCTION

This chapter outlines the research methodology adopted to investigate the uptake of the COVID-19 vaccine among pregnant women in Nairobi City County, Kenya. The methodology provides a structured framework for addressing the study's objectives and research questions, ensuring the systematic collection, analysis, and interpretation of data. It encompasses the research design, target population, sampling techniques, data collection methods, data analysis procedures, and ethical considerations. By employing a mixed-methods approach, this study integrates both quantitative and qualitative methods, allowing for a comprehensive exploration of factors influencing vaccine uptake. The quantitative aspect involved collecting measurable data to assess trends, patterns, and relationships, while the qualitative approach delved into in-depth insights about socio-cultural attitudes, trust, and other subjective factors that shaped decision-making among pregnant women.

This chapter also highlights the justification for the choice of methods, ensuring their alignment with the research objectives and the context of the Nairobi City County. It elaborates on the population of pregnant women targeted in the study and the sampling strategies employed to ensure representativeness and generalisability. Additionally, it discusses the tools and techniques used for data collection, such as structured questionnaires and semi-structured interviews, which were tailored to gather relevant and accurate information from participants. The data analysis procedures, including statistical and thematic analysis, are described to demonstrate how findings were derived from the collected data. Furthermore, the chapter underscores the ethical principles adhered to throughout the study, including obtaining informed consent, ensuring confidentiality, and addressing the unique vulnerabilities of the study participants. This comprehensive methodology serves as the foundation for

generating reliable, valid, and context-specific findings to address the study's objectives effectively.

4.2 PHILOSOPHICAL PRINCIPLES AND PARADIGM OF THE STUDY

Research philosophy provides a foundational framework that guides the entire research process by defining the assumptions, principles, and worldview underlying the study (Paudel 2024). This research, which investigates the uptake of the COVID-19 vaccine among pregnant women in Nairobi City County, Kenya, aligns with a pragmatic paradigm and integrates relevant philosophical principles such as positivism and constructivism. These perspectives help address the multifaceted nature of vaccine uptake, encompassing both measurable factors and subjective experiences.

4.2.1 Pragmatic Paradigm

The pragmatic paradigm is highly suitable for this study as it emphasises the use of methods and approaches that best address the research objectives and questions (Omodan 2024). Pragmatism advocates a focus on practical solutions to real-world problems, enabling the researcher to combine qualitative and quantitative methodologies for a holistic understanding of the phenomena under investigation (Dung and Pham 2022). In this study, the pragmatic paradigm allows the researcher to explore not only statistical relationships, such as the impact of socioeconomic factors on vaccine uptake, but also subjective and contextual dimensions, including cultural attitudes, religious beliefs, and trust in vaccine efficacy. By adopting this paradigm, the study bridges the gap between objective data collection and the rich, in-depth exploration of participants' lived experiences, ensuring actionable insights that can inform health policy and interventions.

4.2.2 Positivism

The positivist principle underpins the quantitative component of the study. Positivism posits that knowledge is derived from observable, measurable phenomena and objective data collection (Mahmoudi-Dehaki and Nasr-Esfahani 2024). This aligns with the study's aim to evaluate the effectiveness

of Kenya's national policy guidelines, assess socioeconomic factors influencing vaccine uptake, and analyse trust levels in vaccine efficacy. By using structured questionnaires to gather data from pregnant women, the study adheres to the positivist assumption that empirical evidence can establish generalisable patterns and relationships. For instance, statistical analysis is used to determine the impact of variables such as income, education, and healthcare access on vaccine acceptance among pregnant women.

4.2.3 Constructivism

Constructivism acknowledges that people create their world through social, cultural, and contextual factors, which feeds the study's qualitative components (Montecillo 2024; Radičuks et al., 2025). This philosophical position is pertinent to comprehending how traditional customs, religious convictions, and cultural attitudes influence pregnant women's vaccination decisions. The study explores individuals' opinions, experiences, and beliefs using semi-structured interviews, exposing the varying subjective meanings people attach to vaccination. Constructivism is a crucial viewpoint for tackling the intricate interaction of social and cultural elements in vaccination uptake because it highlights how these realities are socially produced and differ among people and places. This study has a strong foundation thanks to the pragmatic paradigm's integration with positivist and constructivist principles. While the quantitative component draws on positivist principles to generate measurable evidence, the qualitative aspect embraces constructivist ideas to uncover nuanced and context-specific insights. Together, these philosophical approaches ensure a comprehensive understanding of the socioeconomic, cultural, and personal factors influencing COVID-19 vaccine uptake among pregnant women in Nairobi City County, Kenya.

4.3 THE RESEARCH DESIGN AND APPROACH

4.3.1 The Research Design

A study design serves as a guide that specifies the steps and techniques for gathering and analysing data (Pandey, 2021). To provide deeper insights and explanations, an explanatory sequential design was specifically used, a type of

mixed methods approach that entails collecting and analysing quantitative data first, followed by qualitative data (Haynes-Brown, 2023). The explanatory sequential design was selected based on its appropriateness for addressing the study objectives, particularly the need to quantify COVID-19 vaccine uptake patterns before exploring the underlying reasons influencing acceptance or non-acceptance. In this study, quantitative and qualitative data were collected based on the vaccination data between September 2021 and October 2022, allowing findings from the quantitative phase to directly inform the focus and sampling of the qualitative phase.

The timing involved a sequential process in which quantitative data collection and analysis preceded the qualitative component to enable identification of key trends, associations, and gaps requiring further exploration. The weighting of the design was intentional, with greater emphasis placed on quantitative data due to its capacity to establish prevalence and associations at population level, followed by qualitative inquiry to provide contextual depth and explanation. The qualitative phase comprised key informant interviews with health professionals and focus group discussions with nurses, selected purposely based on insights emerging from the quantitative findings. Key informant interviews were considered appropriate for exploring issues related to policy communication, vaccine efficacy, and trust, as health professionals are directly involved in interpreting, communicating, and implementing national vaccination guidelines at the facility level. Their professional roles positioned them to provide informed perspectives on policy changes, institutional challenges, and patient interactions that influence vaccine decision-making. Focus group discussions with nurses were used to explore cultural attitudes, religious beliefs, and alternative protective practices, as these issues are best understood through shared lived experiences and collective social norms.

4.3.2 Quantitative Approach

This approach involved collecting numerical data to establish the general patterns and trends of COVID-19 vaccine uptake among pregnant women. This approach enabled the collection of numerical data, allowing for the quantification of COVID-19 vaccine uptake rates and the exploration of

associations with variables such as socioeconomic factors, trust in vaccine efficacy, cultural practices, and attitudes towards the vaccine.

4.3.3 Qualitative Approach

Based on the results of the quantitative analysis, qualitative data were collected to gain deeper insights into the findings. Semi-structured Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) were conducted with doctors and nurses respectively. Doctors were interviewed to understand their perspectives on the challenges, barriers, and facilitators of vaccine uptake among pregnant women. Their insights helped clarify issues related to policy communication, vaccine efficacy, and trust. FGDs with nurses provided a platform for exploring cultural attitudes, religious beliefs, and alternative protective measures employed by unvaccinated individuals. This method allowed for a rich and nuanced understanding of participants' lived experiences and decision-making processes. The qualitative data collection tools were designed to address unanswered questions from the quantitative phase, ensuring that the research objectives were comprehensively addressed.

4.3.4 Data Integration and Triangulation

This stage involved integrating and triangulating the quantitative and qualitative findings to provide a holistic understanding of the research problem. Data integration occurred during the interpretation stage, where qualitative findings were used to explain or expand upon the quantitative results. For instance, quantitative data might have shown a significant association between education level and vaccine uptake, while qualitative data revealed the underlying reasons, such as access to information or misconceptions about vaccine safety. Insights from healthcare providers could clarify how policy guidelines were implemented and communicated to pregnant women, addressing gaps identified in the quantitative analysis. Triangulation enhanced the validity and reliability of the study by corroborating findings from multiple data sources and methodologies.

4.3.5 Interpretation and Reporting

In the final phase, the researcher synthesised the findings from both quantitative and qualitative analyses to draw conclusions and provide recommendations. This phase emphasised the practical implications of the findings, particularly for policymakers, healthcare providers, and community leaders. Findings were presented in a clear and concise manner, with quantitative results supplemented by qualitative narratives to provide context and depth. The report also included actionable recommendations for improving vaccine uptake, such as targeted awareness campaigns, culturally sensitive interventions, and enhanced communication strategies by the Ministry of Health, Kenya (2020). The phased approach adopted in this study ensured a systematic and comprehensive investigation of COVID-19 vaccine uptake among pregnant women in Nairobi City County. By combining quantitative data for breadth and qualitative data for depth, the research design effectively addressed the complex and multidimensional nature of the research problem.

4.4 STUDY AREA AND TARGET POPULATION

The research study was conducted in Nairobi County and included a sample of pregnant women from seven (7) sub-counties and ten (10) level five health facilities, which are the highest level of government facilities authorised to administer COVID-19 vaccinations. The sample size was proportionate, with 380 vaccinated pregnant women and 380 unvaccinated pregnant women. The sample was drawn from a population of 3,503 vaccinated pregnant women across 17 sub-counties in Nairobi, utilising a database of 167 health facilities (Ministry of Health Kenya, 2021{Daily, #1285}). Table 4.1 below provides a summary of the vaccinated women per sub-County.

Table 4.1: Summary of Vaccinated Pregnant Women Per Sub-County

Distribution per Sub-County	No. Vaccinated Pregnant women
Dagoretti North Sub County	227
Dagoretti South Sub County	218
Embakasi Central Sub County	97
Embakasi East Sub County	184
Embakasi North Sub County	175
Embakasi South Sub County	161
Embakasi West Sub County	332
Kamukunji Sub County	101
Kasarani Sub County	182
Kibra Sub County	129
Langata Sub County	131
Makadara Sub County	569
Mathare Sub County	110
Roysambu Sub County	145
Ruaraka Sub County	291
Starehe Sub County	158
Westlands Sub County	293
Total	3503

4.5 SAMPLING TECHNIQUES

A three-stage purposive and random sampling techniques were employed in this research study. The selection process involved the following stages:

4.5.1 Selection of Pregnant Women

In the first stage, Nairobi was purposefully chosen due to its high vaccination rate among pregnant women compared to other counties in Kenya. A sampling frame consisting of 3,503 vaccinated pregnant women was developed from the 17 sub-counties, which encompass 167 level five government health facilities authorised to administer mass COVID-19 vaccinations from September 2021 to October 2022. The decision to choose government facilities was driven by the fact that they offered free mass vaccinations, making them more accessible

to a broader population. By concentrating on these government facilities, the study aimed to capture a representative sample of individuals who have received vaccinations under the mass vaccination program. To maintain geographic consistency, only pregnant women who regularly resided in Nairobi City County during the study period were eligible for inclusion; those who were temporarily visiting Nairobi for prenatal care but lived outside the county were excluded.

In the second stage, all health facilities with a vaccination rate of 2 per cent or more were included in the sample. The selection of facilities with higher vaccination rates was purposive, aiming to capture a broader range of responses. These facilities offered insightful information about effective vaccination campaigns and the elements that led to their increased vaccination rates. The study eventually involved ten level five health facilities out of 167 establishments in nine sub-counties related to the vaccination process.

The third stage involved the selection of pregnant women in proportion to the vaccination rate of each health facility. Simple random sampling was performed using the research randomiser application Randomizer.org (n.d) to choose the sampled pregnant women per health facility. This approach ensured that every sampling unit is unbiased and representative of the population throughout Nairobi City County (Bhardwaj 2019). If any selected respondents were unwilling to participate or their phone numbers were unreachable, they were randomly replaced by other respondents within the same health facility. Selected respondents were informed in advance to facilitate efficient planning and ensure that all targeted respondents can be interviewed.

This multistage sampling technique allowed for the selection of a representative sample of vaccinated pregnant women, enabling the study to gather diverse perspectives and experiences regarding the COVID-19 vaccination process. To facilitate comparisons, the sampling technique used in this study included the selection of unvaccinated pregnant women in a manner consistent with the approach for vaccinated pregnant women. Consequently, for every vaccinated pregnant woman selected per health facility, an unvaccinated pregnant woman was chosen. This process ensured that a balanced representation of both

vaccinated and unvaccinated pregnant women was achieved, allowing for meaningful comparisons between the two groups. At the facility level, vaccination status is routinely recorded during prenatal visits using the MOH ANC booklet 405 and confirmed against the Mchanjo M-mobile COVID-19 vaccination platform. Standard Ministry of Health practices were followed to identify vaccinated and unvaccinated pregnant women. The 405 booklet provided the list of pregnant women required during the study period. The researcher then picked phone numbers from the booklet and keyed them into the M-Chanjo system which showed whether a woman was vaccinated or not. Two separate lists were created showcasing pregnant vaccinated and pregnant unvaccinated. A definite sampling frame for unvaccinated pregnant women receiving prenatal care within the same facilities and reference period was made possible by this procedure.

The research study primarily focused on government level five facilities for participant selection, as private facilities were not conducting mass vaccination. The study focused on pregnant women who attend antenatal services at the ten selected health facilities, as they were expected to provide valuable insights for the research area. Information regarding vaccinated pregnant women was obtained from the Ministry of Health (MOH), specifically from the MOH Mchanjo M-mobile chanjo-vaccine platform (Ministry of Health 2023), which was developed by the government to track COVID-19 vaccinations. Data for pregnant women who were not vaccinated were collected from the MOH ANC booklet 405, which is available in all government facilities. The information was narrowed down to the same period between September 2021 and October 2022. Since the researcher had already shortlisted scientifically the facilities that had a vaccination rate of 2 per cent and above for pregnant vaccinated women, the researcher utilised the same facilities to get the pregnant unvaccinated women. After verifying their vaccination status via phone follow-up and facility records, unvaccinated participants were chosen at random from list derived earlier from the Mchanjo platform. Recruitment proceeded proportionately at each facility until parity with the vaccinated sample was reached. The majority of the chosen participants agreed to participate after being informed in advance, so the overall response rate was high. The few non-

responses were handled by random replacement within the same facility, which decreased the possibility that systematic non-response bias would affect the study's conclusions. However, it was worth noting that as much as the information was available on the MOH 405 booklet, the researcher could not have access to this data until receipt of the ethical clearance both in Kenya and South Africa.

4.5.2 Selection of Doctors and Nurses

Purposive sampling, a non-probability method, was used to select doctors and nurses for an in-depth follow-up. The criterion-i strategy was utilised by identifying and selecting all cases that met the predetermined criterion of importance (Bouncken et al.,). In this context, the two inclusion criteria that were considered were; those who were present in the selected facility at the time the study was conducted, and those who had participated in the vaccination programme within the period of September 2021 to October 2022 as shown in Table 4.2. Health professionals were included only if they had direct involvement in COVID-19 vaccination delivery, counselling, or policy implementation at the facility level, ensuring relevancy to the study objectives. A total of five doctors and ten nurses were selected to participate in the study. This method of selection was ideal in selecting individuals that are especially knowledgeable and have experience with the COVID-19 vaccination which was the phenomenon of interest in this study.

Table 4.2: Summary of inclusion and Exclusion Criteria

Participant category	Inclusion criteria	Exclusion criteria
Pregnant women	Expectant mothers during the period of September 2021 to October 2022. Must have been attending antenatal care at selected government level five health facilities; usual place of residence within Nairobi City County during the study period; willing and able to provide informed consent.	Non-expectant mothers during the period of September 2021 to October 2022. Pregnant women residing outside Nairobi City County and temporarily visiting the facilities; those unable or unwilling to provide informed consent; critically ill individuals unable to participate in interviews.
Nurses	Must have participated in the vaccination programme (September 2021 to October 2022). Direct involvement in COVID-19 vaccination delivery, counselling, or related policy implementation at facility level.	Did not participate in the vaccination programme during the period of from September 2021 to October 2022. Administrative staff without direct involvement in vaccination activities
Doctors	Must have been present in the selected facility. Must have participated in the vaccination programme (September 2021 to October 2022). Clinical or supervisory responsibility related to COVID-19 vaccination or maternal health services.	Absent in the facility. Did not participate in the vaccination programme during the period of from September 2021 to October 2022. Doctors without direct clinical or supervisory engagement in vaccination activities.

4.5.3 Sample Size Formulae

The quantitative sample size was determined from a population (sampling frame) of 3,503 COVID-19 vaccinated pregnant women who had received at least one dose of the vaccine in Nairobi County. These vaccinations were administered at level five government facilities during the mass vaccination campaign that took place from September 2021 to October 2022. To calculate the appropriate sample size, Solvin's formula was employed, as demonstrated below:

Where.

$$n = \frac{N}{1 + N(e)^2}$$

Where.

n=Sample size

N=Number of pregnant women = 3,503

e=Desired precision level (Significance Level= 5 per cent)

By substituting:

$$n = \frac{3503}{1+3503 (0.5)^2} = \frac{3503}{1+3503 (.0025)} = \frac{3503}{1+8.7575} = 359$$

=359 vaccinated pregnant Women

To account for missing data in the analyses, an additional 21 participants (representing 5 per cent of the sample size) were included in the sampling population. As a result, the total sample size for each group amounted to 380 respondents. The sample of 380 participants was distributed proportionally based on the vaccination rate across the ten selected government health facilities as represented in Tables 4.3.

Table 4.3: Distribution of the Sample Size in Nairobi County

S/ N	Sub County	Health facility	No. of pregnant women vaccinate d	Vaccin ation Rate	Sample Size
1	Makadara Sub County	Bahati Health Centre	334	9.53	99
2	Ruaraka Sub County	Babadogo Health Centre	165	4.71	50
3	Dagoretti South Sub County	Waithaka Health Centre	160	4.57	47
4	Embakasi West Sub County	Dandora (Edarp) Clinic	133	3.8	40
5	Makadara Sub County	Kaloleni Dispensary	89	2.54	26
6	Embakasi North Sub County	Ushirika Dispensary (Dandora)	85	2.43	25
7	Starehe Sub County	Starehe Sub County	83	2.37	25
8	Embakasi Central Sub County	Kayole I H/C	80	2.28	24
9	Mathare Sub County	Huruma Lions Dispensary	73	2.08	23
10	Roysambu Sub County	Marurui Dispensary	72	2.06	21
		Total	1274		380

4.6 DATA COLLECTION INSTRUMENTS

4.6.1 Questionnaires

A questionnaire is a research tool comprising a series of questions designed to collect data from respondents (Iwaniec 2019). This present study utilised closed questionnaires, encompassing structured items. The questionnaires were developed based on an extensive review of existing validated instruments used in maternal vaccination studies, adapted to the COVID-19 context, and pilot-tested with 20 pregnant women in a comparable health facility to ensure clarity, sensitivity, and cultural appropriateness. These questionnaires were specifically tailored for pregnant women visiting prenatal clinics at the ten selected government health facilities. Questionnaires were deemed suitable for

this study due to their ease of administration, cost-effectiveness, and ability to gather a substantial amount of data within a short timeframe (Salama, et al., 2020). Key constructs such as policy awareness, cultural beliefs, taboos, customary preventive practices, and exposure to misinformation were operationalised with clear definitions and translated into Kiswahili using forward-backward translation to ensure semantic equivalence by the enumerators during the phone interviews.

To enhance efficiency and minimise errors, the questionnaires were digitised using the ODK mobile data kit. This allowed enumerators to input data using mobile phones, facilitating real-time monitoring of data collection and ensuring data quality. Furthermore, the digital format enabled immediate online transmission of data after each interview, mitigating the risk of data loss. The utilisation of questionnaires, enabled a systematic and streamlined approach to data collection, enhancing the overall efficiency and accuracy of the study. Overall, these measures ensured that the questionnaires were valid, reliable, culturally sensitive, and capable of capturing nuanced determinants of COVID-19 vaccine uptake among pregnant women.

4.6.2 Key Informant Interview Guide

In addition to a questionnaire, a Key Informant Interview (KII) guide was developed to gather data from the selected five doctors who served as key informants in the study. The researcher conducted the quantitative survey first, analysed it, and from the findings, produced a list of questions that still needed clarifications from the expert groups identified for the study, that is, doctors and nurses. The KII guide consisted of open-ended questions. The qualitative data collected from these healthcare professionals were used to complement, clarify, and validate the findings obtained from quantitative survey of the pregnant women. The use of an interview guide during the KII facilitated the researcher in asking the right questions during face-to-face interviews with the key informants. According to Cresswell (2008), conducting interviews provided an opportunity to enhance question clarity and allowed participants to simplify their responses if any ambiguity arises. KIIs also allowed for a wide range of

responses based on how participants perceive the research topic. The KIIls maintained response consistency and avoided predetermined responses.

The key objective of interviewing doctors was to understand the findings and seek clarifications to answers provided by vaccinated and unvaccinated pregnant women that can be scientifically explained by the doctors. The study's quantitative results were explained using the questions posed. Compared to the data obtained using other methods, the information obtained through interviews was more accurate. Furthermore, the use of interviews was appropriate since it allowed for the probing of the sentiments behind an expressed opinion into extensive and in-depth information and disclosed information about complicated, emotionally charged themes (Höppner et al., 2022). But interviews took longer, and the process may go on for hours at a time (Morgan 2022).

4.6.3 Focus Group Discussions (FDGs)

The ideal range for participants in an FGD is typically 7-12 people (Guest 2017). Nevertheless, for this particular study, the approach involved getting ten nurses to meet the minimum number of nurses required in a FGD. The FDGs were conducted to obtain the clarifications from the quantitative findings as they work with the pregnant women daily and also understand their behaviour from interacting with them on a day-to-day basis. The use of Focus Group Discussion offers several advantages, including rich and in-depth data (Schulze et al., 2023). In addition, FDGs allowed the researcher to gather detailed and nuanced information from participants. The interactive nature of the discussions was to encourage participants to share their thoughts, experiences, and feelings, providing rich data beyond simple responses. The FDGs also allowed for diverse perspectives (Flayelle et al., 2022). In a focus group, participants had a diverse backgrounds and experiences, which led to various ideas and perspectives related to the research topic. This diversity helped the researcher gain an in depth understanding of the findings from the quantitative study regarding the pregnant women and vaccine uptake.

4.7 DATA COLLECTION

4.7.1 Quantitative Data

The information for vaccinated pregnant women was sourced from the MOH Mchanjo M-mobile chanjo-vaccine platform, a government-developed system for tracking COVID-19 vaccinations. Data for non-vaccinated women was obtained from the MOH ANC booklet 405, available in all government facilities. Telephonic interviews were conducted using the numbers provided in this booklet. The booklet facilitated access to the total population of pregnant women who were not vaccinated but received antenatal care. This enabled a comparative study to be conducted, aiming to understand the reasons, fears, and risks that influenced women's decisions to either accept or decline the vaccine. Pregnant women attending prenatal clinics in the chosen hospitals were the target for the structured and semi-structured questionnaires used to collect data. There were five primary sections of the questionnaire. Screening questions and demographic data were included in the first section, which was followed by sections on policy awareness, socioeconomic position, cultural influences, degree of vaccine trust, and strategies employed by pregnant women who were not vaccinated. Both structured and semi-structured questions were used, enabling thorough insights.

4.7.2 Qualitative Data

The qualitative data was collected using KIIs with doctors and the FGDs with nurses. The KII included 13 open-ended inquiries, while the FGD comprised 11 questions. During the data collection process, interviews were conducted in the language that each participant feels most comfortable speaking. English and Swahili were chosen because they are the most widely spoken languages in Kenya and are recognised as the country's two national and official languages. These qualitative approaches were designed to capture healthcare providers' viewpoints regarding COVID-19 vaccination guidelines, communication approaches, and obstacles encountered in encouraging vaccine acceptance among expectant mothers. The qualitative data gathered from the nurses served as a critical component in validating findings from the primary respondents, namely pregnant women. This methodology facilitated a holistic

understanding of the elements influencing the acceptance of COVID-19 vaccines among pregnant mothers in Nairobi County.

4.7.3 Training of Enumerators

The data collection enumerators were recruited from the government facility ICT team. Each government facility had an ICT lead with a medical background. This team was selected because they had participated in the data entry of the vaccinated pregnant women at their respective facility. This ensured that they are familiar with the data. A total of ten enumerators were recruited and engaged for data collection. One enumerator administered at least six questionnaires per day for two weeks (14 days). The enumerators participated in a two-day virtual training session held in Nairobi before beginning the data collection process. Ahead of the actual data collection, a pretesting activity was carried out to assess the tools designed for gathering both qualitative and quantitative information. The training allocated one day specifically for pretesting the questionnaire, utilising participants selected from the database of respondents associated with their respective facilities. This pretesting exercise was intended to evaluate key aspects to ensure accuracy and efficiency of the procedure for data collection. The pretesting exercise involved administering the questionnaires to a small sample of ten respondents (five per language), and it focused on evaluating the following aspects:

1. Clarity: The main purpose of pre-testing is to make sure the questions can easily be answered by the participants.
2. Duration: The time taken to administer each questionnaire was measured to estimate the overall time required for data collection.
3. Comprehension: The enumerators' understanding of the questionnaire was assessed to ensure they were able to comprehend and properly administer the questions.
4. Digital questionnaire: The ease of use of the digital questionnaire was examined to verify that the data collection tool was user-friendly and compatible with the data collection devices.

5. Question sequencing and structure: The order and logical progression of the questions were examined to ensure they were straightforward and easy for respondents to understand and follow.
6. Language translation: Where necessary, the questionnaire's translation into the local language was assessed to verify its precision and suitability.
7. Relevance and completeness: The provided response options in the questionnaire were assessed to ensure they covered all relevant aspects of the research topic and offered comprehensive choices for the respondents.
8. Enumerator experience: The practical experience of the enumerators in administering the questionnaires was considered to identify any areas where additional training or support may be required.

4.8. QUANTITATIVE AND QUALITATIVE DATA ANALYSIS

The research study employed a mixed-methods approach, combining both quantitative and qualitative techniques. Descriptive and inferential statistical methods were utilised to inspect the relationships between socioeconomic factors and vaccine uptake among pregnant women. A comprehensive analysis of both data types was conducted, adhering to a sequential explanatory design. In this approach, quantitative data were analysed first, and consequently qualitative data, which were used to validate and enhance the findings through a triangulation process. The quantitative analysis involved a rigorous examination using univariate, bivariate, and multivariate statistical methods. Quantitative data were subjected into a robust analysis basing on univariate, bivariate and multivariate statistics.

4.8.1 Quantitative Data Analysis

ODK was the platform that was used to collect data for this study and were uploaded and processed using Statistical Package for Social Sciences (SPSS) Version 28.0, which was also employed for subsequent analysis. Descriptive statistics such as frequencies, percentages, means, and standard deviations were calculated to summarise the socio-demographic characteristics of participants and their COVID-19 vaccine uptake rates. The results were

presented using tables, charts, and graphs to provide clear and factual insights. Logistic regression analysis was utilised to explore the relationships between socioeconomic factors and vaccine uptake. Initially, bivariate logistic regression was conducted to evaluate the connection between individual socioeconomic variables and vaccine uptake. This was followed by multivariable binary logistic regression to identify significant socioeconomic predictors of vaccine uptake at each stage of analysis. Chi-square tests were employed to assess discrepancies between data on vaccine willingness and factors such as fear, perceived vulnerability, perceived control over virus transmission, and psychological distress. Additionally, differences in key predictors between vaccinated and unvaccinated pregnant women were evaluated using a t-test to identify statistically significant variations.

4.8.2 Qualitative Data Analysis

Data from focus group discussion and key informant interviews was analysed and interpreted thematically. Responses were methodically coded and categorised, and key themes were found. Consistent trends were established by calculating the average number of codes assigned to each subject. Verbatim quotes and in-depth narratives were used to convey the findings of the qualitative investigation.

4.8.3 Integration of Quantitative and Qualitative Findings

To create a comprehensive picture of the variables impacting pregnant women's adoption of the COVID-19 vaccine, the quantitative and qualitative data were combined. Deeper understanding of the factors influencing vaccination acceptability was gained by contrasting and comparing the findings from the two analyses to identify any areas of agreement or disagreement.

Table 4.4: Summary of Analysis as per Research Question

Item No.		Statistical Analysis	Data presentation
1	<i>Research Question 1</i>	Descriptive statistics, thematic analysis	Narratives/verbatim
2	<i>Research Question 2</i>	Chi-square Test of Independence, Logistic Regression	Figures, tables and charts
3	<i>Research question 3</i>	Chi-square Test of Independence, Logistic Regression	Figures, tables and charts
4	<i>Research Question 4</i>	Chi-square Test of Independence, Logistic Regression	Figures, tables and charts
5	<i>Research Question 5</i>	Chi-square Test of Independence, Logistic Regression	Figures, tables and charts
6	<i>Research Question 6</i>	Descriptive statistics, thematic analysis	Figures, tables and Narratives/verbatim

4.9 RELIABILITY AND VALIDITY

Validity and reliability are essential components of research technique because they establish the dependability and credibility of the study's conclusions. Questionnaires, FGDs, and the KIs were the tools used to collect data, they were carefully planned and thoroughly pretested. The purpose of the pretesting procedure was to assess their efficacy, clarity, and fit with the study's objectives. Moreover, a strong mixed-methods strategy that combined quantitative and qualitative techniques was used in this study to ensure the validity and reliability of the results. The term "reliability" describes a measuring device's capacity to remain stable and consistent over time, guaranteeing that its use yields consistent results. This study used several data collection methods, including surveys of pregnant women, semi-structured interviews, observations, and a review of previous research. This multi-method approach was created to improve the data's reliability and offer a thorough comprehension of the research topic. By using different methods, the study aimed to triangulate the information and data collected, increasing the reliability of the findings. Triangulation involves comparing and contrasting different

sources of data to validate and strengthen the results. To increase a low-inference description was used to improve the reliability of the qualitative data from the interviews and focused group discussions. This type of description tends to give the most concrete data that isn't constructed by the researcher.

Validity means how well measurements or data collection methods accurately do what they're supposed to do, such as accurately measuring specific behaviours or qualities. Split-half analysis, in which test scores were associated each time a participant finished the test, was used to evaluate the internal consistency of quantitative data. With a correlation coefficient of 0.74, which indicates a significant association, the questionnaire was deemed credible. Both quantitative and qualitative research methods were used in this research to obtain a comprehensive picture of pregnant women's absorption of the COVID-19 vaccine. While the qualitative technique used focus group discussion guides and key informant interviews to obtain in-depth insights, the quantitative approach used standardised questionnaires to collect numerical data. By combining these approaches, the study was able to approach the research topics from a more comprehensive angle, which improved the validity of the results. A three-stage purposive random sample technique was used to guarantee the accuracy and dependability of the sampling procedure, offering a strong framework for participant selection. The selection of the sample involved multiple stages, including the choice of Nairobi County due to its high vaccination rate, selecting health facilities with higher vaccination rates, and randomly selecting pregnant women based on the vaccination rate of each facility. This sampling technique aimed to capture a representative sample of vaccinated and unvaccinated pregnant women, allowing for meaningful comparisons between the two groups and enhancing the validity of the study.

4.10 ETHICAL CONSIDERATIONS

By improving knowledge about pregnant women's uptake of the COVID-19 vaccine, the study sought to help both the participants and the larger community. Throughout the research process, every effort was taken to reduce any possible injury or pain to the subjects. Enumerators in the study were transparently informed about the goals, risks, and advantages of the research

prior to their involvement. Participants were made notified that their participation was completely voluntary and that they may leave at any time without facing any repercussions. Anonymity was ensured, with participant names not disclosed or identified in any publication. The study upheld strict privacy and confidentiality standards to safeguard participants' personal and health information.

Data was anonymised and stored securely with limited access to authorised personnel. Since the study involved both pregnant vaccinated and pregnant unvaccinated women, the study ensured that all participants, regardless of their vaccination decisions, are treated fairly and without discrimination. Equitable access to participation in the study was promoted giving both vaccinated and unvaccinated women a fair chance. Contact details were provided for follow-up and clarification. Ten enumerators were picked who could speak English and Swahili as these are the two national languages of Kenya and underwent training. Prior to commencing the research, authorisation was obtained from the Department of Development Studies, UNISA. A research permit was also sought from Kenya's National Commission for Science and Technology (NACOSTI). The study adhered to all ethical guidelines and recommendations provided by both bodies. To cater for diversity and inclusion, the research strived for diversity and representation among pregnant women in Nairobi County, considering various socioeconomic backgrounds, ethnicities, and geographical locations and ensure adequate geographic representation. Potential risks associated with the research, such as psychological distress or breaches of confidentiality, were carefully evaluated and mitigated. The research was culturally sensitive, and care was taken to respect the beliefs, values, and practices of the local community. Input and guidance from community leaders and organisations were sought to ensure alignment with local customs and norms.

Ethical considerations were continuously monitored and reassessed throughout the research process, with openness to feedback and concerns raised by participants and other key informants. This study ensured openness while disseminating its findings, explicitly stating any restrictions or difficulties

that arose throughout the investigation. Every piece of information gathered was treated with the highest confidentiality. In accordance with the Do No Harm principles, the research method complied with ethical standards, placing a strong emphasis on informed consent, confidentiality, voluntary involvement, and preventing participant harm or distress. Anonymity was given top priority in this study. Strict ethical guidelines were adhered to during the data processing process in order to preserve the participants' privacy and confidentiality.

Discussing COVID-19 vaccination may evoke fear, anxiety, or emotional distress among nurses, and doctors following the traumatising experience due to exposure to the virus during the pandemic. The researcher looked for a dedicated counsellor, social worker, or psychologist available to provide psychological support to participants throughout the research process. This individual was trained to address emotional distress, anxiety, or concerns related to COVID-19 vaccination in a sensitive and supportive manner. The researcher implemented strict confidentiality measures to protect participants' personal and health information. The data was stored securely, with limited access to authorised personnel only. Pseudonyms or coding systems were used to anonymise participant data in research reports and publications.

4.11 RISK MANAGEMENT

Emotional Distress: After being exposed to the virus during the pandemic, nurses and doctors may experience dread, anxiety, or emotional discomfort when discussing COVID-19 vaccination, especially to expectant mothers worried about the vaccine's safety for both them and their unborn child.

Stigmatisation: Participants may fear stigma or discrimination based on their vaccination status, especially if they express hesitancy or refusal to receive the vaccine due to cultural or individual beliefs.

Breach of Confidentiality: There was a potential risk of inadvertently revealing participants' personal or health information, leading to breaches of confidentiality and potential harm to their privacy and well-being.

Risk Management Plan:

- a) Before the study began, the researcher ensured that all research staff, including the psychologist, received appropriate training on ethical guidelines, participant safety, and risk management strategies.
- b) The researcher made sure that participants understood the goal of the study, the possible dangers, and the advantages of taking part by carrying out a comprehensive informed consent procedure. They were given clear information regarding confidentiality procedures and their freedom to leave the study at any moment without facing repercussions.
- c) The researcher looked for a dedicated psychologist available to provide psychological support to participants throughout the research process. This individual was trained to address emotional distress, anxiety, or concerns related to COVID-19 vaccination in a sensitive and supportive manner.
- d) The researcher implemented strict confidentiality measures to protect participants' personal and health information. The data was stored securely, with limited access to authorised personnel only. Pseudonyms or coding systems were used to anonymise participant data in research reports and publications.
- e) The participants' well-being was monitored throughout the study, conducting regular check-ins and assessments of emotional distress or adverse events. Open communication was encouraged, and opportunities were provided for participants to express any concerns or feedback they may have.
- f) The researcher developed a response protocol for addressing unexpected adverse events or participant concerns. This protocol included procedures for providing additional support, referrals to mental health professionals if needed, and reporting mechanisms for adverse events.
- g) To make sure the research protocol complied with ethical standards and laws, the researcher applied for ethical permission from institutional review boards or ethics committees.

4.12 SUMMARY

This chapter provided a thorough description of the research methods used in the study. Both quantitative and qualitative methodologies were used in the study's descriptive mixed-method approach. The study's results were the main focus of the subsequent investigation. The next chapter discusses the data analysis and interpretation of findings.

CHAPTER FIVE

THE RESEARCH FINDINGS

5.1 INTRODUCTION

This chapter provides an in-depth analysis and interpretation of the study's results., combining quantitative and qualitative data to address the research objectives. The sequential explanatory design guided the analysis, with quantitative data forming the foundation for the initial exploration of patterns, trends, and relationships among variables. The results from quantitative analysis were subjected to rigorous statistical techniques, including univariate, bivariate, and multivariate analyses, to ensure robust and reliable insights. Univariate analysis explored descriptive statistics such as means, frequencies, and proportions to highlight key characteristics of the study population. Bivariate analysis examined associations between independent and dependent variables, while multivariate techniques assessed the combined effects of multiple factors, offering a deeper understanding of the complex interactions influencing COVID-19 vaccine uptake among pregnant women.

To enrich the findings, qualitative data were used to validate and provide context to the statistical results through a triangulation process. Semi-structured interviews and open-ended responses were analysed thematically to capture the nuanced perspectives, behaviours, and experiences of the participants. This combination of quantitative and qualitative data helped us understand the research problem better by connecting numerical trends with personal and social dynamics. The chapter systematically presents the findings, aligned with the study's specific objectives and research questions, including awareness of and satisfaction with national policy guidelines, communication strategies, socioeconomic factors, cultural attitudes, alternative protection methods, and trust in vaccine efficacy.

The data analysis process involved three stages: univariate analysis, bivariate analysis, and multivariate analysis. Each stage served a different purpose and utilised specific techniques to explore various aspects of the data

comprehensively as illustrated under the following sub-sections (5.1.1, 5.1.2 and 5.1.3).

5.1.1 Univariate Analysis

Univariate analysis represents the most basic form of statistical analysis, focusing on a single variable is examined to understand its main characteristics. The process began by collecting data on a single variable, such as age, education, or vaccine uptake. Once the data was collected, descriptive statistics were used to summarise it. This included calculating frequency distributions and percentages to show how often each category appeared and determining percentages to express the proportion of participants within each category. The results of the univariate analysis were then presented using tables, graphs, or charts to allow for easy interpretation. This stage provides an overview of individual variables and helps identify trends or patterns within the dataset.

5.1.2 Bivariate Analysis

Bivariate analysis involves examining the relationship between two variables to determine if there is a significant association between them. In this stage, chi-square tests were used to test for the association between two categorical variables. Correlation analysis was also useful when examining the strength and direction of the relationship between two continuous variables. The results from these tests were then interpreted to determine whether the relationship between the two variables is statistically significant. Bivariate analysis helps identify key factors that influence vaccine acceptance and reveals patterns in the data that warrant further investigation.

5.1.3 Multivariate Analysis

#Multivariate analysis takes the analysis a step further by examining the combined effect of multiple independent variables on a dependent variable. This stage is crucial for understanding how several factors work together to influence an outcome, such as vaccine uptake. In this analysis, multiple independent variables were simultaneously considered to assess their collective impact on vaccine uptake among pregnant women. Techniques like

multiple linear regression or multivariate logistic regression were used depending on the nature of the dependent variable. Multiple linear regression is suitable when the dependent variable is continuous, while multivariate logistic regression is used when the dependent variable is categorical, such as vaccine uptake (yes/no). These methods provide insights into how each independent variable influences the likelihood of the dependent variable, controlling for other factors. The results were interpreted by examining the coefficients or odds ratios to determine the strength and direction of these relationships. Multivariate analysis also allows for the exploration of interaction effects, where the relationship between one independent variable and the dependent variable may differ based on the level of another independent variable. By considering multiple variables at once, multivariate analysis offers a deeper understanding of the complex factors that influence vaccine uptake.

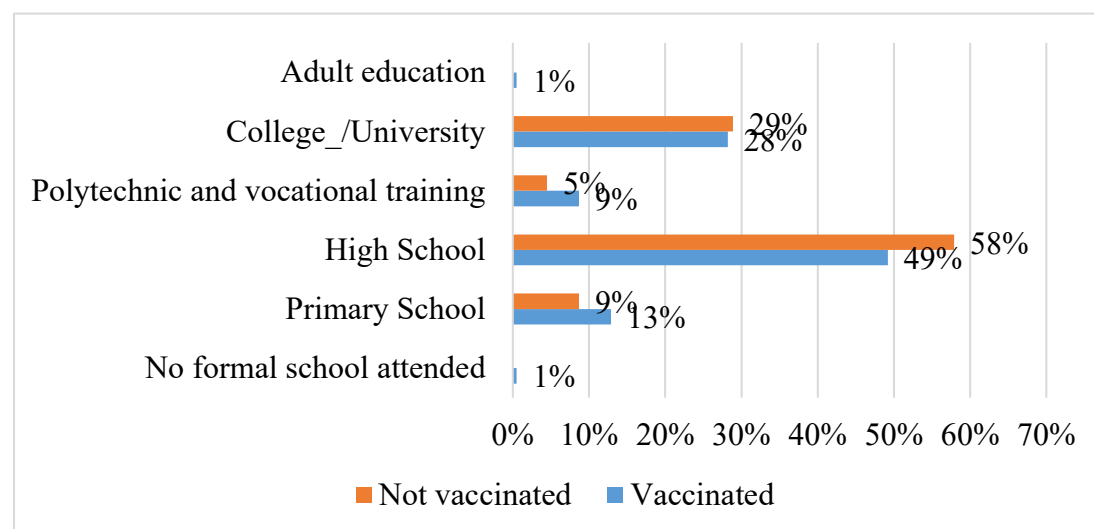
5.2 GENERAL CHARACTERISTICS OF THE SAMPLE

Using univariate statistics, an exhaustive analysis was carried out to investigate the major behavioural and demographic data determinants impacting vaccination rates in the context of understanding COVID-19 vaccine uptake among pregnant women in Nairobi City County. With the use of univariate analysis, which concentrates on looking at each variable separately, data distributions and patterns can be easily understood. Univariate analysis focuses on examining individual variables in isolation, allowing for a clear and straightforward interpretation of data patterns and distributions. Frequency counts were first established for each variable of interest, providing a comprehensive overview of how many respondents fell into each category. Next, percentages were calculated to contextualise these frequencies within the total sample size.

5.2.1 Distribution by Socioeconomic Characteristics against Vaccine Uptake

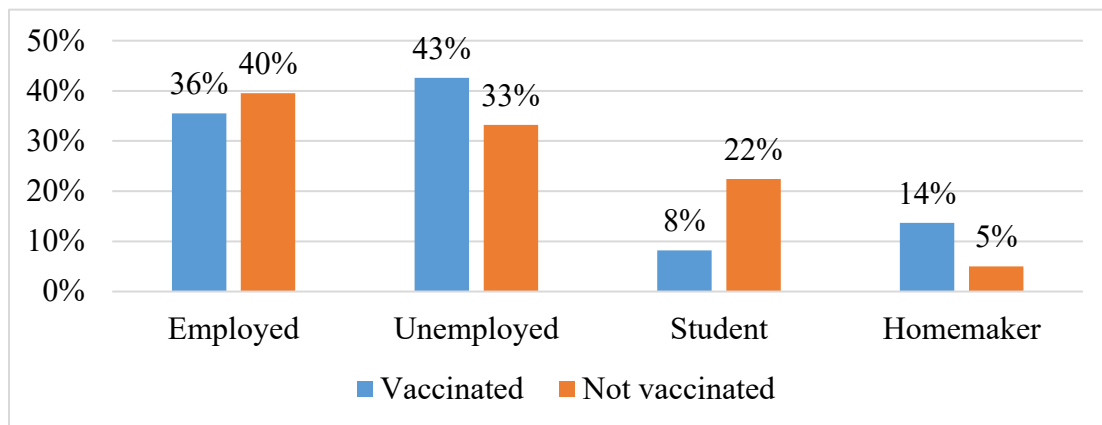
The univariate analysis of socioeconomic characteristics related to COVID-19 vaccine uptake reveals significant patterns in vaccination status among the surveyed population, particularly highlighting the extremes in both the highest and lowest frequencies of vaccination across the two groups. Data was presented in bar graphs and pie charts as shown below.

Figure 5.1: Distribution by Education Level



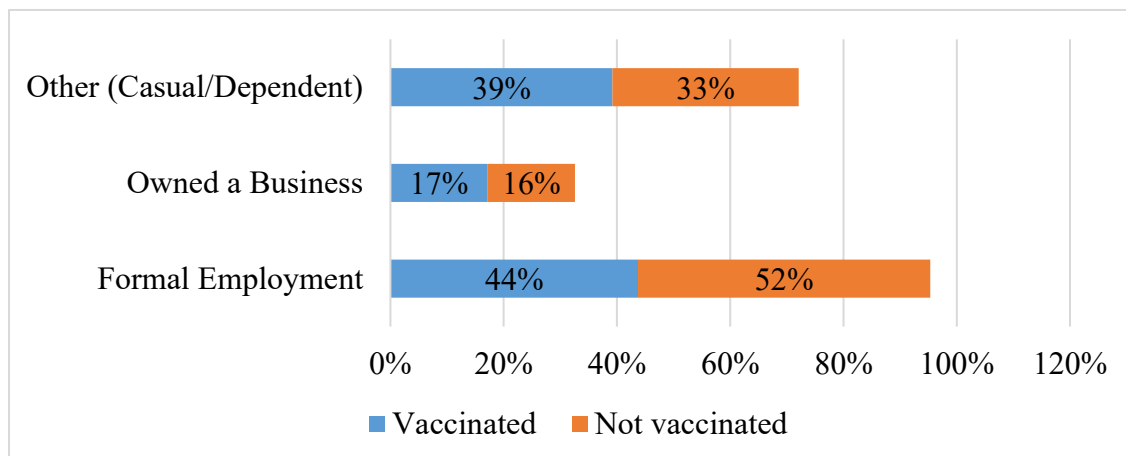
The analysis, as shown in Figure 5.1, shows that the highest percentage of vaccinated individuals was among those who completed high school, with 49 per cent having received the vaccine. In stark contrast, individuals with no formal schooling and those engaged in adult education equally exhibited the lowest vaccination rate, at 0.5 per cent. Among the unvaccinated, the highest proportion, 58 per cent, is found in the high school category. Above high school, 87 per cent were vaccinated, and 92 per cent were not vaccinated. At this point, it does not seem like education was a factor in influencing vaccination. However, this was analysed later as we progressed to the bivariate and multivariate levels.

Figure 5.2: Distribution by Employment Status



Concerning employment status as presented in Figure 5.2, the results revealed that 43 per cent of unemployed respondents were vaccinated. Conversely, those vaccinated in the students' category recorded a notably lower proportion of 8.2 per cent. From the graph above, students and homemakers did not get vaccinated as much as the employed and unemployed. The fact that someone was employed or unemployed did not seem to affect their decision to get vaccinated. The researcher further investigated this finding.

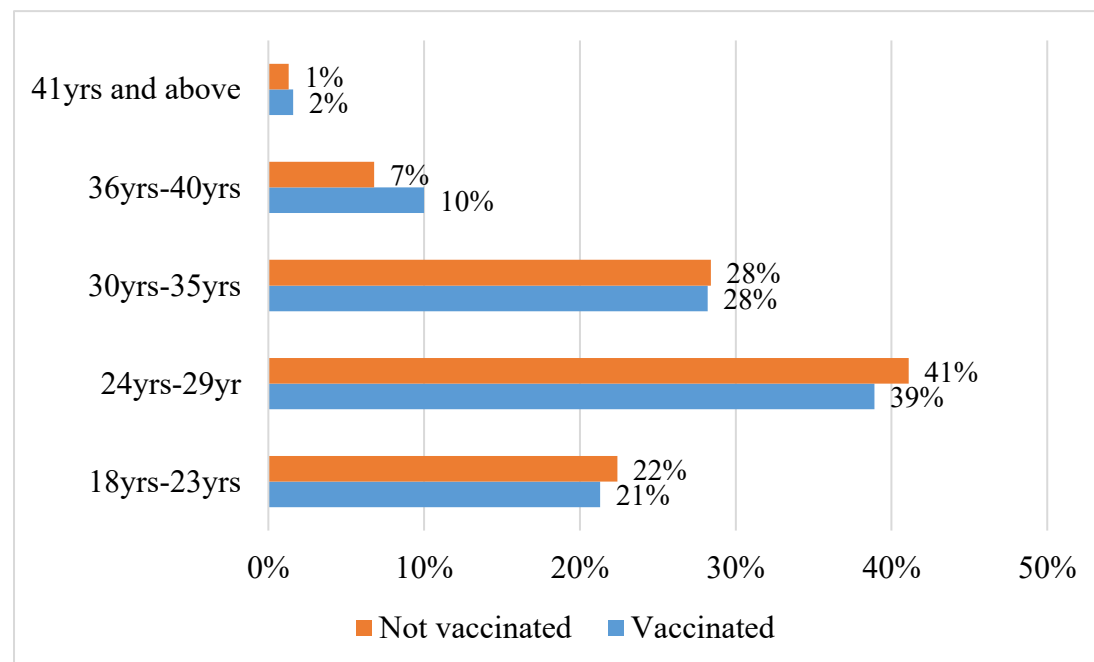
Figure 5.3: Distribution by Income Source



Based on income sources as shown in Figure 5.3, the highest vaccination rate was found within the formal employment category, where 44 per cent were vaccinated. In contrast, business owners showed a lower vaccinated proportion at 17 per cent. Among the unvaccinated, those in formal employment also constituted a significant group at 52 per cent. It was evident that business

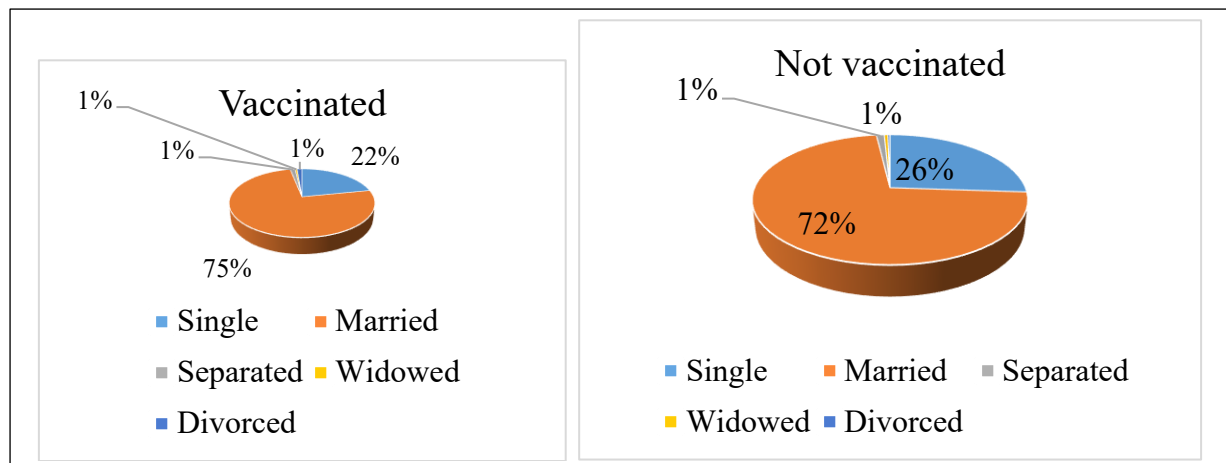
owners were the least vaccinated and most unvaccinated compared to casual workers and individuals in formal employment. This result seems to suggest that employment or an income source did not influence the vaccination decision. However, this finding was further examined later.

Figure 5.4: Distribution by Age



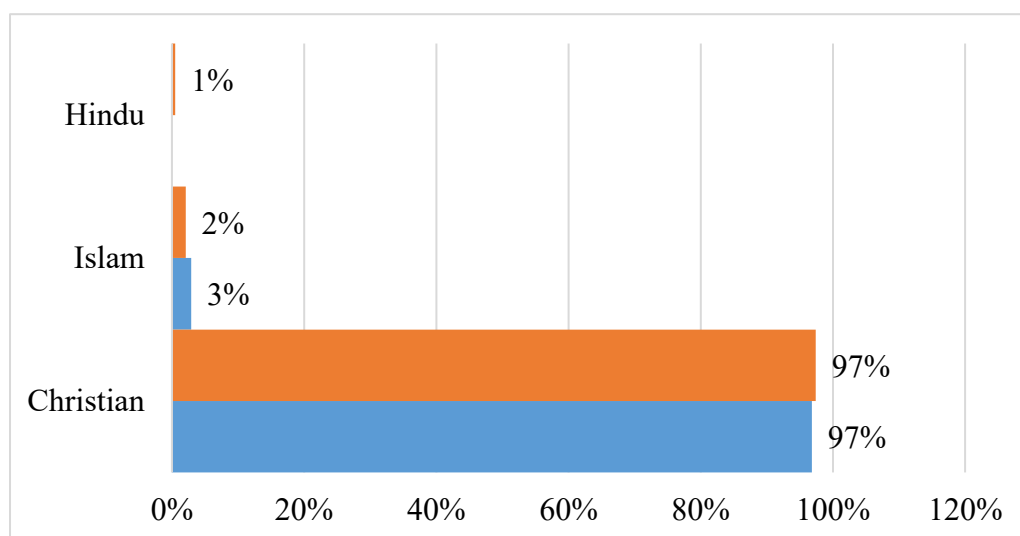
In terms of age, the highest percentage (39per cent) of vaccinated participants were within the age range of 24-29 years. Conversely, the lowest proportion of vaccinated respondents occurred among participants aged 41 years and above, where 2 per cent were vaccinated and 1 per cent unvaccinated. Similarly, among the unvaccinated group, the highest frequency (41 per cent) was in the 24- to 29-year-old category. According to Klls, the highest percentage of individuals that were vaccinated were aged between 24 and 35. This data syncs with current findings in terms of the highest numbers of people vaccinated. However, age did not seem to be a determinant in the decision for pregnant women to be vaccinated.

Figure 5.5: Distribution by Marital Status



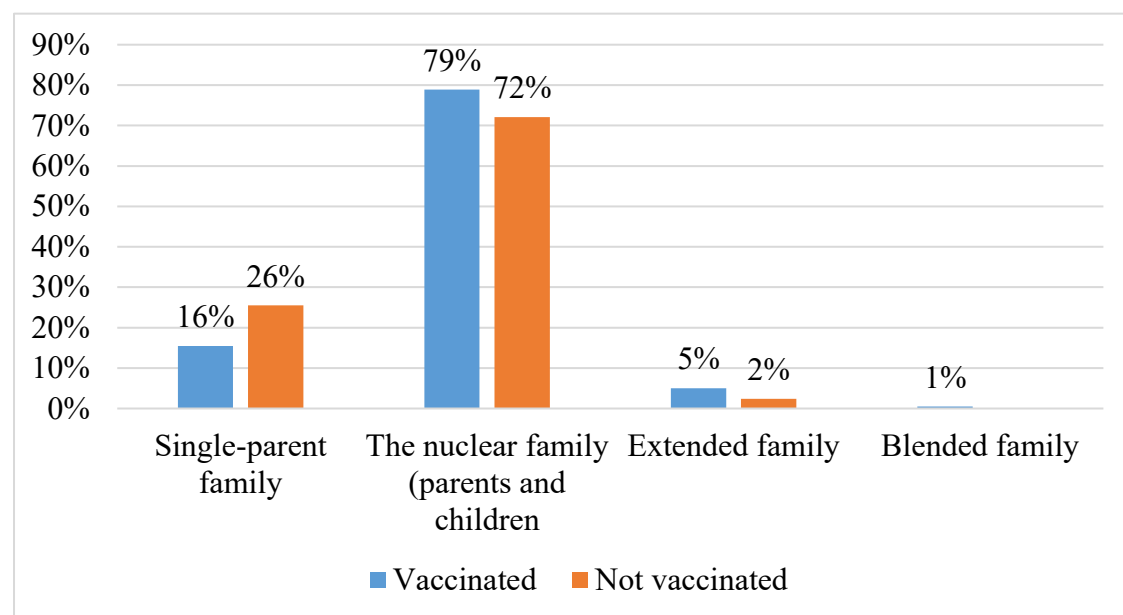
When examining marital status, the highest proportion (75.0 per cent) of the married group were vaccinated. In contrast, the divorced group displayed the lowest proportion of vaccinated respondents at 1.3 per cent (five individuals). Among the unvaccinated, the largest segment is also from the married population. However, at this current univariate level, there is not much difference between the vaccinated and unvaccinated by marital status. The fact that a person was divorced or married did not make a difference at this level. The researcher investigated more at the bivariate and multivariate levels to see if there was a significant difference with marital status as an indicator.

Figure 5.6: Distribution by Religion



In terms of religious affiliation shown in Figure 5.6 above, the majority of the vaccinated group (97 per cent) identified as Christians, followed by Muslims (three per cent). Among the unvaccinated, the Christian group similarly constitutes a significant portion at 97.4 per cent. The population for Buddhists and Hindus was not significant (<1 per cent) in both groups. According to the 2019 census, 85.5 per cent of the population in Kenya were Christians, thus forming the majority of the religious community. This was estimated at about 47.2 million people (Kenya National Bureau of Statistics, 2019). The above findings showed no noticeable difference in the impact of religion on the vaccine uptake at the univariate level. However, more analysis at the bivariate and multivariate levels was required to reach an informed conclusion.

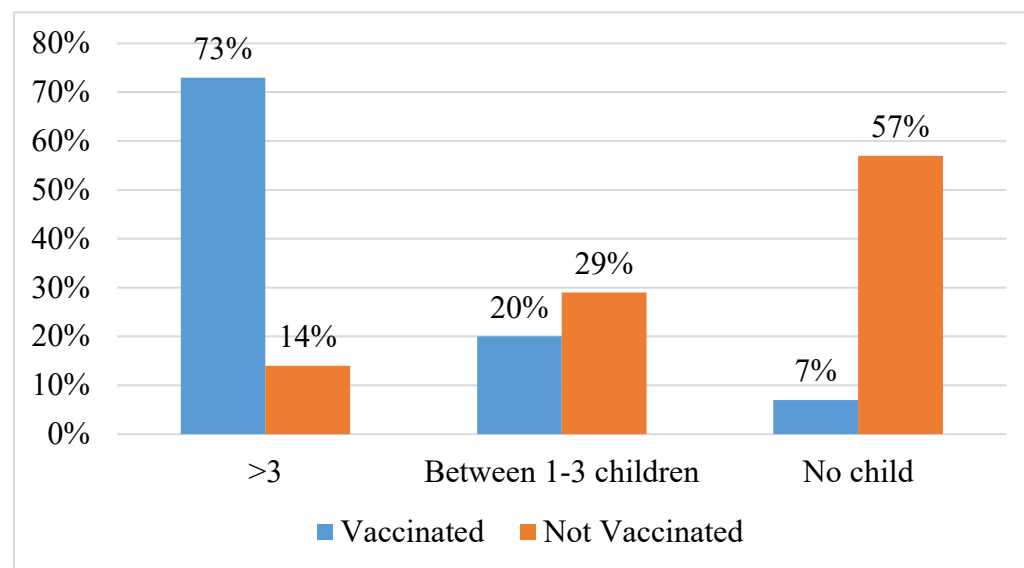
Figure 5.7: Distribution by Family Structure



Findings indicate that the nuclear family had the highest vaccination rate, with 78.9 per cent vaccinated. Conversely, the blended family group had the lowest proportion of vaccinated respondents, with only 0.5 per cent reported as vaccinated. Similarly, the largest group (72 per cent) of unvaccinated pregnant women came from the nuclear family. It was interesting to note that among the single-parent families, the unvaccinated pregnant women were more than the vaccinated ones at 25.5 per cent. According to the findings, respondents from nuclear families recorded the highest proportion of vaccination uptake (79 per

cent), whereas only 16 per cent of those from single-parent families were vaccinated. However, for the nuclear family, there was not much difference between vaccinated and unvaccinated pregnant women at the univariate level. This variation was investigated at the bivariate and multivariate levels to establish any significance.

Figure 5.8: Distribution by Number of Children before Pregnancy



Regarding the number of children before pregnancy, respondents with more than three children exhibited the highest proportion of vaccinated rates at 73 per cent. In contrast, those without children show the lowest vaccination proportion, with only seven per cent vaccinated. Among the unvaccinated group, participants with no children comprised the majority (57 per cent). Perhaps having children positively influenced the perception of vaccine uptake. However, this assumption was investigated below at the bivariate and multivariate levels. When one examines characteristics of the sample as indicated above (education level, religion, marital status, income source, employment status, number of children before pregnancy) at the univariate level, it seems there was not much difference between vaccinated and unvaccinated individuals. However, the above comments were substantiated through bivariate and multivariate analysis, as we shall see below.

5.3 FINDINGS FOR RESEARCH QUESTION 1

The primary research question addressed in this study was *To what extent are pregnant women are informed about and satisfied with Kenya's current national policy guidance on COVID-19 vaccines among pregnant women, and what is the vaccination rate?* Bivariate analysis focused on examining individual variables related to pregnant women's awareness of and satisfaction with national policy guidance on COVID-19 vaccines in isolation in terms of frequency and percentages with respect to the number of vaccinated and unvaccinated pregnant women. To establish the significance of the association between categorical data linked to awareness of the policy and vaccine uptake, chi-square tests were employed. A 2x2 contingency table was constructed to present and analyse the relationship between two categorical variables.

5.3.1 Bivariate Data Analysis

The results for the Pearson Chi-Square Tests for information on policy and COVID-19 Vaccine Uptake are as presented in Table 5.1.

Table 5.1: Pearson Chi-Square Tests for information on policy and COVID-19 Vaccine Uptake

National policy guidance on COVID-19 vaccines		COVID-19 Vaccine Uptake						
		Vaccinated		Unvaccinated		Pearson Square Tests		Chi-
		F	%	F	%	χ ²	d f	p
Whether informed about any policy changes related to Vaccine	Informed about policy	265	69.7%	134	35.3%	90.547	1	.000*
	Not informed about policy	115	30.3%	246	64.7%			
	Total	380	100.0%	380	100.0%			
Satisfaction with Health Ministry's Information	Satisfied	214	56.3%	72	18.9%	113.044	1	.000*
	Not Satisfied	166	43.7%	308	81.1%			
	Total	380	100.0%	380	100.0%			
*Sig at p<.05								

Data in Table 5.1 above shows a substantial gap between the two groups (vaccinated and unvaccinated). Among those who reported being informed about policy changes, the majority (69.7 per cent) of pregnant women had received the COVID-19 vaccine. In contrast, only 35.3 per cent of unvaccinated women claimed to have been informed about these policy changes. The finding indicates that there is a significant association between awareness of policy changes and vaccine acceptance among pregnant women ($\chi^2=90.547$; $p=0.000<0.05$). This finding implies that policy changes awareness plays a critical role in influencing vaccine uptake. The significantly higher percentage of vaccinated individuals who were informed suggests that targeted communication strategies could effectively bridge the gap between knowledge and action.

In terms of satisfaction with the information provided by the Ministry of Health, the data reveals another significant disparity. Among vaccinated women, 56.3 per cent expressed satisfaction with the information they received. Conversely, only 18.9 per cent of the unvaccinated reported being satisfied with health communications. From the chi-square test, the finding showed a significant association between satisfaction with the information provided by the Ministry of Health and vaccine acceptance among pregnant women ($\chi^2=113.044$; $p=0.000<0.05$). The notably lower satisfaction level among the unvaccinated group points to a potential barrier in their decision-making process regarding vaccination.

Table 5.2: Summary of alternative hypotheses for Objective 1

Alternative Hypothesis	Association	Verdict
Ha1: There is significant association between being informed about and satisfaction with policy changes related to COVID-19 vaccines and the uptake of the COVID-19 vaccine among pregnant women in Nairobi County.	Exists	Accepted

5.3.2 Binary Logistics Regression (BLR)

Binary logistics regression was used to establish the significance of the relationship between the categorical variables of information on policy changes related to vaccine and binary dependent outcome (vaccinated coded as 1 or not vaccinated coded as 0). The categorical independent variables (whether informed about any policy changes and Satisfaction with Health Ministry's Information) were coded using dummy variables. Beta coefficients (B) and Odds Ratio (OR) were computed through BLR. Taking the outcome "Not vaccinated" as the reference (Ref=Not vaccinated coded as 0), the B coefficient (also called the log-odds) measures the effect size or strength of the relationship between independent variables (predictors) and the logit of the outcome (being vaccinated).

A positive value of B implies that an increase in predictor variable increases the odds of the outcome (being vaccinated). On the other hand, a B coefficient with a negative value indicates that an increase in the predictor variable decreases the odds of the outcome (vaccinated). Odds Ratio (OR) is derived by exponentiating the B coefficient using the formulae ($OR=e^B$). If $OR>1$, then the odds of being vaccinated increases as the independent variable unit increases, while an $OR<1$ shows that the odds of being vaccinated decreases as the independent variable unit upsurges. Nonetheless, if $OR=1$, then the predictor has no effect on the odds of the outcome. The OR is considered statistically important if the p-value is equal or less than 0.05 ($p\leq 0.05$) and the Confidence Interval (C.I) does not include the value 1. The result for binary logistics regression between information on policy factors and COVID-19 vaccine uptake is as presented in Table 5.3 below.

Table 5.3: Binary Logistics Regression Between Information on Policy Factors and COVID-19 Vaccine Uptake

COVID-19 Vaccine uptake		B	df	P-value	OR	95% C.I. for OR	
						Lower	Upper
Step 1 ^a	Informed about any policy changes related to Vaccine	.857	1	.000	2.356	1.299	2.601
	Satisfied with Health Ministry's Information	1.277	1	.000	3.586	1.193	2.403
	Constant	1.222	1	.000	3.395		
a. Predictors entered on step 1: Informed about any policy changes related to Vaccine (1), Satisfaction with Health Ministry's Information (1) b. Outcome: Vaccinated (1): Ref=Not vaccinated REF: Not Informed (0); Not satisfied with Health Ministry's Information (0)							

As shown in Table 5.3 above, the findings suggest that pregnant women who are informed about policy changes related to the vaccine are over 2.35 times more likely to be vaccinated compared to those who are not informed (OR=2.356). This finding shows a positive and significant correlation between the predictor and the outcome ($P=.000<.05$). The odds ratio of 3.586 indicates that those who are satisfied with the information from the Ministry of Health are approximately 3.59 times more likely to be vaccinated compared to those who are not satisfied with the information conveyed by the Ministry (95% C.I. 1.193-2.403; $P=.000<.05$).

5.3.3 Multiple Regression

Further, multiple regression was conducted for independent variable with more than two categories (women's level of satisfaction with the information from the Ministry of Health) with reference to the COVID-19 vaccine uptake. The category (unvaccinated) was set as the reference category, against which the other category (vaccinated) was compared, and data was presented in Table 5.4 below.

Table 5.4: Odds Ratio for the Association between Health Ministry's Information Satisfaction and Vaccine Uptake

COVID-19 Uptake ^a	Vaccine	B	df	p-value	OR	95% C.I. for OR	
						Lower	Upper
Health Ministry's Information satisfaction	Intercept	.142	1	.377			
	Not very satisfied	-1.241	1	.000	.289	.188	.445
	Somewhat satisfied	.384	1	.319	1.468	.690	3.123
	Neutral	.406	1	.055	1.500	.992	2.268
	Satisfied	.676	1	.013	1.966	1.154	3.351
	Very satisfied	0 ^b	0	.	.	.	.
a. The reference category is: Not Vaccinated.							
b. This parameter is set to zero because it is redundant.							

The results from the binary logistics regression analysis in Table 5.4 above indicate several significant insights regarding the relationship between information satisfaction and vaccine uptake. For those who reported being "Not Very Satisfied" with the information from the Ministry of Health, the findings are striking. The negative coefficient of -1.241 suggests that this group is significantly less likely to be vaccinated compared to the reference category. In fact, the odds of vaccination decreased by approximately 71.1 per cent for individuals in this group, with a significant high p-value of less than 0.001. This indicates a strong negative impact of low satisfaction on vaccine uptake. In contrast, the "Somewhat Satisfied" group shows a positive coefficient of 0.384. This indicates an increased likelihood of vaccination, but the result is not statistically significant ($p = 0.319$). Although the odds ratio of 1.468 implies that those in this category have 46.8 per cent higher odds of being vaccinated than the unvaccinated group, the result is not statistically significant ($OR=1.468$; $p = 0.319 > 0.05$). For women in the group of "Neutral" level of satisfaction with the Health Ministry's Information, the coefficient of 0.406 suggests a potential increase in vaccination likelihood.

The p-value of 0.055 is marginally significant, indicating a trend where those who feel neutral are 50 per cent more likely to be vaccinated compared to the unvaccinated group. Most notably, the "Satisfied" group shows a strong and

significant positive relationship with vaccine uptake. Those who are satisfied with the information have nearly double the odds (96.6 per cent higher) of being vaccinated compared to the unvaccinated group (OR=1.966; $P=0.013<0.05$) supporting the robustness of this finding.

5.3.4 Interpretation and Discussions: Women's Awareness of and Level of Satisfaction with COVID-19 Vaccine Policy Guidance

The comparison between vaccinated and unvaccinated groups emphasises the significance of practical communication strategies in promoting COVID-19 vaccine uptake among pregnant women. The chi-square tests indicate that increased awareness of policy changes and satisfaction with the information provided by the health ministry are crucial factors influencing vaccination decisions. The significant chi-square values reinforce the need for health authorities to focus on these areas to improve vaccination rates. By enhancing awareness and satisfaction, health authorities can protect the health of pregnant women and contribute to broader public health goals in the fight against the COVID-19 pandemic. These findings align with the Theory of Planned Behaviour (TPB), which supports the idea that awareness and satisfaction with Ministry Communication significantly influence attitudes toward the vaccine and enhance behavioural intentions. Pregnant women who found the information clear, credible, and sufficient were more likely to develop positive attitudes, which increased their willingness to vaccinate. The results correspond with the Social Cognitive Theory (SCT), namely the concept of outcome expectations. Adequately informed pregnant women likely viewed vaccination as advantageous and protective, thereby reinforcing positive outcome expectancies and increasing vaccine uptake.

The finding is supported by Khairat et al. (2022), who identified low vaccination thresholds in communities with poor information dissemination. They emphasised that effective communication is critical to reducing vaccine hesitancy. This finding corroborates with those of Vásquez and Trudeau (2021), who demonstrated that improving the clarity and relevance of vaccine communication could significantly boost vaccination rates, particularly when tailored to specific concerns of the population. The chi-square tests further

illustrate that awareness and satisfaction with information provided by health authorities are pivotal factors influencing vaccine decisions. This aligns with the findings of Burch et al. (2021), who noted that targeted educational materials emphasising the risks of non-vaccination were effective in addressing hesitancy in groups with low vaccination intent. Similarly, Stock et al. (2022) observed that tailored communication campaigns in Scotland helped increase vaccine uptake among pregnant women.

The multiple regression analysis distinctly demonstrates the significant association between satisfaction with the Ministry of Health's information and vaccine uptake. Women who were categorised as "Not Very Satisfied" were less likely to be vaccinated. This link can be analysed at the institutional and policy levels of the Social Ecological Model (SEM). The minister's communication tactics embody the institutional factors that shape human behaviour. Weak or inconsistent institutional communication generates intrapersonal barriers, thereby diminishing vaccine adoption. Robinson et al. (2021) further corroborate these findings, pointing out that insufficient or unclear information frequently causes vaccine hesitancy. Their study highlighted how socioeconomic and educational disparities exacerbate hesitancy, which directly aligns with the role of satisfaction as a determinant in this study. If we address their informational concerns, the "Neutral" category suggests a latent group with potential for increased uptake. This observation aligns with Rottenstreich et al. (2022), who identified gaps in trust and knowledge among pregnant women as significant barriers to vaccine acceptance. Targeted information could bridge these gaps and encourage this group to vaccinate.

Findings from qualitative data similarly highlight that Kenya's initial national policy guidance excluded pregnant women from receiving the COVID-19 vaccine during the early vaccination phases, which led to significant delays in vaccination uptake among this vulnerable group. The exclusion of pregnant women during the initial phases of Kenya's COVID-19 vaccine rollout contributed to delays in uptake. This suggests that structural exclusion reduced perceived behavioural control as explained by the Social Ecological Model at the institutional level, where the Ministry of Health is mandated to give details

on Covid-19 vaccinations, encompassing every logistic from the general practitioner to healthcare facilities. This finding corroborates with Qiu, Bailey and Thorne (2021), who observed that safety concerns and delayed policy inclusivity were major barriers in high-income countries. Once pregnant women were included, safety evidence and endorsements from healthcare workers significantly improved vaccine confidence, as also noted by Zheng et al. (2021) in China. However, once safety evidence emerged, pregnant women were included, and vaccines approved specifically for them helped build trust and confidence

Moreover, the nurses who received the vaccine acted as compelling role models and positive endorsements, motivating pregnant women to contemplate vaccination. This study aligns with the Social Cognitive Theory of observational learning (modelling), wherein pregnant women observed healthcare providers safely administering the vaccination and subsequently modified their beliefs of safety and efficacy. The nurses acting as role models in this study are in line with findings by Diesel et al. (2021), who noted that healthcare providers' vaccination behaviour influenced public perceptions, particularly among hesitant groups.

5.4 FINDINGS FOR RESEARCH QUESTION 2

The second research question that this study sought to answer was *What communication channels does the Ministry of Health use to disseminate the policy changes with regard to COVID-19 vaccines to pregnant women?*

5.4.1 Univariate Analysis

Table 5.5: Factors influencing the women's decision to uptake the vaccine or hesitation.

Who/what influenced respondents to get vaccinated or not		COVID-19 Vaccine Uptake						
		Vaccinated		Not Vaccinated		Pearson Chi-Square Tests		
		F	%	F	%	χ ²	df	P
Health workers	Influenced	316	83.2%	205	53.9%	14.548	1	.000*
	Not influenced	64	16.8%	175	46.1%			
	Total	380	100.0%	380	100.0%			
TV/Radio programs	Influenced	107	28.2%	201	52.9%	48.237	1	.000*
	Not influenced	273	71.8%	179	47.1%			
	Total	380	100.0%	380	100.0%			
Social media	Influenced	96	25.3%	272	71.6%	65.356	1	.000*
	Not influenced	284	74.7%	108	28.4%			
	Total	380	100.0%	380	100.0%			
Magazine s/Newspa pers	Influenced	30	7.9%	17	4.5%	3.833	1	.050
	Not influenced	350	92.1%	363	95.5%			
	Total	380	100.0%	380	100.0%			
Governm ent	Influenced	123	32.4%	57	15.0%	31.710	1	.000*
	Not influenced	257	67.6%	323	85.0%			
	Total	380	100.0%	380	100.0%			
Family member	Influenced	62	16.3%	44	11.6%	3.552	1	.059
	Not influenced	318	83.7%	336	88.4%			
	Total	380	100.0%	380	100.0%			
Employer	Influenced	3	0.8%	0	0.0%	3.012	1	.083 ^b
	Not influenced	377	99.2%	380	100.0%			
	Total	380	100.0%	380	100.0%			
Self	Influenced	6	1.6%	0	0.0%	6.048	1	.014 ^{*, b}
	Not influenced	374	98.4%	380	100.0%			
	Total	380	100.0%	380	100.0%			

The findings from Table 5.5 above reveal significant insights into the factors influencing vaccine uptake. Findings showed that a substantial majority of vaccinated women (83.2 per cent) reported being influenced by health workers. The chi-square test results show a significant relationship ($\chi^2 = 14.548$, $p < .001$), highlighting the critical role that health workers play in promoting vaccine uptake. On the other hand, majority (71.6 per cent) of unvaccinated women was influenced by the social media to abstain from vaccine. This trend is

supported by the chi-square test ($\chi^2 = 65.356$, $p < .001$), indicating that unvaccinated women may rely more heavily on these media outlets for information. This finding suggests that misinformation or negative narratives circulating on social media may contribute to vaccine hesitancy. In addition to the media effect, findings showed that 28.2 per cent of vaccinated women were swayed by TV and radio programs. Other factors, such as the influence of family members, employers, and self-initiative, appeared to have less statistical significance. For example, while 16.3 per cent of vaccinated women indicated family influence, this was not as pronounced as the influence from health workers or government communication ($p = 0.059$). This suggests that while family support can play a role, it may not be as critical as professional or governmental guidance. The influence by employers, family members were the least to influence women's decision to accept the vaccine and were therefore not significant as their p-values were greater than the .05 ($p > .05$).

5.4.2 Decision Factors and COVID-19 Vaccine Uptake

The participants were asked to provide who/what influenced their decision to accept the COVID-19 vaccine or to abstain from it. In exploring how the Ministry of Health communicates policy changes to pregnant women and its impact on their COVID-19 vaccine uptake, the findings from the binary logistic regression analysis in Table 5.6 reveal several critical factors influencing these decisions.

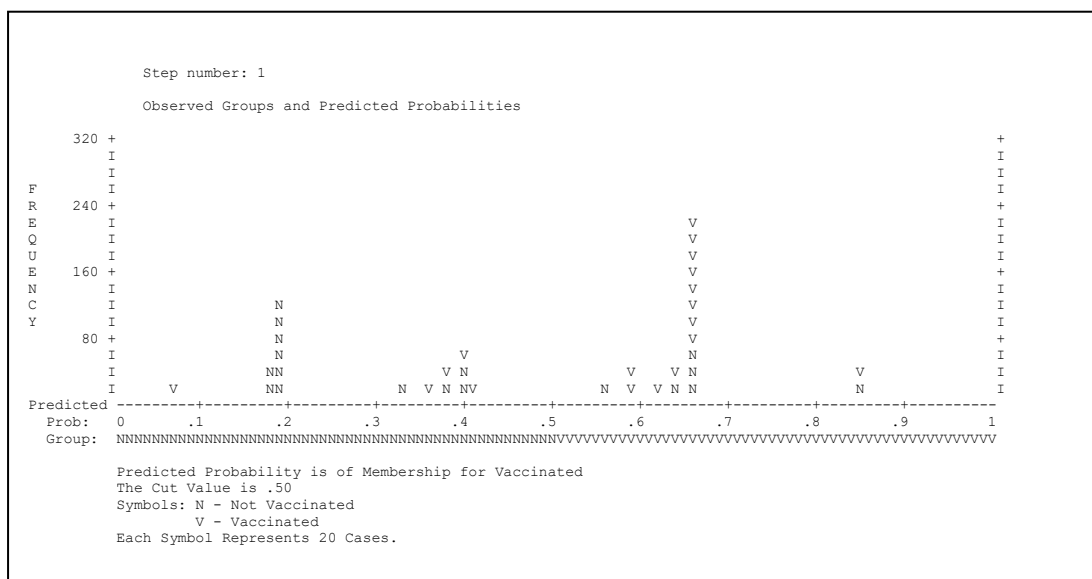
Table 5.6: Binary Logistics Regression-Who/what influenced respondent's decision and COVID-19 Vaccine Uptake

Vaccinated (1)		B	df	p	OR	95% C.I. for OR	
						L.B	U. B
Step 1 ^a	Nurses (1)	1.158	1	.000	3.148	.208	.474
	TV/Radio programs (1)	1.073	1	.000	2.925	1.977	4.328
	Social media (1)	1.051	1	.000	2.862	1.921	4.264
	Magazines/Newspapers (1)	-.871	1	.018	2.418	.204	.860
	Government (1)	1.045	1	.000	2.843	.234	.514
	Family member (1)	-.739	1	.003	.477	.295	.773
	Constant	43.328	1	.999	6.5E+18		
a. Variable(s) entered on step 1: Health workers, TV/Radio programs, social media, Magazines/Newspapers, Government, Family member, Employer, Self. Key: L. B=Lower Bound; U. P=Upper Bound							

The analysis in Table 5.6 indicates that nurses are a significant positive influence on vaccine uptake, with an odds ratio (OR) of 3.148 ($p < 0.001$). This suggests that when pregnant women are influenced by nurses, they are more likely to get vaccinated. This counterintuitive finding may point to a potential trust in health workers regarding the vaccine's benefits. Both TV/radio programs and social media emerged as strong positive influencers on vaccine uptake, with ORs of 2.925 ($p < 0.001$) and 2.862 ($p < 0.001$), respectively. This indicates that exposure to health messages through these channels significantly increases the likelihood of pregnant women choosing to vaccinate. These media outlets could effectively serve as platforms for disseminating accurate information about the vaccine.

The government's influence on vaccine decisions was also significant, with an OR of 2.843 ($p < 0.001$), pregnant women who are influenced by government communications were nearly three times more likely to have received the vaccine compared to those who were not. The influence of magazines and newspapers were also negative, with an OR of 0.418 ($p = 0.018$). This implies

that reliance on print media for information may not be effective in promoting vaccine uptake among pregnant women. Family members also had a negative influence on vaccine uptake, with an OR of 0.477 ($p = 0.003$). This finding indicates that family opinions may be swaying pregnant women away from vaccination, suggesting the need for strategies to address family dynamics and beliefs regarding the vaccine.



reinforces that the model is likely capturing relevant factors influencing vaccination status.

5.4.3 Sources of Information for The Vaccinated and Unvaccinated

Table 5.7: Chi-square test for Sources of Information for the Vaccinated and Unvaccinated

Source of information		COVID-19 Vaccine Uptake						
		Vaccinated		Not Vaccinated		Pearson Chi-Square Tests		
		Freq	%	Fre q	%	χ ²	df	p
Nurs e	Influenced by Nurse	287	75.5%	145	38.2%	108 .15 2	1	.00 0*
	Not influenced by Nurse	93	24.5%	235	61.8%			
	Total	380	100.0 %	380	100.0%			
Frien d	Influenced by Friend	112	29.5%	369	97.1%	374. 051	1	.00 0*
	Not influenced by Friend	268	70.5%	11	2.9%			
	Total	380	100.0 %	380	100.0%			
Medi a	Influenced by media	176	46.3%	82	21.6%	51.8 50	1	.00 0*
	Not influenced by media	204	53.7%	298	78.4%			
	Total	380	100.0 %	380	100.0%			
Doct or	Influenced by Doctor	123	32.4%	141	37.2%	1.95 5	1	.16 2
	Not influenced by doctor	257	67.6%	238	62.8%			
	Total	380	100.0 %	379	100.0%			
*Sig at p<.05								

Data in Table 5.7 above shows that a significant portion of vaccinated women (75.5 per cent) reported being relied on nurses for information ($\chi^2 = 108.152$, $p < 0.001$). Nonetheless, an overwhelming 97.1 per cent of unvaccinated women indicated that friends did influence their decision. The chi-square statistic ($\chi^2 = 374.051$, $p < 0.001$) shows a clear relationship, suggesting that negative peer pressure or misinformation from friends may contribute

significantly to vaccine hesitancy among unvaccinated women. Exposure to media also appears to have a substantial impact. Among vaccinated women, 46.3 per cent reported being influenced by media, compared to 21.6 per cent of unvaccinated women ($\chi^2 = 51.850$, $p < 0.001$). This suggests that media plays a positive role in informing and motivating women to get vaccinated, though there remains a significant portion of unvaccinated women who do not engage with media messages. Interestingly, the influence of doctors did not show a significant association with vaccination. Only 32.4 per cent of vaccinated women reported being influenced by their doctors compared to 37.2 per cent of unvaccinated women, resulting in a non-significant chi-square value ($\chi^2 = 1.955$, $p = 0.162$).

5.4.4 Correlation Analysis: Source of Information and Vaccination

This analysis seeks to explore the correlation between various sources of information such as health workers, media outlets, family members, and government communications and the likelihood of COVID-19 vaccination among pregnant women in Nairobi City County, Kenya (Table 5.8 below).

Table 5.8: Pearson Correlation Analysis between source of Information and COVID-19 Vaccine Uptake

COVID-19 Vaccine Uptake* Source of Information		COVID-19 Vaccine Uptake	Nurse	Friend	Media	Doctor
COVID-19 Vaccine Uptake	Pearson Correlation	1	.377**	-.702**	.261**	-.051
	Sig. (2-tailed)		.000	.000	.000	.162
	N	760	760	760	760	759
Nurse	Pearson Correlation	.377**	1	-.327**	.389**	.497**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	760	760	760	760	759
Friend	Pearson Correlation	.702**	-.327**	1	-.117**	.149**
	Sig. (2-tailed)	.000	.000		.001	.000
	N	760	760	760	760	759
Media	Pearson Correlation	.261**	.389**	-.117**	1	.329**
	Sig. (2-tailed)	.000	.000	.001		.000
	N	760	760	760	760	759
Doctor	Pearson Correlation	-.051	.497**	.149**	.329**	1
	Sig. (2-tailed)	.162	.000	.000	.000	
	N	759	759	759	759	759
**. Correlation is significant at the 0.01 level (2-tailed).						

Table 5.8 above presents the Pearson correlation coefficients between various sources of information (nurses, friends, media, and doctors) and COVID-19 vaccine uptake. The analysis shows a moderate positive ($r = 0.377$, $p < 0.001$) between being influenced by nurses and COVID-19 vaccine uptake. This suggests that pregnant women who receive guidance from nurses are more likely to get vaccinated. There is a strong positive correlation ($r = 0.702$, $p < 0.001$) between the influence of friends and vaccine uptake. This indicates that when friends are influential in decision-making, the likelihood of vaccination increases significantly. This finding underscores the potential for peer pressure or misinformation among social circles to deter vaccination. The correlation with media is positive ($r = 0.261$, $p < 0.001$), indicating that exposure to media messages regarding COVID-19 vaccination is associated with higher rates of

vaccine uptake. However, this influence is weaker compared to that of nurses, suggesting that while media can play a role in informing and encouraging vaccination, it is not as impactful as direct healthcare communication. The correlation between doctor influence and vaccine uptake is weak and not statistically significant ($r = -0.051$, $p = 0.162$). This suggests that in this context, doctors may not be perceived as a major source of information influencing vaccination decisions among pregnant women.

5.4.5 Confidence in Information Sources and Adequacy of the Information

The data presented in Table 5.9 below regarding the confidence in information sources and the adequacy of information significantly impacts COVID-19 vaccine uptake among pregnant women in Nairobi City County, Kenya.

Table 5.9: Pearson Chi-Square Tests for Information on Policy and COVID-19 Vaccine Uptake

Confidence in Information Sources		COVID-19 Vaccine Uptake						
		Vaccinated		Unvaccinated		Pearson Chi-Square Tests		
		F	%	F	%	χ ²	df	P
Confidence in information sources	Had confidence	324	85.3%	108	28.4%	250.244	1	.000*
	No confidence	56	14.7%	272	71.6%			
	Total	380	100.0%	380	100.0%			
Adequacy of Information vaccine uptake	Adequate	326	85.8%	148	38.9%	177.627	1	.000*
	Not adequate	54	14.2%	232	61.1%			
	Total	380	100.0%	380	100.0%			
*Sig at p<.05								

The findings in Table 5.9 above indicate that 85.3 per cent of vaccinated pregnant women expressed confidence in the information sources regarding the COVID-19 vaccine, whereas only 28.4 per cent of unvaccinated pregnant women reported the same ($\chi^2 = 250.244$, $p < 0.001$). A considerable proportion of unvaccinated pregnant women (71.6 per cent) indicated a lack of confidence

in the information they received, which can contribute to vaccine hesitancy. Similarly, 85.8 per cent of vaccinated pregnant women perceived the information they received as adequate, in stark contrast to only 38.9 per cent of unvaccinated pregnant women who felt the information was insufficient ($\chi^2 = 177.627$, $p < 0.001$). This finding further reinforces the relationship between the perception of adequate information and the likelihood of vaccination.

Hypotheses/Assumptions

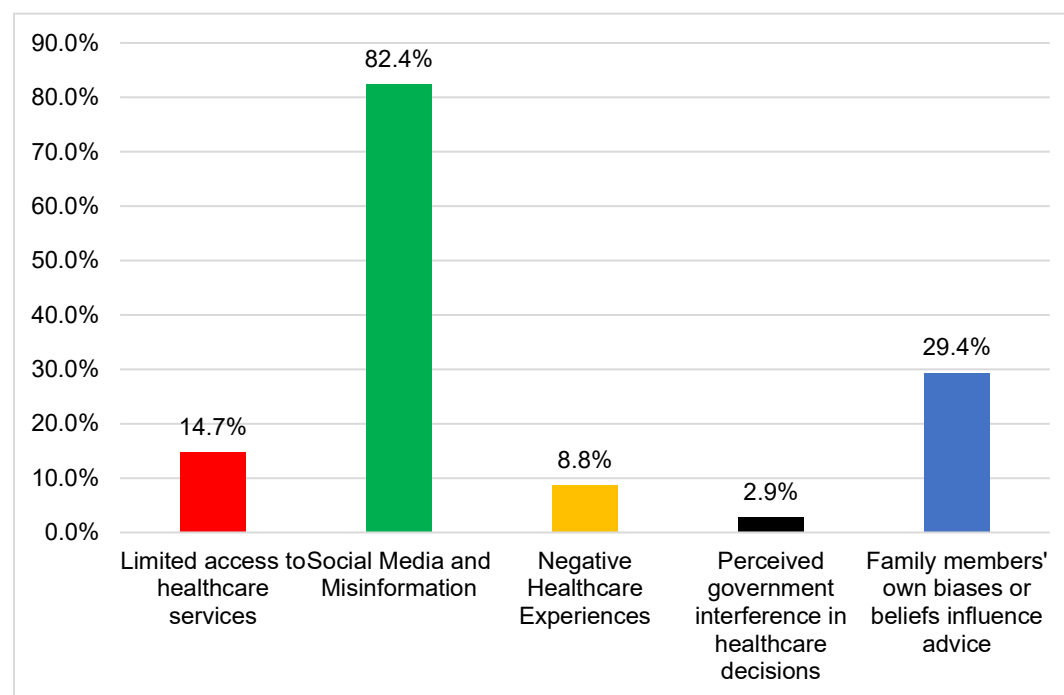
Table 5.10: Summary of Alternative Hypotheses for Objective 2

Secondary Alternative Hypothesis	Association	Verdict
H2a: There is significant association between the influence of nurses and the uptake of the COVID-19 vaccine among pregnant women in Nairobi County.	Exists	Accepted
H2b: There is significant association between the media and COVID-19 vaccine uptake among pregnant women	Exists	Accepted
H2c: There is significant association between perception of government communication and COVID-19 vaccine uptake among pregnant women	Exists	Accepted
H2d: There is a significant positive relationship between confidence in information sources and the likelihood of COVID-19 vaccine uptake among pregnant women in Nairobi City County	Exists	Accepted
H2e: There is a significant positive relationship between the perceived adequacy of information and the likelihood of COVID-19 vaccine uptake among pregnant women.	Exists	Accepted

5.4.6 Reasons for Lack of Confidence in Information Sources among The Unvaccinated

The findings presented in Figure 5.10 below provide valuable insights into the reasons behind the lack of confidence in information sources among unvaccinated pregnant women (n=380) based on a multiple -choice question.

Figure 5.10: Reasons for Lack of Confidence in Information Sources Among the Unvaccinated



The variables were analysed individually from the multiple- choice questions to establish the responses of the pregnant women and participants were asked to present their responses based on lack of confidence in information sources and Figure 5.10 above, shows that substantial majority (82.4 per cent) of unvaccinated respondents cited social media and misinformation as a reason for their lack of confidence in information sources. This finding underscores the pervasive influence of digital platforms on public perception and decision-making, particularly during a health crisis such as the COVID-19 pandemic. About 29.4 per cent noted that family members' biases or beliefs influenced their decision-making process. This points to the role of family principles and community networks in shaping perceptions about health interventions. Only 14.7 per cent of unvaccinated pregnant women indicated that limited access to

healthcare services contributed to their lack of confidence. This suggests that while access issues are present, they may not be the primary factor influencing vaccine hesitancy. A small proportion (8.8 per cent) reported negative healthcare experiences as a factor. This indicates that while past interactions with the healthcare system may affect some individuals, they are not a widespread concern among the majority. Very few respondents (2.9 per cent) mentioned perceived government interference in healthcare decisions as a reason for their lack of confidence. This suggests that concerns about government interference in healthcare decisions may not significantly impact vaccine uptake in this demographic.

5.4.7 One-Sample Test for Reasons for Lack of Confidence in Information Sources among the Unvaccinated

T-test was employed to ascertain whether significant differences exist in means. Table 5.12 below elucidates the factors contributing to the lack of faith in information sources among unvaccinated pregnant women concerning the COVID-19 vaccine.

Table 5.11: One-Sample Test for Reasons for Lack of Confidence in Information Sources Among the Unvaccinated

Reasons for lack of confidence in information sources	One-Sample Test Parameters					
	T	df	p	Mean Difference	95% C.I of the Difference	
					Lower	Upper
Limited access to healthcare services	2.248	379	.025	.013	.00	.02
Social media and misinformation	5.491	378	.000	.074	.05	.10
Negative healthcare experiences	1.737	378	.083	.008	.00	.02
Perceived government interference in healthcare decisions	1.000	378	.318	.003	.00	.01
Family members' own biases or beliefs influencing advice	3.201	378	.001	.026	.01	.04

With a mean difference of 0.074 and a t-value of 5.491 as shown in Table 5.11 above, the factor of social media and misinformation is statistically significant ($p < 0.001$). This suggests that the rampant misinformation circulating on social media plays a significant role in undermining confidence in credible information sources related to the vaccine. Another important finding relates to the biases of family members. This factor has a mean difference of 0.026 and a t-value of 3.201, which is also significant ($p < 0.001$). This indicates that the beliefs and advice of family members heavily influence the decision-making process for pregnant women when it comes to vaccination. Thus, family relationships and advice are pivotal in shaping perceptions about the COVID-19 vaccine.

Limited access to healthcare services also emerged as a significant factor. It recorded a mean difference of 0.013 and was statistically significant ($p = 0.025$), implying that inadequate healthcare access contributes to uncertainty about the reliability of information sources. While this factor is significant, it appears to be less impactful compared to the overwhelming influence of misinformation and family biases. In contrast, the findings regarding negative healthcare experiences suggest a more complex picture. With a mean difference of 0.008 and a p-value of 0.083, this factor did not reach statistical significance, indicating that negative past interactions with healthcare providers might have some influence but are not as prevalent a concern as the other factors. Lastly, perceptions of government interference in healthcare decisions showed minimal impact, with a mean difference of 0.003 and a non-significant p-value ($p=0.318>0.05$). This suggests that concerns about government roles in healthcare decisions are not significantly affecting confidence in information sources, possibly reflecting a broader trust in governmental messaging.

During the Key Informant Interviews, doctors were asked to share their experiences on vaccine accessibility amidst the publication and dissemination of National Policy Guidance on COVID-19 vaccine among pregnant women by the Ministry of Health. Data from the doctors were arranged by identifying the common themes and considering the frequency of specific responses whilst aligning each of them with the research questions. The following themes were identified:

Theme 1: Role of Health Workers in Communication

Access to vaccines was a significant barrier during the initial phases of rollout. Many health facilities lacked sufficient stock, especially in rural areas, where pregnant women often travelled long distances to access care. Furthermore, vaccination centres frequently lacked a separate queue or priority system for pregnant women. This finding highlights the need for targeted interventions such as mobile vaccination clinics and priority services for pregnant women. Overtime, the vaccination rate among pregnant women improved due to sustained education and awareness campaigns. Public health initiatives, such as using community health workers to educate women during antenatal visits, were effective. One of the participants mentioned, *“Community health workers were instrumental in encouraging women to vaccinate by dispelling myths.”* (Male Doctor 3, 2024). Mass media campaigns and endorsements by prominent healthcare professionals further influenced vaccine uptake. This suggests that continuous advocacy and public education can drive behavioural change, even in populations initially resistant to vaccination.

Healthcare workers served as the primary point of contact for disseminating vaccine information to pregnant women. Their interactions during antenatal care visits provided a platform to address concerns directly. One of the participant acknowledged that *“Many women trusted advice from healthcare workers over what they saw on social media,”* (Male Doctor 1, 2024) However, the effectiveness of this strategy was hindered in under-resourced facilities where staff were overwhelmed with patient loads. Enhanced training for healthcare workers and improved staffing levels could further strengthen this communication channel.

Theme 2: Mass Media Campaigns and Endorsements

Social media platforms and messaging apps such as WhatsApp were both a blessing and a curse. While they helped disseminate information rapidly, they also facilitated the spread of misinformation. One of the key informants highlighted that *“digital platforms played a critical role, but they also created confusion among women due to conflicting messages”* (Female Doctor 2,

2024). In the slum areas with limited internet access, radio and community meetings remained essential. This underscores the importance of aligning official messaging across all communication channels to ensure consistency and trust.

Theme 3: Strategies for Effective Communication

In a focused group discussion with nurses, the participants were asked to share their experiences in how the Ministry of Health communicated policy changes to pregnant women to facilitate informed decision-making. The results from the FGDs highlighted several action points for improving vaccine uptake. The participants emphasised the importance of comprehensive training for healthcare providers to enhance vaccine counselling, especially within the Antenatal Care (ANC) setting. A participant stated, *"comprehensive training for healthcare workers on the COVID-19 vaccination is key for ensuring accurate information delivery"* (Female Nurse 1, 2024). Additionally, there was a strong recommendation for better communication prior to facility visits. One Participant mentioned, *"pre-facility communication can significantly improve vaccine uptake if pregnant mothers receive clear, concise, and comprehensive vaccine information before coming to the clinic"* (Male Nurse 2, 2024).

Another crucial point was the integration of vaccine information into ANC services. *"Integrating COVID-19 vaccine education into ANC services can improve acceptance as pregnant women trust these healthcare settings"* (Female Nurse 3, 2024). The concept of peer educators, particularly first-vaccinated mothers, was also suggested as a means to empower communities and foster trust in the vaccine. *"Mothers who have received the vaccine should be empowered to share their experiences with others in their communities"* (Male Nurse 4, 2024). To improve vaccine uptake, comprehensive training and clear communication strategies need to be established for healthcare workers, and peer-to-peer information dissemination should be encouraged. This ensures that pregnant women are well-informed and more likely to make an informed decision about vaccination.

Challenges in accessing vaccination centres was highlighted as significant barriers. Some facilities provided dedicated ANC lines for pregnant women, reducing waiting times and improving the experience. *"Dedicated ANC lines helped pregnant women avoid long waits at vaccination centres"* (Female Nurse 5, 2024). However, long queues and centralised vaccine distribution at some centres discouraged pregnant women from attending vaccination sites. *"Some women were discouraged from attending vaccination centres due to long queues and the inconvenience of having to travel to centralised locations"* (Female Nurse 1, 2024). Overcrowded facilities also led to hesitation among pregnant women. *"Pregnant women were often discouraged from visiting overcrowded vaccination centres, fearing for their safety"* (Nurse 6, 2024). Efforts to streamline vaccine distribution and ensure dedicated, safe spaces for pregnant women at vaccination centres could help increase uptake. Reducing overcrowding and offering easier access to vaccination services will help address barriers to access.

5.4.8 Interpretation and Discussion: Information Channels used by the Ministry of Health to Disseminate Covid-19 Vaccine Policy Changes

The findings suggest a complex interplay between various sources of information and pregnant women's decisions regarding COVID-19 vaccination. While media channels like TV/radio and social media and government communication show a positive correlation with vaccine uptake, reliance on nurses appear to be associated with vaccine uptake more. This is attributed to the fact that pregnant women interacted with the nurses more than the doctors during their ANC visits. According to the Theory of Reasoned Action (TRA), health workers substantially impacted vaccination acceptance by influencing subjective standards. When pregnant women believed that trusted health professionals endorsed vaccination, their drive to comply increased, ultimately reinforcing their behavioural intentions. Subjective standards, according to TRA, are precise assessments of women's perceptions of a Covid-19 vaccine's capacity to help them achieve their objectives, whereas attitude can be defined as either positive or negative sentiments related to achieving an objective (Nabeel et al., 2022). This finding corroborates with Qiu, Bailey and Thorne

(2021), who reported that healthcare providers (HCPs), including nurses, often have the confidence to recommend vaccines upon the awareness of vaccination guidelines. The findings further indicate a moderate positive correlation between media campaigns and vaccine uptake, suggesting the potential of media as an effective communication tool. This observation aligns with Vásquez and Trudeau (2021), who found that well-structured media campaigns significantly influenced vaccine willingness, particularly when emphasising vaccine efficacy and safety. Similarly, Diesel et al., (2021) underscored the importance of media in disseminating educational materials to demographic groups with low vaccination uptake. Robust partnerships with media outlets to deliver clear and consistent pro-vaccine messaging, tailored to address the concerns of pregnant women, could be instrumental in combating vaccine hesitancy. As Vásquez and Trudeau (2021) noted, incorporating narratives that resonate with the target audience enhances the impact of media interventions.

The study identifies friends and family as significant influencers, particularly among unvaccinated pregnant women. This finding is additionally corroborated by SCT, which highlights reciprocal determinism, the dynamic interplay among individual cognition, conduct, and environment. The clinical setting offered means one must consider not just the consequences of their activities and their personal impact, but also how these actions provoke responses from others and influence one's self-perception (Dura 1977). Consequently, friends and families exposed to pro-vaccine messages, which reinforced positive behavioural incentives, created a setting for the women to make a cognitive decision to either accept or hesitate regarding the vaccine. The findings are supported by Robinson et al., (2021) who documented that social dynamics and misinformation within personal networks contribute substantially to vaccine hesitancy. The role of misinformation, particularly through social media platforms, is further emphasised by Zheng et al., (2021), who found that fear of adverse effects and lack of trust in vaccine efficacy are often exacerbated by unverified information circulating in social networks. Public health campaigns addressing social influences and misinformation are critical. Engaging trusted community figures and family members in vaccination dialogues could shift

perceptions and foster supportive environments for vaccine acceptance. This approach aligns with Burch et al., (2021), who advocated for community-based strategies to counter misinformation and build vaccine confidence.

The qualitative findings highlight the Ministry of Health's partial success in communicating vaccine policies, with gaps in message tailoring and language accessibility. These findings are in line with Khairat et al., (2022), who observed that low educational attainment and poorly contextualised communication exacerbate vaccine hesitancy. The need for localised and accessible messaging, as advocated by Robinson et al., (2021), is evident. Incorporating community dialogues and translating messages into local languages could bridge information gaps and enhance message clarity, thereby improving vaccine acceptance. Nonetheless, the hesitancy as a result of social media contributes to misinformation and scepticism among expectant mothers. Additionally, Zheng et al., (2021) emphasised that fostering trust in healthcare professionals is pivotal for improving vaccine adoption rates. The predominant role of social media in propagating misinformation underscores the necessity for robust counter-narratives. Zheng et al., (2021) also found that misinformation about vaccine safety and efficacy significantly contributes to hesitancy. Targeted educational campaigns leveraging popular platforms among pregnant women can counteract misinformation and provide accurate, evidence-based information. Engaging social media influencers to champion vaccination could amplify these efforts, as suggested by Vásquez and Trudeau (2021).

5.5 FINDINGS FOR RESEARCH QUESTION 3

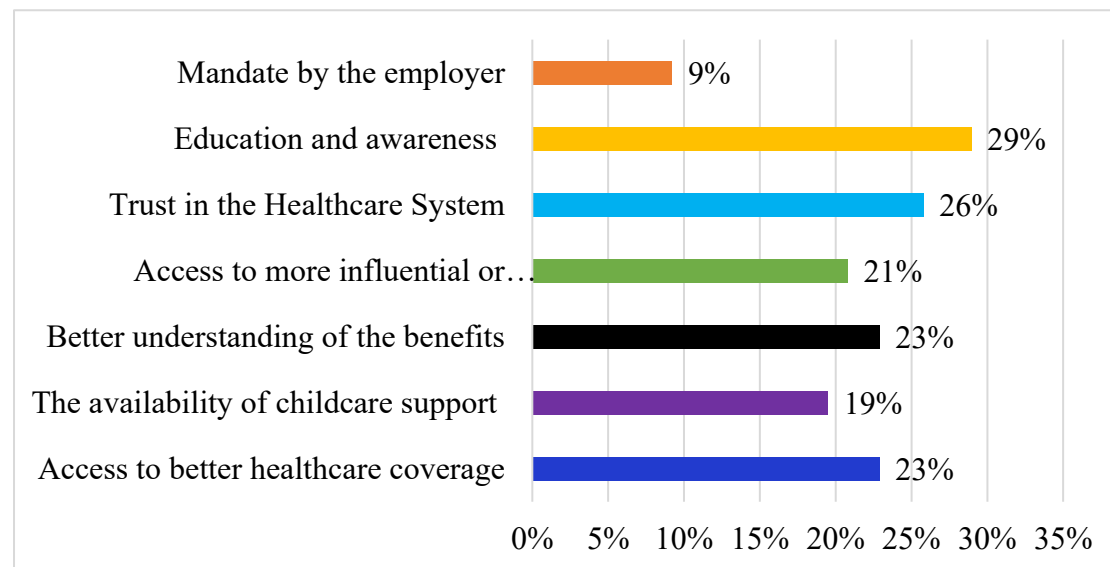
The third research question that this study sought to answer was: What is the impact of socioeconomic factors on the uptake of the COVID-19 vaccine among pregnant women in Nairobi County, Kenya?

5.5.1 Univariate Analysis

The analysis presented in Figure 5.11 below provides insightful data regarding the socioeconomic factors influencing the uptake of the COVID-19 vaccine among pregnant women in Nairobi City County, Kenya. By examining these

factors, we can better understand the barriers and facilitators impacting vaccine decision-making within this demographic. Based on a multi-choice question, vaccinated pregnant women (n=380) were asked to identify what led to their decision to accept the COVID-19 vaccine and the results are as presented in Figure 5.11 below.

Figure 5.11: General Factors of Decision Making to Vaccine Uptake



Based on the multi-choice questions, each variable was tested to establish its contribution to factors that affect decision making to vaccine uptake. data presented in Figure 5.11 above indicates that one of the most significant findings is that only 23 per cent reported having access to better healthcare coverage. This lack of access may contribute to vaccine hesitancy, as inadequate healthcare coverage may lead to fears about vaccine availability and accessibility. Similarly, the availability of childcare support is another critical factor, with only 19 per cent of respondents indicating they did have adequate childcare support. This limitation may have deterred pregnant women from seeking vaccination due to concerns about their ability to manage childcare responsibilities while attending vaccination appointments. When it comes to understanding the benefits of the vaccine, only 23 per cent of respondents reported a better understanding, paralleling the lack of access to reliable information and education. The low percentage indicates a potential gap in public health messaging that could be filled to enhance vaccine uptake.

Trust in the healthcare system emerges as a crucial determinant, with 26 per cent of respondents expressing trust in healthcare providers and institutions. This relatively low figure may suggest that mistrust could act as a barrier to vaccine acceptance, emphasising the need for strategies to build confidence in the healthcare system. Education and awareness are similarly pivotal, with 29 per cent of respondents affirming they have sufficient understanding. Further findings showed that 21 per cent felt informed through educational campaigns aimed to improve their knowledge about the COVID-19 vaccine's safety and efficacy. Interestingly, only nine per cent of respondents reported being influenced by an employer mandate, highlighting that workplace policies may not be a significant factor driving vaccine uptake in this context. This finding suggests that voluntary measures and public health initiatives may need to be prioritised over employer mandates.

5.5.2 Bivariate Analysis – Binary Logistics Regression

The Odds Ratios for each predictor (independent variables) were also computed using Binary Logistics Regression (BLR) based on the Equation: $\text{Logit}(p) = \ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n$ where; p is the probability of the outcome (being vaccinated), β_0 is the intercept, and β_i are the coefficients for each predictor variable X_i . The findings from the binary logistic regression analysis provide valuable insights into how socioeconomic factors influence the uptake of the COVID-19 vaccine among pregnant women in Nairobi City County, Kenya (Table 5.12 below).

Table 5.12: Binary Logistics Regression for Socioeconomic Factors and Uptake of the COVID-19 Vaccine

		Variables in the Equation					
COVID-19 vaccine uptake (1)		B	S.E.	p-value	OR	95% C.I. for OR	
						L.B	U. B
Step 1 ^a	Age (1)	-.129	.284	.651	.879	.504	1.533
	Education Level (1)	.296	.162	.067	1.344	.979	1.846
	Marital Status-binary (1)	-1.174	.350	.001	.309	.156	.613
	Religion-binary (1)	-.084	.461	.855	.919	.372	2.269
	Employment Status-binary (1)	-.304	.190	.109	.738	.508	1.071
	Income Source-binary (1)	-.205	.176	.244	.815	.577	1.150
	Size of Income (Monthly)-binary (1)	21.331	22903.524	.999	18.36E8	.000	.
	Family Structure-binary (1)	-1.547	.373	.000	.213	.103	.442
	Number of Children before pregnancy-binary (1)	.947	.365	.010	2.577	1.260	5.270
	Whether Children were Vaccinated before COVID-19(1)	.636	.168	.000	1.888	1.358	2.626
	Constant	.980	.573	.087	2.664		
a. REFS (Age:>35yrs (0); Education Level-No Formal Education (0); Marital Status-Not married (0); Employment Status-Not employed (0); Income Source-Informal employment (0); Size of Income-<Kes. 10,000; Family Structure- Non-Traditional Families (0); Number of Children before pregnancy-<3 children (0); Whether Children Vaccinated before COVID-19 pandemic-Not Vaccinated (0). Note: Indicator (Coded 1) and Reference (coded 0) Key: L. B=Lower Bound; U. P=Upper Bound							

As shown in Table 5.12 above, one of the most significant findings is the negative association between marital status and vaccine uptake. Specifically, married pregnant women were less likely to receive the vaccine compared to their unmarried counterparts, with an odds ratio of 0.309 ($p < 0.001$). This suggests that social dynamics within marriages, such as partner influence or family decision-making, may contribute to vaccine hesitancy. Additionally, the number of children a woman has before the present pregnancy positively correlates with vaccine uptake. The analysis indicates that women with more

children are more likely to get vaccinated than those without children (OR=2.577; $p = 0.010$). This finding implies that past experiences with child vaccinations may enhance awareness of the benefits of vaccinations, encouraging these women to continue that trend during their pregnancies.

Another noteworthy result pertains to previous vaccinations of children. Women whose children were vaccinated before the pandemic were more likely to receive the COVID-19 vaccine themselves than those whose children were not vaccinated (OR=1.888; $p < 0.001$). This suggests that a history of positive vaccination experiences may build trust in vaccines, further emphasising the importance of public health campaigns that reinforce the value of vaccination.

Table 5.13: Summary of Alternative Hypotheses for Objective 3

Alternative Hypothesis	Association	Verdict
H3: Prior vaccinations of children are positively correlated with the decision to receive the COVID-19 vaccine among pregnant women	Exists	Accepted

5.5.3: Multivariate Analysis: Multiple Logistics Regression

Further, Multiple Logistics Regression analysis was done to provide an extensive prediction of COVID-19 uptake for independent variables with more than two distinct categories. Most importantly, the coefficients represent the log-odds of being in a category relative to the reference category. It provides insights into how the predictors affect the likelihood of being in one category versus another, rather than just one outcome as in binary regression. To achieve this, nominal data (marital status, religion, employment status, family structure and income source) were treated as factors while scale data (including education level, number of children vaccinated before COVID-19 pandemic, age distribution and income size) were treated as continuous covariates (Table 5.14 below).

Table 5.14: Multiple Logistic Regression Parameter Estimates for COVID-19 Vaccine Uptake

COVID-19 Vaccine Uptake (1) Categorical Variable		B	P	OR	95% C.I. for OR	
					L. B	U. B
Marital Status	Single	-.995	.405	.370	.036	3.840
	Married	-2.574	.032	.076	.007	.806
	Separated	-1.116	.416	.328	.022	4.811
	Widowed	-3.404	.051	.033	.001	1.014
Religion	Christian	16.188	.994	10.72e8	.341	21.632
	Islam	16.189	.994	10.73e8	.519	13.177
	Buddhist	31.931	.994	7.3 e8	.305	13.143
Employment Status	Employed	-.994	.007	.370	.180	.761
	Unemployed	-.887	.006	.412	.218	.776
	Student	-2.672	.000	.069	.028	.170
Family Structure	Single-parent family	-2.030	.000	.131	.043	.399
	Nuclear family	-.534	.235	.586	.243	1.415
Income Source	Formal Employment	-.177	.484	.838	.510	1.376
	Owned a Business	-.056	.829	.945	.568	1.575
Distribution by Age	18yrs-23yrs	1.493	.088	4.449	.801	24.723
	24yrs-29yr	.989	.243	2.689	.510	14.169
	30yrs-35yrs	.674	.420	1.963	.381	10.111
	36yrs-40yrs	.694	.415	2.002	.377	10.634
Education Level	No formal school attended	.151	0.000	1.163	.000	. ^c
	Primary School	-15.768	.000	1.420e-7	7.74e-8	2.61e-7
	High School	-15.962	.000	1.169e-7	8.04e-8	1.70e-7
	Polytechnic/vocational trainings	-15.091	.000	2.792e-7	1.38e-7	5.65e-7
	College_/University	-15.620	.000	1.646e-7	1.65e-7	1.65e-7
No. children	No child	-1.379	.001	.252	.109	.584
	1-3	-.945	.014	.389	.184	.823
Size of Income (Monthly)	Less than Ksh 10,000	-15.531	.993	1.798E-7	.000	. ^c
	Ksh 10,000 - Ksh 30,000	-16.303	.993	8.310E-8	.000	. ^c
	Ksh 30,001 - Ksh 50,000	-15.631	.993	1.628E-7	.000	. ^c

Findings in Table 5.14 above showed that the participants within the group of widowed pregnant women have the lowest OR of 0.033 ($p = 0.051$), indicating they are significantly less likely to receive the vaccine compared to other pregnant women within other marital status. This suggests that widowed pregnant women may experience barriers such as lack of support and increased caregiving responsibilities, which can hinder their access to vaccination. Also on marital status, single pregnant women have an odds ratio of 0.370 ($p = 0.405$) indicating a lower likelihood of vaccination, although this finding is not statistically significant. Employment status reveals that pregnant women within the category had the lowest odds ($OR=0.069$) implying that they are less likely to receive the vaccine compared to non-student women which is statistically significant ($p=.000<0.05$). In the context of family structure, single-parent families present an OR of 0.131 ($p < 0.001$), indicating they are significantly less likely to vaccinate compared to pregnant women from nuclear families.

Age distribution indicates that younger pregnant women aged 18-23 have a promising OR of 4.449 ($p = 0.088$), suggesting they may be more receptive to vaccination. Although this finding is close to significance, it underscores the potential for effective outreach strategies targeting younger demographics. Education Level is a critical determinant of vaccine uptake, with all educational categories showing negative coefficients and odds ratios less than 1.0. For instance, pregnant women with no formal education have an odds ratio close to zero, indicating severe barriers to understanding the importance of vaccination. Those with primary education have an odds ratio of $1.420e-7$ ($p < 0.001$), while those with secondary and higher education also show similarly low odds ratios, emphasising the urgent need for educational initiatives to improve awareness about vaccine safety and efficacy among all educational levels.

Regarding income, all categories exhibit negative coefficients and odds ratios less than 1.0, with women earning less than Ksh 10,000 showing an odds ratio of $1.798E-7$ ($p < 0.001$). This indicates substantial economic barriers faced by low-income pregnant women, significantly impacting their access to vaccination

services. The findings indicate the need for targeted interventions to improve these economic constraints. Finally, the number of children a pregnant woman already has also played a significant role in vaccine uptake. Pregnant women with no children show an odds ratio of 0.252 ($p = 0.001$), indicating they are less likely to vaccinate compared to those with children. This suggests that previous maternal experiences may enhance awareness and acceptance of vaccinations, pointing to the importance of maternal education and support.

5.5.4 Qualitative Data Analysis

Theme 4: Role of Education on Vaccine Uptake

In a focused group discussion with nurses, the participants were asked to share their experiences and opinions on the role education played on the uptake of the COVID-19 vaccine among pregnant women in Nairobi County. The findings from the FGDs identified that the level of education played a key role in vaccine uptake as one of the participants explained that *“the more educated the pregnant woman, the higher the likelihood of her accepting the vaccine, as they tend to seek more information and have better access to health resources”* (Female Nurse 1, 2024). Moreover, information packaging was deemed crucial. One nurse noted that *“proper packaging of vaccine information is essential for encouraging acceptance, particularly for less educated individuals”* (Male Nurse 2, 2024).

Relatively, the findings from the interviews revealed that education emerged as a strong determinant of vaccine uptake. Pregnant women with secondary and tertiary education levels were more likely to understand vaccine benefits and dispel myths as one of the participants acknowledged that *“educated women could analyse information critically and were less influenced by rumours.”* (Female Doctor 4, 2024). Conversely, women with limited education were more susceptible to misinformation, emphasising the need for simplified, and culturally relevant educational materials.

The need for health education messages to be translated into local languages was also stressed. One of the participants recommended that *“we need to ensure that health messages are in local languages so that all women,*

regardless of their education level, can understand and make informed decisions” (Female Nurse 1, 2024). Community dialogues were also emphasised as effective communication strategies as another recommended that *“community dialogues create opportunities for open discussions, which can help improve the acceptability of vaccines in the community”* (Male Nurse 4, 2024). This finding implies that tailoring communication strategies based on educational levels and translating materials into local languages can enhance vaccine uptake. It is also crucial to engage communities directly through dialogues to foster trust and understanding about the vaccine.

Theme 5: Employment Status and Financial Independence

Further findings from the interviews with the key informants showed that employment status influenced vaccine acceptance, as working pregnant women often had better access to healthcare facilities and the financial means to cover transportation costs. One of the participants remarked that *“employed women valued vaccination more because they saw it as essential to staying healthy and maintaining their jobs”* (Male Doctor 3, 2024). However, unemployed pregnant women were often left out due to financial and logistical constraints. Targeted subsidies or travel support for underprivileged groups could help address this gap.

5.5.5 Interpretation and Discussion: Socioeconomic factors Versus Uptake of the COVID-19 Vaccine among Pregnant Women

The findings of this study emphasised the significant influence of socioeconomic factors, including marital status, education, employment, and the number of children, on the uptake of the COVID-19 vaccine among pregnant women in Nairobi County. Pregnant women with formal education were more likely to accept the vaccine, whereas those without formal education showed lower uptake rates. From the standpoint of the theory of planned behaviour, more education augments information, which favourably influences attitudes toward vaccination and reinforces perceived behavioural control. Educated women are more inclined to assess vaccine advantages logically, resulting in more robust behavioural intentions. This finding is supported by Viswanath et al., (2021), who reported that individuals with higher education

levels and access to COVID-19-related information were more likely to accept vaccines. The study emphasised that risk perception and understanding of vaccine benefits play a critical role in influencing vaccine uptake. Similarly, Mcmanus et al., (2021) found that lower education levels and socioeconomic disparities contributed to vaccine hesitancy, highlighting the need for targeted educational campaigns to improve vaccine acceptance.

Employment status also emerged as a crucial determinant, with employed pregnant women demonstrating higher vaccination rates than their unemployed counterparts. Employment in Social Ecological Model denotes structural and institutional positioning that improves access to healthcare and information. Because working women may feel more capable and empowered to access vaccination programs, employment promotes perceived control as outlined by the Theory of Planned Behaviour (TPB). Employed women were more likely to perceive vaccination as a priority due to their increased health literacy and exposure to workplace health initiatives. The association between employment and vaccine uptake corroborates findings from Vilca et al., (2021), who noted that employed pregnant women in Italy exhibited higher vaccination rates due to better access to healthcare and vaccine-related information through their workplaces. Moreover, pregnant women with prior vaccination experiences were more likely to trust and accept COVID-19 vaccines, aligning with the findings of Walker et al., (2021) who reported that trust in healthcare providers and prior positive vaccination experiences were significant predictors of vaccine uptake. The role of education in shaping vaccine acceptance is further echoed in the findings of Descamps et al., (2020), who observed that women with higher education levels were more likely to accept influenza vaccines during pregnancy. Conversely, women with lower education levels were more likely to reject vaccines due to a lack of understanding of their benefits and safety. This aligns with the present study's findings, which highlight the need for vaccine literacy programs targeting less-educated populations to enhance acceptance rates.

Marital status and family context also significantly influenced vaccine decisions in this study. Married pregnant women or those with supportive partners were more likely to accept the vaccine, suggesting the importance of family support

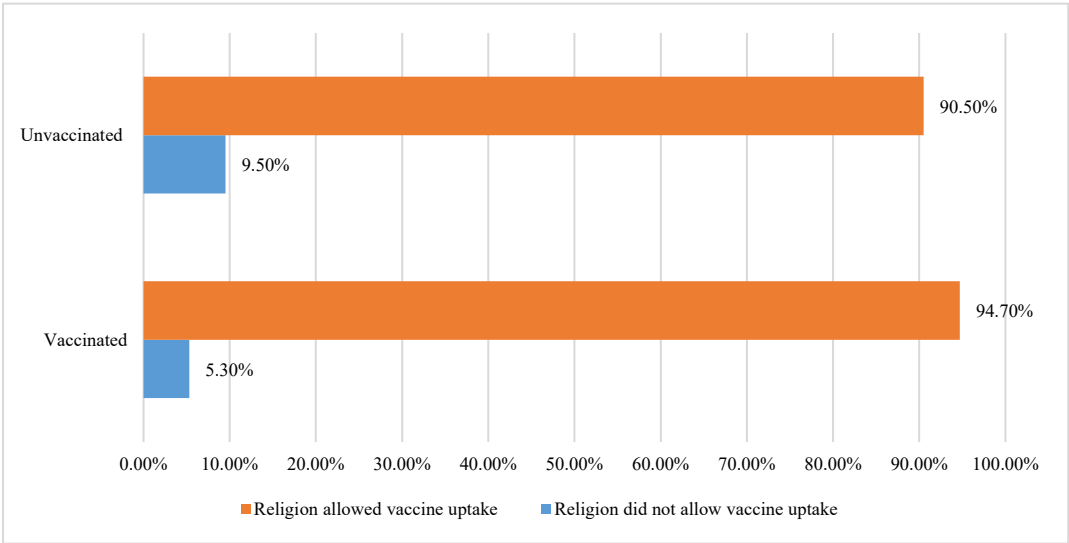
in health-related decisions. This result supports the focus on subjective norms in TRA. Positive normative pressure from supportive partners increases a woman's motivation to adhere to perceived vaccination requirements. This finding corroborates with the work of Nganga et al., (2019), who noted that trust in healthcare providers and family support was critical in influencing maternal vaccination decisions in Kenya. Employment status as a determinant of vaccine uptake resonates with the findings of Gutierrez et al., (2022), who identified household income and employment as critical factors influencing vaccine decisions among women in the USA.

The study also found that women with fewer children and had received vaccines before were more likely to accept the COVID-19 vaccine compared to those with more children. This is consistent with the SCT idea of mastery experience, which holds that prior positive vaccination experiences boost confidence and self-efficacy in carrying out comparable health activities. This finding aligns with Santorelli et al., (2020), who observed that vaccination rates decreased in households with more children due to resource constraints and competing priorities. The additional responsibilities associated with larger families often limit access to healthcare services, including vaccinations.

5.6 FINDINGS FOR RESEARCH QUESTION 4

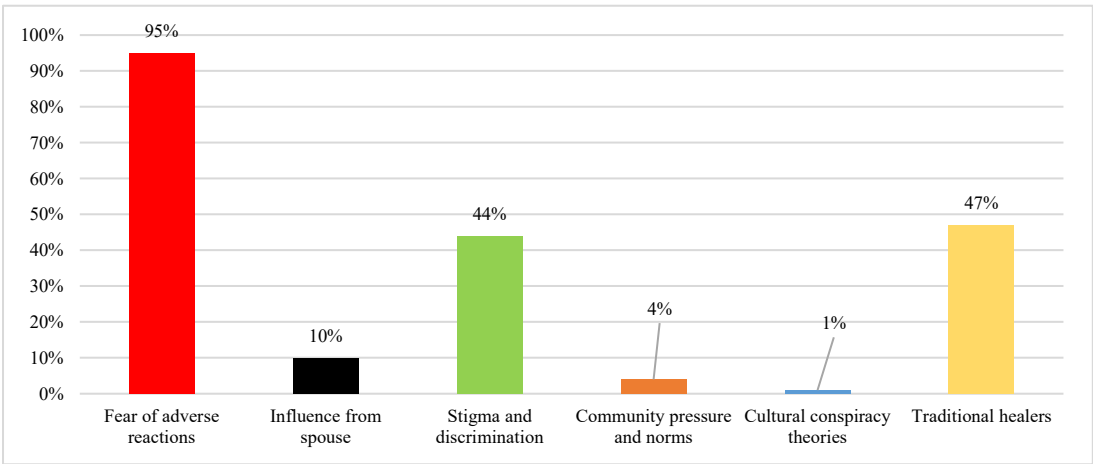
The fourth research question addressed in this study was: how do cultural attitudes and practices influence pregnant women's reluctance to use the COVID-19 vaccine? The data was analysed and presented under the following sub-sections:

Figure 5.12: Influence of Religion on COVID-19 Vaccine Uptake



The data in Figure 5.12 above indicates a considerable influence of religion on vaccine uptake. Among vaccinated women, 94.7 per cent reported that their religion allowed for vaccine uptake, whereas only 90.5 per cent of unvaccinated pregnant women felt similarly. This suggests that religious endorsement plays a pivotal role in facilitating vaccine acceptance or rejection. The higher proportion of vaccinated pregnant women affirming religious support highlights the potential for religious leaders to advocate for vaccination, thereby enhancing uptake rates.

Figure 5.13: Specific Cultural Factors against COVID-19 Vaccine Uptake among Unvaccinated Women



From Figure 5.13 above, each variable was tested individually out of 100 per cent to check each cultural factor against COVID-19 vaccine uptake. A staggering 95 per cent of unvaccinated women reported a fear of adverse reactions to the vaccine. This overwhelming concern indicates that apprehension about potential side effects significantly influences vaccine hesitancy. This fear may stem from a combination of first-hand experiences, anecdotal accounts from peers, and a general lack of information regarding vaccine safety and efficacy since COVID-19 vaccine was new. The involvement of traditional healers in the decision-making process was noted by 47 per cent of respondents. This suggests that traditional beliefs and practices continue to hold significant sway over health decisions. Stigma and discrimination surrounding vaccination are prevalent, with 44 per cent of respondents acknowledging such societal pressures. This highlights a cultural context where unvaccinated individuals may face negative judgment from their communities, which can contribute to feelings of isolation or fear of being criticised.

The influence of the spouse as head of the household is also noteworthy, although only 10 per cent of respondents indicated that this factor directly affected their decision. This suggests that while spousal influence may not be a predominant concern, it still plays a minor role in some households. Engaging men in conversations about vaccine benefits and addressing their concerns can help mitigate barriers related to spousal influence, ultimately supporting pregnant women in making autonomous health decisions. Interestingly, 3.9 per cent of pregnant women reported experiencing community pressure and norms that discouraged vaccination, while only 1 per cent acknowledged the impact of cultural conspiracy theories on their decisions. This indicates that while these factors are less common, they still exist and could be addressed through community engagement strategies that promote positive narratives around vaccination.

5.6.3 Chi-square Tests: Cultural Beliefs and Uptake of COVID-19 Vaccine

The findings, as presented in Table 5.15 below, underscore the significant role that cultural beliefs play in shaping vaccine uptake.:

Table 5.15: Cultural Beliefs and Uptake of COVID-19 Vaccine

Cultural beliefs		Vaccinated		Not Vaccinated		Pearson Chi-Square Tests		
		Freq	%	Fre q	%	χ ²	d f	p
Sterilisation	No belief in sterilisation	259	68.2%	175	46.1%	37.902	1	.000*
	Believed in sterilisation	121	31.8%	205	53.9%			
	Total	380	100.0%	380	100.0%			
Misinformation	No misinformation	156	41.1%	141	37.1%	1.244	1	.265
	Misinformation	224	58.9%	239	62.9%			
	Total	380	100.0%	380	100.0%			
Social Stigma	No stigma	308	81.1%	205	53.9%	63.632	1	.000*
	Feared stigma	72	18.9%	175	46.1%			
	Total	380	100.0%	380	100.0%			
Lack of Female Authority	No female authority	349	91.8%	364	95.8%	5.103	1	.024*
	Female authority	31	8.2%	16	4.2%			
	Total	380	100.0%	380	100.0%			
Natural healing philosophy	Did not believe in natural healing	377	99.2%	380	100.0%	3.012	1	.311
	Believed in natural healing	3	0.8%	0	0.0%			
	Total	380	100.0%	380	100.0%			
Fear of side effects	No side effects	265	69.7%	272	71.6%	.083 ^b	1	.577
	Feared sided effects	115	30.3%	108	28.4%			
	Total	380	100.0%	380	100.0%			
*Sig at p<.05								

As indicated in Table 5.15 above, a substantial difference is observed regarding beliefs about sterilisation, with 68.2 per cent of vaccinated pregnant women expressing no belief in sterilisation compared to only 46.1 per cent of unvaccinated pregnant women. The Pearson Chi-Square test shows a highly significant result ($\chi^2 = 37.902$, $p < .001$), indicating that the belief in sterilisation is a strong factor influencing vaccination status. This suggests that pregnant women who believe that the vaccine may lead to sterilisation are significantly less likely to get vaccinated. The findings also highlight the impact of social stigma. Among vaccinated pregnant women, 81.1 per cent reported no stigma associated with vaccination, while 46.1 per cent of unvaccinated pregnant women feared stigma. This difference is statistically significant ($\chi^2 = 63.632$, $p < .001$), indicating that social stigma surrounding vaccination plays a critical role in vaccine hesitancy. Women who fear stigma are less likely to be vaccinated, emphasising the need for community-based interventions to create a supportive environment that encourages vaccination without fear of judgment.

The data regarding the influence of female authority shows that 91.8 per cent of vaccinated pregnant women reported a lack of female authority impacting their decision, compared to 95.8 per cent of unvaccinated women. Although this is significant ($\chi^2 = 5.103$, $p = .024$), the overall impact appears less pronounced than other factors. Nevertheless, it suggests that pregnant women might feel more empowered to make health decisions when supported by female authorities. Strategies to include female leaders and health advocates in vaccination campaigns could improve uptake. A minimal percentage of pregnant women believed in natural healing (only 0.8 per cent of vaccinated pregnant women), and this factor did not show a significant impact on vaccination status ($p = .311$). This indicates that traditional beliefs in natural healing do not strongly influence vaccine uptake in this sample. The data on fears regarding side effects shows no significant difference between vaccinated (30.3 per cent) and unvaccinated women (28.4 per cent) ($p = .577$). This suggests that fear of side effects is not a major determinant in the decision to vaccinate among this population, which is a positive finding for public health messaging and can be aimed at increasing vaccine acceptance since the fear is not significant.

Table 5.16: Summary of Alternative Hypotheses for Objective 4

Alternative Hypothesis	Association	Verdict
H4a: Pregnant women who believe in sterilisation as a consequence of the COVID-19 vaccine are significantly less likely to be vaccinated compared to those who do not hold such beliefs.	Exists	Accepted
H4b: Pregnant women who experience social stigma regarding COVID-19 vaccination are significantly less likely to accept the vaccine than those who do not fear stigma	Exists	Accepted
H4c: There is a significant relationship between the presence of female authority figures and the likelihood of pregnant women getting vaccinated against COVID-19.	Exists	Accepted

5.6.4 Binary Logistics of Cultural/Religious Beliefs and COVID-19

Vaccine uptake

To compute the odds ratios, the variables analysed included beliefs related to sterilisation, misinformation, and social stigma, lack of female authority, natural healing philosophy, and fear of side effects.

Table 5.17: Odds Ratio for Cultural/Religious Beliefs and COVID-19 Vaccine Uptake.

		Variables in the Equation					
		B	D f	P	OR	95% C.I. for OR	
						L.B	U. B
Step 1 ^a	Sterilisation (1)	.795	1	.000	2.215	1.428	3.436
	Misinformation (1)	.049	1	.861	1.050	.605	1.825
	Social stigma (1)	1.199	1	.000	3.317	2.152	5.114
	Lack of female authority (1)	-.446	1	.208	.640	.320	1.281
	Natural healing philosophy (1)	-21.622	1	.999	.000	.000	.
	Fear of side effects (1)	.928	1	.005	2.529	1.329	4.812
	Constant	20.088	1	.999	5.2e+ 8		
a. Variable(s) entered on step 1: Sterilisation, Misinformation, Social Stigma, Lack of Female Authority, Natural healing philosophy, Fear of Side Effects. Key: L. B=Lower Bound; U.P =Upper Bound							

The analysis in Table 5.17 above indicates a strong association between beliefs in sterilisation and vaccine uptake, with an OR of 2.215 ($p < .001$). This means that pregnant women who believe that the COVID-19 vaccine could lead to sterilisation are more than twice as likely to reject vaccination compared to those who do not hold this belief. The results show that social stigma is another significant factor influencing vaccine uptake, with an OR of 3.317 ($p < .001$). This suggests that pregnant women who fear social repercussions for getting vaccinated are over three times more likely to remain unvaccinated. The analysis also highlights the role of fear regarding potential side effects, yielding an OR of 2.529 ($p = .005$). Women who express concerns about side effects are over two times more likely to be unvaccinated. This finding underscores the need for clear communication about vaccine safety and potential side effects, which can alleviate fears and increase acceptance. The other variables including misinformation, lack of female authority, and natural healing philosophy did not show significant associations with vaccine uptake ($p > 0.05$). The OR for misinformation was 1.050 ($p = .861$), suggesting that it does not significantly impact vaccination decisions in this sample. The lack of female

authority and beliefs in natural healing were also not significant factors, with ORs of 0.640 ($p = .208$) and 0.000 ($p = .999$), respectively. This indicates that, while these beliefs may exist, they do not heavily influence the decision of pregnant women to vaccinate.

5.7 Pearson Correlation Analysis

Pearson correlation analysis was used to measure and define the extent and direction of the association between two variables. The results indicate numerous significant relationships that are essential for comprehending vaccine acceptance or hesitancy.

Table 5.18: Pearson Correlation Coefficient between Cultural/Religious Beliefs and COVID-19 Vaccine Uptake

Correlations								
		Vaccine Uptake	Sterilisation	Misinformation	Social Stigma	Lack of Female authority	Natural healing philosophy	Fear of side effects
Pearson Correlation	Vaccine Uptake	1.000	-.223	-.040	-.289	.082	.063	.020
	Sterilisation	-.223	1.000	.367	.619	.142	.073	-.559
	Misinformation	-.040	.367	1.000	.441	.004	-.079	-.805
	Social Stigma	-.289	.619	.441	1.000	-.073	.046	-.447
	Lack of Female authority	.082	.142	.004	-.073	1.000	.158	-.165
	Natural healing philosophy	.063	.073	-.079	.046	.158	1.000	-.041
	Fear of side effects	.020	-.559	-.805	-.447	-.165	-.041	1.000

As shown in Table 5.18 above, there is a negative correlation ($r = -0.223$, $p < 0.001$) between beliefs regarding sterilisation and vaccine uptake. This indicates that as the belief in sterilisation linked to vaccination increases, the

likelihood of accepting the vaccine decreases. This finding underscores the pervasive fear that vaccines may affect fertility, which can significantly hinder public health efforts to increase vaccine coverage among pregnant women. A stronger negative correlation ($r = -0.289$, $p < 0.001$) is observed between social stigma and vaccine uptake. This suggests that fear of judgment has a profound impact on women's decisions regarding vaccination. The findings highlight the importance of addressing stigma in health messaging and community outreach initiatives.

Although misinformation shows a negative correlation ($r = -0.040$, $p = 0.133$), it is not statistically significant. This may suggest that while misinformation is present, it does not play a direct role in influencing vaccine uptake compared to beliefs in sterilisation or social stigma. Interestingly, the fear of side effects displays a negative correlation ($r = -0.289$, $p < 0.001$) as well, indicating that as fear increases, the likelihood of vaccination decreases. This finding reinforces the necessity for clear, transparent communication about the safety of vaccines, particularly addressing common concerns related to side effects. Both of these variables show negligible correlations with vaccine uptake, suggesting they may not be significant barriers in this context. The lack of female authority has a slight positive correlation ($r = 0.082$), indicating that it may not influence the decision to vaccinate significantly.

5.6.6 Qualitative Data Analysis

Theme 6: Misconceptions and Cultural Beliefs

In a focused group discussion with nurses, the participants were asked to share their experiences and opinions on the vaccine hesitancy and misconception among pregnant women. It was reported that vaccine hesitancy was primarily driven by misconceptions and cultural beliefs. A common belief was that the COVID-19 vaccine could cause miscarriages. One participant stated, "*many women believed the vaccine could cause them to lose the baby in the early stages of pregnancy*" (Female Nurse 3, 2024). Other rumours circulating in communities suggested that the vaccine could cause stillbirths, particularly in the third trimester. "*We heard rumours in the community that the vaccine could*

lead to stillbirth in the third trimester, which scared a lot of pregnant women" (Female Nurse 6, 2024).

Theme 7: Misinformation from Religious Leaders

Findings from the interviews revealed that some religious leaders openly discouraged vaccination, framing it as incompatible with their faith. One of the participant recalled that *"in certain denominations, religious leaders warned their congregations against the vaccine, claiming it was against God's will to heal or let you die from the disease (Male Doctor 3, 2024)*. Others viewed it as a test of faith, where reliance on divine protection was considered sufficient. This highlights the need for faith-based interventions that collaborate with religious leaders to promote vaccine acceptance. Further fuelling this hesitation were religious leaders who contributed to the spread of misinformation as reported from the focused group discussions with nurses. One of the participants remarked that *"some pastors claimed the vaccine was a form of family planning that would cause infertility"* (Male Nurse 4, 2024).

Theme 8: Dynamics in the Family Decision Making

Findings from the key interviews insinuated that in many African households, husbands or male family members made decisions regarding healthcare, including vaccinations. One of the participants remarked that *"women often sought permission from their husbands, who sometimes forbade them from taking the vaccine."* (Female Doctor 2, 2024). Moreover, in extended family setups, elder relatives sometimes influenced decisions, perpetuating myths, and fears. Engaging men and elder family members in health campaigns could significantly impact vaccine acceptance within families. Additionally, the above finding was buttressed by the results from the FGDs with the nurses which revealed that social stigma and partner disapproval played a significant role in vaccine hesitancy. One participant shared, *"some pregnant women hesitated to get vaccinated because their partners disapproved, or they feared social judgment from others"* (Female Nurse 5, 2024). These findings suggest that cultural and religious factors, along with social pressures, play a major role in

vaccine hesitancy. These however were contrary to the findings as religion did not play a significant role in influencing vaccine uptake.

5.6.7 Interpretation and Discussion: Cultural Attitudes and Practices Versus COVID-19 Vaccine Acceptance

The findings from this study reveal that cultural attitudes and practices, including beliefs about sterilisation, social stigma, and misconstructions about the COVID-19 vaccine, significantly influence vaccine acceptance or hesitancy among pregnant women in Nairobi City County. These results are consistent with the SCT paradigm: these worries are a reflection of expectations for unfavourable outcomes, which reduce self-efficacy and promote avoidance behaviour. Despite the existence of policies, women's behavioural intentions decrease when they anticipate negative outcomes. This study identified misconceptions such as the belief that the COVID-19 vaccine could cause sterilisation or negatively affect fertility. These findings are supported by Davis et al., (2022), who identified perceived risks and concerns about vaccine safety as strong determinants of vaccine hesitancy in Kenya and other low- and middle-income countries. Similarly, Enea (2023) emphasised the importance of addressing conspiracy theories to enhance vaccine acceptance. In the Kenyan context, Otieno et al., (2020) found that pregnant women viewed vaccinations as generally safe for mother's and child health, but the novelty of the COVID-19 vaccine created additional concerns not associated with established vaccines like influenza

The study highlights that fear of social stigma and partner disapproval plays a significant role in vaccine hesitancy. This embodies both the subjective norm component of TRA and the interpersonal level of SEM. Beyond personal views, social stigma functions as a potent normative influence that shapes behavioural intentions. This finding corroborates the results of Viswanath et al., (2021), who identified social and informational determinants as critical in influencing vaccine uptake. The role of social norms and the opinions of trusted individuals, including partners and community leaders, was found to be significant by Davis et al., (2022). Testimonies from community leaders or vaccinated individuals could therefore help mitigate the negative impact of these social factors.

Misconceptions about vaccine safety, including fears of miscarriages and stillbirths, emerged as significant barriers in this study. These findings align with those of Allotey et al., (2020), who reported that concerns about vaccine side effects were the primary reasons for vaccine hesitancy among pregnant women globally. This finding also aligns with Otieno et al., (2020), who observed that the safety of maternal vaccinations was critical in influencing uptake, though their study was limited to influenza vaccines.

Religious leaders amplifying fears about vaccines as a form of family planning further complicated vaccine acceptance. Religious institutions function as significant social structures at the SEM community level. Collective norms and perceptions of risk are greatly influenced by their support or opposition to vaccination. This finding aligns with Enea (2023) who emphasised the need to include religious groups in vaccination campaigns to debunk myths and promote evidence-based acceptance. Addressing these challenges requires engaging religious leaders as advocates for vaccine safety and efficacy. Cultural practices that discourage medical interventions during pregnancy may also contribute to hesitancy. This finding is supported by Mcmanus et al., (2021) who identified cultural attitudes and heightened belief in COVID-19 conspiracy theories as critical factors affecting vaccine acceptance. Engaging community influencers and integrating culturally sensitive messaging into health campaigns could help address these barriers. The findings emphasise the need for targeted interventions to address cultural misconstructions and promote vaccine uptake among pregnant women. Health authorities should prioritise educational campaigns to dispel myths and fears, leveraging testimonials from vaccinated mothers and community leaders. Multilevel approaches are needed to overcome cultural barriers, as shown by the integration of SEM, SCT, and TPB: altering subjective norms (TPB), correcting outcome expectancies (SCT), and involving institutional and community actors (SEM). The role of trust, as highlighted by Viswanath et al., (2021), underscores the importance of transparent communication to build confidence in vaccine safety and efficacy. Collaborative efforts between health officials, community organisations, and influencers can foster supportive environments that encourage informed decision-making.

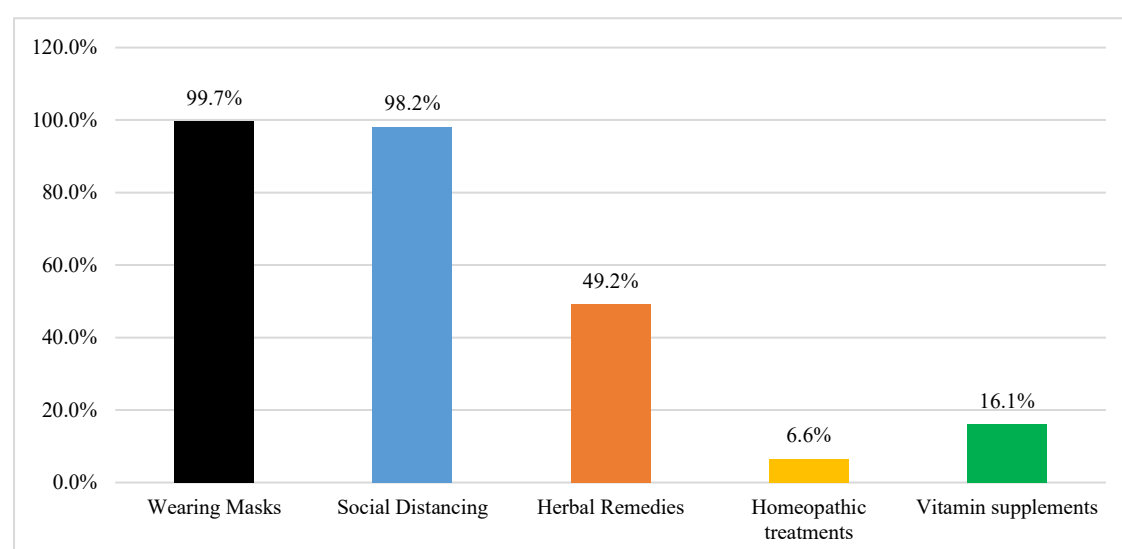
5.7 FINDINGS FOR RESEARCH QUESTION 5

The fifth research question that this study sought to answer was: What alternative methods do unvaccinated pregnant women in Nairobi County, Kenya, employ to protect themselves against COVID-19?

5.7.1 Univariate Analysis

Using univariate statistics, the alternative methods employed by unvaccinated pregnant women in Nairobi City County to protect themselves against COVID-19 reveals significant insights into their health-seeking behaviours. (Figure 5.14 below).

Figure 5.14: Alternative Methods to Combat COVID-19 Vaccine



As indicated in Figure 5.14 above, findings indicate that an overwhelming majority, 99.7 percent, reported wearing masks as a protective measure against COVID-19. This high percentage indicates that even in the absence of vaccination, pregnant women are taking proactive steps to safeguard their health. Similarly, 98.2 per cent (n=373) of the participants acknowledged practicing social distancing. The mean score of 0.98 reinforces that social distancing is nearly universally adopted. This indicates a strong awareness of and commitment to reducing transmission risks, reflecting public health messaging's effectiveness in promoting these behaviours.

In contrast, nearly half (49.2 per cent) reported using herbal remedies. This suggests a cultural inclination towards traditional medicine, highlighting that some pregnant women may be seeking alternative, non-pharmaceutical solutions to health concerns. However, this reliance on herbal remedies may raise concerns regarding their efficacy and safety, particularly during pregnancy. A significantly lower percentage, 6.6 per cent (n=25), reported using homeopathic treatments. This finding indicates that while some women may explore alternative health options, homeopathy does not appear to be a prevalent choice among the respondents. Only 16.1 percent(n=61) of pregnant women indicated they were taking vitamin supplements as a protective measure. This low uptake could suggest a lack of awareness regarding the potential benefits of specific vitamins in boosting immunity, or it may indicate barriers to access.

5.7.2 Chi-Square Test: Choice of Protective Methods Per Demographic Characteristics

Table 4.19 presents Chi-square tests for demographic variables and the choice of protective methods.

Table 5.19: Chi-square Tests for Demographic Variables and the Choice of Protective Methods

Demographic factors		Protective Methods				
		Wearin g Masks	Social Distan cing	Herbal Remed ies	Homeopat hic treatment s	Vitami n supple ments
Distribution by Age (1=<35years)	Chi- square	4.438	.633	1.971	8.964	1.067
	df	1	1	1	1	1
	Sig.	.035 ^{a, *}	.426 ^{a, b}	.160	.003 ^{a, *}	.302 ^a
Marital Status (1=Married)	Chi- square	.466	.002	14.839	.874	1.566
	df	1	1	1	1	1
	Sig.	.495	.968 ^a	.000 [*]	.350	.211
Religion (1=Christian)	Chi- square	4.865	.193	.003	.723	1.964
	df	1	1	1	1	1
	Sig.	.027 ^{a, b, *}	.661 ^{a, b}	.960 ^a	.395 ^{a, b}	.161 ^a
Number of Children before pregnancy (1=>3)	Chi- square	.205	33.567	.622	1.698	.493
	df	1	1	1	1	1
	Sig.	.650 ^{a, b}	.000 ^{a, b, *}	.430	.193 ^{a, b}	.483 ^a
Employment Status (1=Employed)	Chi- square	.522	.034	14.572	.229	1.257
	df	1	1	1	1	1
	Sig.	.470	.853 ^a	.000 [*]	.632	.262
Income Source (1=Formal)	Chi- square	1.739	1.511	139.61 4	17.507	43.316
	df	1	1	1	1	1
	Sig.	.187	.219 ^a	.000 [*]	.000 [*]	.000 [*]
Family Structure (1=Traditiona l Family- Nuclear)	Chi- square	2.367	.035	14.654	1.544	1.310
	df	1	1	1	1	1
	Sig.	.124 ^a	.852 ^a	.000 [*]	.214	.252
*Sig at p<.05						

Table 5.19 above indicates that the chi-square test indicated a significant association between age and the practice of wearing masks, with a p-value of 0.035. This indicated that younger pregnant women (those aged under 35) are more likely to adopt mask-wearing as a protective measure. This finding may reflect heightened awareness or responsiveness to public health guidelines among younger pregnant women. Regarding social distance, the analysis showed no significant association with age ($p = 0.426$) or other demographic factors, suggesting that social distancing practices may be uniformly adopted across diverse groups. This lack of variability implies a widespread recognition of the importance of social distancing, regardless of demographics. A significant association was found between marital status and the use of herbal medicines, with a chi-square value of 14.839 ($p < 0.001$).

Married pregnant women were more likely to report using herbal remedies, potentially reflecting cultural practices or beliefs surrounding traditional medicine in marital settings. The chi-square analysis showed a significant association between the number of children before current pregnancy and the use of homeopathic treatments ($p < 0.001$). This suggests that pregnant women who have had more children might be more inclined to explore homeopathic options, possibly due to previous experiences or established beliefs in alternative medicine. Significant associations were observed between income source and the use of vitamin supplements ($p < 0.001$). Pregnant women with formal income sources were more likely to report using vitamin supplements, indicating that economic stability may influence health-seeking behaviours.

Table 5.20: Summary of Alternative Hypotheses for Objective 5

Alternative Hypothesis	Association	Verdict
H5a: There is a significant relationship between age difference, religion and the likelihood of wearing masks as an alternative protective method among the unvaccinated pregnant women.	Exists	Accepted
H5b: There is a significant relationship between marital status, employment status, income source, family structure and the likelihood of using herbal as an alternative protective method among the unvaccinated pregnant women.	Exists	Accepted
H5c: There is a significant relationship between the number of Children before pregnancy and the likelihood of social distancing as an alternative protective method among the unvaccinated pregnant women.	Exists	Accepted

5.7.3 Qualitative Data Analysis

Theme 9: Mask Wearing and Social-Distancing as Alternative Measures

In a focused group discussion with nurses, the participants were asked to share their encounter with the alternative methods unvaccinated pregnant women employed to protect themselves against COVID-19. Findings showed that unvaccinated pregnant women adopted various protective measures to safeguard themselves against COVID-19. Common practices included social distancing and wearing masks as one of the participants explained, "*many women who did not get vaccinated relied on mask-wearing and social distancing to reduce their risk of contracting COVID-19*" (Female Nurse 1, 2024).

Theme 10: Use of Home-made/Traditional Preventive Methods

Unvaccinated pregnant women often relied on traditional remedies and practices, such as herbal concoctions believed to boost immunity. Results from the FGDs revealed that some unvaccinated pregnant women turned to home remedies like ginger, lemon, and steaming. *"Some pregnant women believed that home remedies, such as ginger, lemon, and steaming, could protect them from the virus"* (Male Nurse 4, 2024). The reliance on alternative measures such as home remedies highlights the need for further education on the effectiveness of vaccines compared to other forms of protection. It is essential to clarify that vaccination offers stronger protection than home remedies.

5.7.4 Interpretation and Discussion: Alternative Methods Employed By Unvaccinated Pregnant Women in Nairobi County

The finding that unvaccinated pregnant women relied heavily on masks and social distancing is consistent with global trends in non-pharmaceutical interventions (NPIs) to combat COVID-19. According to SCT, this behaviour is indicative of alternate coping strategies influenced by self-efficacy beliefs and perceived risk. Women who questioned the effectiveness of vaccines might have thought that conventional methods gave them more control. Additionally, the use of herbal medicines is a sign of mistrust, and according to the TPB, behavioural intentions changed toward non-pharmaceutical interventions as a result of negative attitudes about vaccines and inadequate perceived behavioural control. This finding corroborates with Robinson et al., (2021), who highlighted that individual from lower socioeconomic backgrounds or minority groups, often characterised by vaccine hesitancy, were more likely to adopt NPIs.

Similarly, in the United States, Khairat et al., (2022), emphasised that communities with vaccine hesitancy relied on masks and social distancing as primary protective measures due to accessibility challenges and vaccine phobia. The finding underscores the importance of targeted public health education to complement NPIs with vaccination. The reliance on herbal remedies, such as ginger, lemon, and steaming, reflects cultural health

practices and a mistrust of modern healthcare systems. This finding aligns with Van Heemskerken et al., (2022), who noted that traditional health beliefs in sub-Saharan Africa significantly influence vaccination behaviours. In particular, maternal autonomy and perceived health benefits of traditional practices were shown to play a pivotal role in decision-making.

Furthermore, Rottenstreich et al., (2022) reported similar findings in high-income economies, where cultural and safety concerns about vaccines influenced the uptake of alternative therapies among pregnant women. However, this finding contrasts with the results from China, where high trust in domestic medical advancements and vaccine efficacy reduced the reliance on non-scientific alternatives (Zheng et al., 2021). The differing cultural contexts highlight the need for locally adapted culturally sensitive health campaigns to address vaccine mistrust.

The finding that homeopathic treatments and vitamin supplementation were not primary protection methods among unvaccinated pregnant women is consistent with Oluwatemitope Olomofe et al., (2021), who reported that perceived satisfaction with vaccination overshadowed the use of alternative protection methods. In sub-Saharan Africa, maternal health campaigns typically emphasise the importance of balanced nutrition and vitamin supplementation. Yet, these measures appear underutilised among the study group, perhaps reflecting economic barriers, as suggested by Van Heemskerken et al., (2022).

Socio-demographic characteristics such as age, income, and marital status determined the adoption of alternative approaches, according to the results. In keeping with this observation, SEM explains this pattern by pointing to economic and structural barriers that restrict access and influence institutional and community-level health behaviour decisions. In line with the findings, Robinson et al., (2021) observed that younger individuals and those with limited financial resources exhibited lower vaccination intentions and higher adoption of NPIs. In Pakistan, Ali et al., (2022) demonstrated that affordability and accessibility significantly impacted health behaviour choices, a trend also evident in Nairobi County. Moreover, the study's observation that married pregnant women were more likely to rely on herbal remedies aligns with Qiu,

et al., (2021), who noted that married pregnant women often consider family traditions and partner influence when making health decisions. Public health campaigns could benefit from involving partners and family members to reinforce the importance of vaccination.

The qualitative findings revealed mistrust in vaccine safety and efficacy, which aligns with Rottenstreich et al., (2022), who identified safety concerns as a significant deterrent among pregnant women. In contrast, Zheng et al., (2021), in China highlighted the success of robust educational campaigns and trust-building measures in reducing vaccine resistance. The reliance on NPIs and traditional remedies underscores the need for similar confidence-building initiatives in Nairobi.

5.8 FINDINGS FOR RESEARCH QUESTION 6

The sixth research question that this study sought to answer was: What is the level of trust that pregnant women have in the effectiveness of the COVID-19 vaccine?

Figure 5.15: Trust in the COVID-19 Vaccine

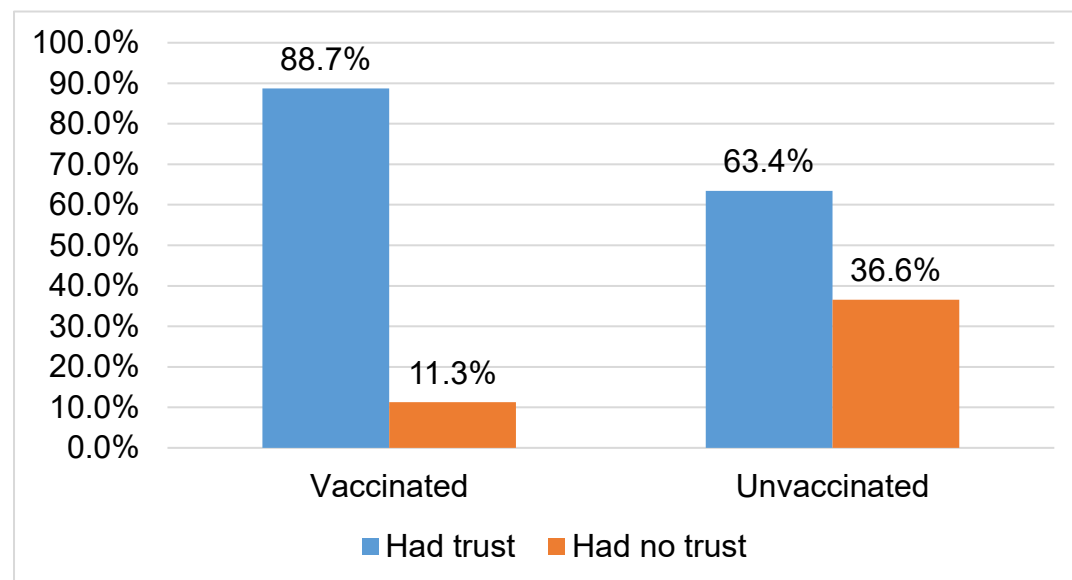


Figure 5.15 above presents the trust levels regarding the COVID-19 vaccine among the sampled pregnant women. Among the vaccinated group, 88.7 per cent expressed trust in the vaccine, while only 11.3 per cent indicated a lack of

trust. Conversely, among unvaccinated women, a significant 36.6 per cent reported no trust in the vaccine, with only 63.4 per cent expressing trust. Overall this indicates that trust in the vaccine is markedly higher among those who have been vaccinated.

Table 5.21: Chi-square Test for Level of Trust and COVID-19 Vaccine Uptake

Level of trust		COVID-19 Vaccine Uptake						
		Vaccinated		Unvaccinate d		Pearson Chi-Square Tests		
		F	%	F	%	χ^2	df	p-value
	Low trust	155	40.8%	172	46.1%	145.259	1	.000*
	High trust	225	59.2%	208	53.9%			

The chi-square test results in Table 5.21 illustrates that among the vaccinated pregnant women, 59.2 per cent reported having high trust in the vaccine. On the other hand, 46.1 per cent of the unvaccinated had low trust in covid-19 vaccine. This suggests a spectrum of scepticism that varies among those who remain unvaccinated. The Pearson Chi-Square statistic of 145.259 with a p-value of 0.000 indicates a highly significant association between the level of trust and vaccine uptake. This finding implies that as trust in the vaccine increases, the likelihood of vaccination also rises.

Figure 5.16: Factors Contributed to Trust Among the Vaccinated.

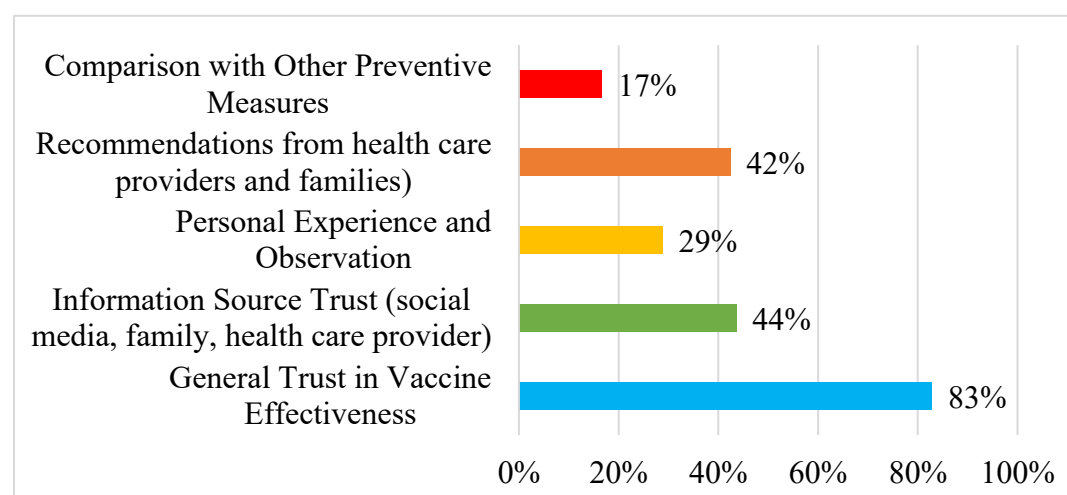
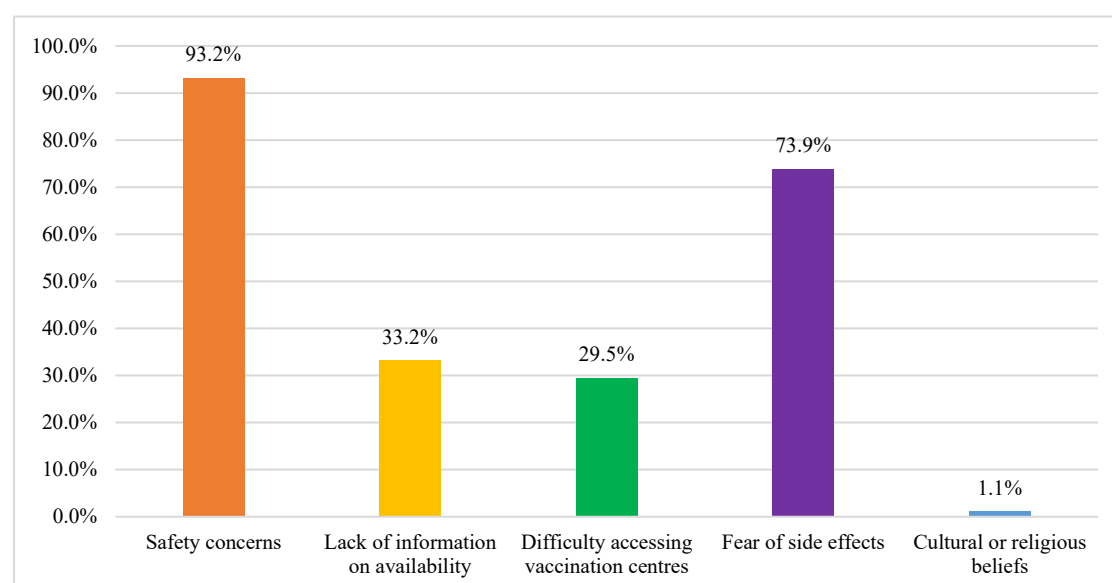


Figure 5.16 above outlines numerous factors contributing to trust among vaccinated women. A notable 83 per cent reported general trust in vaccine effectiveness, while 43.6 per cent indicated trust in information sources, including social media, family, and healthcare providers. Interestingly, only 29 per cent cited personal experience and observation as a factor in their trust. Recommendations from healthcare providers and families had a trust rate of 42 percent. Comparatively, only 17 per cent based their trust on comparisons with other preventive measures. This suggests that while the majority of vaccinated pregnant women have a foundational trust in the vaccine, the sources of this trust vary widely.

Figure 5.17: Reasons For Not Receiving the COVID-19 Vaccine Among the Unvaccinated



The above variables were tested individually out of 100 per cent , as the item was a multi-choice question, to establish the reasons why pregnant unvaccinated women did not receive the vaccine and are examined in Figure 5.17 above. A predominant concern among unvaccinated pregnant women is safety, with 93.2 per cent expressing safety concerns. Fear of side effects is also high at 73.9 percent. Lack of information regarding vaccine availability (33.2 per cent) and difficulty accessing vaccination centres (29.5 per cent) further illustrate barriers to vaccine uptake. In contrast, only 1.1 per cent cited cultural or religious beliefs as reasons for their hesitance, indicating that factors related to misinformation and access are more significant obstacles than cultural attitudes.

Table 5.22: Summary of Alternative Hypotheses for Objective 6

Alternative Hypothesis	Association	Verdict
H6a: There is a significant positive relationship between the level of trust in the COVID-19 vaccine and the likelihood of being unvaccinated among pregnant women.	Exists	Accepted
H6b: Pregnant women who report higher levels of trust in the COVID-19 vaccine have significantly higher rates of vaccination compared to those with lower levels of trust.	Exists	Accepted

5.8.1 Bivariate Analysis: Level of Trust And COVID-19 Vaccine Uptake

Table 5.23 provides paired sample statistics showing a positive correlation between trust level in the COVID-19 vaccine and vaccination uptake.

Table 5.23: Paired Sample T-Test for Level of Trust and COVID-19 Vaccine Uptake

Paired Samples Statistics				
		Mean	N	Sig.
Pair 1	COVID-19 Vaccine uptake	.50	760	.000
	Trust in the COVID-19 vaccine?	.76	760	
Pair 2	COVID-19 Vaccine uptake	.50	760	.000
	Level of trust	1.78	760	

The paired sample t-test indicates that the mean trust in the COVID-19 vaccination ($M = 0.76$) significantly exceeds the mean uptake of the COVID-19 vaccine ($M = 0.50$) ($p < 0.001$). This result demonstrates a significant difference between trust levels and actual vaccination practices among individuals. The examination of vaccination uptake concerning general trust levels indicates a significant mean difference ($p < 0.001$), implying that trust levels exceed actual uptake.

5.8.2 Paired Sample Tests and Mean Difference of Trust and COVID-19 Vaccine Uptake

Table 5.24: Paired Samples Test

Paired Samples Test									
		Paired Differences					t	d f	Sig. (2- tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	COVID-19 Vaccine Uptake - Trust in the COVID-19 vaccine	-.261	.553	.020	-.300	-.221	-12.979	759	.000
Pair 2	COVID-19 Vaccine Uptake - Level of trust	-1.278	1.686	.061	-1.398	-1.158	-20.886	759	.000

In Table 5.24 above, the paired samples test further confirms that the difference in means between trust levels and vaccine uptake is statistically significant ($p < 0.001$). This indicates that as trust in the vaccine increases, so does the probability of vaccination. This result highlights the importance of fostering public trust in health initiatives, as it may lead to higher vaccination rates and improved public health outcomes. Consequently, addressing concerns and misinformation about vaccines should be a priority for health authorities.

5.8.3 Multivariate Analysis: Level of Trust and COVID-19 Vaccine Uptake

Table 5.25: Multiple Logistic Regression Parameter Estimates for Trust and COVID-19 Vaccine Uptake

COVID-19 Vaccine Uptake ^a		B	S. E		p	OR	95% C.I. for OR	
							L-B	U-B
Trust in the COVID-19 vaccine	Intercept	22.203	5249.54		.997			
	Had no Trust in the COVID-19 vaccine	1.416	.308		.000	4.123	2.255	7.538
	Had Trust in the COVID-19 vaccine	0 ^b	.		.	.	.	.
Level of trust	No trust	-24.771	5249.54		.996	1.746-11	.000	. ^c
	Very little Trust	-45.749	.000		.	1.354E-20	1.354e-20	1.354E-20
	Little Trust	-20.721	5249.54		.997	1.002E-9	.000	. ^c
	Neutral	-17.951	5249.54		.997	1.600E-8	.000	. ^c
	Trust	-17.689	5249.54		.997	2.078E-8	.000	. ^c
	Strong Trust	0 ^b	.		.	.	.	.
Key: L. B=Lower Bound; U. P=Upper Bound								

The analysis of data as presented in Table 5.25 above indicates that pregnant women who reported "no trust" in the COVID-19 vaccine have a coefficient of 1.416, with a standard error of 0.308 and a p-value of 0.000. The odds ratio (OR) associated with this category is 4.123, signifying that women with no trust in the vaccine are over four times more likely to remain unvaccinated compared to those who express trust. This finding highlights a critical barrier to vaccination; lack of trust is a significant driver of vaccine hesitancy among this demographic. The analysis further differentiates between various levels of trust. As the level of trust decreases—from "Strong Trust" (the reference category)

through "Trust," "Neutral," "Little Trust," and "Very Little Trust" — the likelihood of being vaccinated sharply declines. The coefficients for these categories approach extreme negativity, indicating a near-zero probability of vaccination. For instance, the category "Very little Trust" results in an odds ratio approaching zero, suggesting an almost negligible chance of vaccination compared to those with strong trust. This pattern underscores the profound impact that trust levels have on vaccine acceptance.

5.8.4 Qualitative Data Analysis

Theme 11: Vaccine's safety, Confidence and Trust Instilled By Health Workers

With regards to trust, findings from the FGDs revealed that most pregnant women voluntarily sought vaccination after they were assured of its safety. One nurse noted, *"Once pregnant women heard that the vaccine was safe, most of them sought it out voluntarily. This proactive approach reflected their desire to protect both themselves and their unborn children"* (Female nurse 6, 2024). Initially, pregnant women were excluded from early vaccination phases but were later included once safety evidence was established. *"Pregnant women were excluded initially but included later when evidence showed the vaccine was safe for them"* (Male nurse 2, 2024).

Healthcare workers who had taken the vaccine themselves acted as role models. *"Healthcare workers who were vaccinated served as good examples to encourage pregnant women"* (Female Nurse 5, 2024). Additionally, the introduction of a vaccine specifically approved for pregnant women helped build confidence in the vaccination process. *"When the vaccine was specifically approved for pregnant women, it significantly boosted confidence in the vaccine"* (Male Nurse 4, 2024). These findings imply that building trust in the vaccine is essential for improving uptake. Health campaigns that feature testimonials from healthcare professionals and mothers who have successfully been vaccinated can further reinforce this trust. By sharing personal experiences and emphasising the protective benefits for both mother and child,

these initiatives can encourage more pregnant women to participate in vaccination programmes.

Theme 12: Enhanced Trust Through Education

Early in the vaccine rollout, hesitancy was fuelled by myths surrounding the vaccine's safety and side effects. Pregnant women feared that the vaccine might be harmful to their unborn babies or cause infertility as one of the participants said, *"there were many fears about miscarriages, which were often exaggerated by social media"* (Male Doctor 1, 2024). Additionally, stories of adverse reactions in non-pregnant individuals further discouraged uptake among this vulnerable group. Nonetheless, as healthcare workers provided evidence-based information, trust in the vaccine grew among pregnant women. One of the key informants remarked that *"when we informed them that we are also vaccinated against the virus, their concerns eased and started trusting the vaccine"* (Female Doctor 4, 2024). Positive testimonials from vaccinated mothers also played a role in changing perceptions. This demonstrates the importance of peer-led campaigns and transparent communication in building confidence.

5.8.5 Interpretation and Discussion: Level of Trust versus COVID-19 Vaccine Uptake

The findings underscore the critical role of trust in shaping health behaviours, particularly in the context of vaccination. The findings highlight the importance of trust in determining health behaviours, particularly vaccine uptake among pregnant women in Nairobi City County. Trust interacts across all theoretical frameworks: in SCT, trust bolsters self-efficacy and favours outcome expectations. In the Theory of Planned Behaviour, trust influences attitudes on the vaccine. In the Theory of Reasoned Action (TRA), trust affects subjective norms when credible authorities advocate for vaccination. In SEM, trust signifies institutional legitimacy at the policy and healthcare system tiers. The observed low trust levels among unvaccinated pregnant women align with broader global patterns. For instance, Robinson et al., (2021) noted a significant

decline in vaccination intentions among women worldwide due to apprehensions about vaccine safety and efficacy.

These results demonstrate that mistrust in vaccines is a universal challenge requiring targeted public health strategies. This finding is supported by Rottenstreich et al., (2022), who emphasised that safety concerns are a primary barrier to vaccine uptake among pregnant women. Their study found that the absence of clear, credible information from healthcare providers exacerbated mistrust. Similarly, the findings from Nairobi County suggest that addressing information gaps and involving trusted healthcare providers in vaccine advocacy are essential steps in improving vaccine trust and uptake.

The findings particularly highlight the role of healthcare staff as trusted figures. This aligns with SCT's modelling concept and SEM's level of institutional impact. Observing reputable professionals receiving vaccinations bolstered both confidence and behavioural purpose. This finding corroborates with those of Qiu et al., (2021), who noted that healthcare professionals' endorsements play a critical role in alleviating safety concerns and improving vaccine acceptance. However, the gap between healthcare professionals' awareness of vaccine recommendations and their consistent advice to pregnant women, as highlighted by Qiu et al., (2021) remains a challenge that needs to be addressed through better training and communication.

Furthermore, the shifting nature of trust, as additional facts on vaccine safety emerge, illustrates that behavioural intention is dynamic. This corresponds with the Theory of Planned Behaviour's acknowledgement that intentions may shift as new information modifies attitudes or perceived control. This finding mirrors findings from studies in China. For instance, Zheng et al., (2021) reported that people were more likely to trust the vaccine when they perceived it as a form of self-protection and had faith in local medical advancements. In Nairobi, the findings suggest that clear communication of scientific evidence and localised messages could have similar positive impacts on trust.

Finally, the voluntary uptake of vaccines among women who received assurances about safety illustrates the value of transparent and evidence-

based communication. The results indicate that vaccination adoption is not merely an individual choice but rather the outcome of complex interactions among cognitive beliefs, social influences, structural factors, and policy contexts. Consequently, effective interventions must be multi-faceted, targeting self-efficacy (SCT), reforming norms (TRA/TPB), and enhancing institutional trust and accessibility (SEM). This finding aligns with the results of Stock et al. (2022) in Scotland, where vaccination rates among pregnant women improved as public health campaigns effectively communicated safety and efficacy.

5.9 SUMMARY

This chapter provided a comprehensive presentation and interpretation of the research results. Further, this chapter demonstrates the triangulation and in-depth discussion of the findings. The integration of SCT, SEM, TRA, and TPB offers a thorough elucidation of vaccination uptake among pregnant women in Nairobi County. Social cognitive theory elucidates how self-efficacy, modelling, and outcome expectations influence individual cognition. The Theory of Planned Behaviour (TPB) and the Theory of Reasoned Action (TRA) elucidate the relationship between attitudes, subjective standards, and perceived behavioural control in the formation of behavioural intention. SEM contextualises these individual processes within larger institutional, community, and policy frameworks.

The next chapter (Chapter six) draws the conclusions from the findings, presents contribution to the knowledge and makes recommendations as per the study objectives.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

This chapter provides a synthesis of the study's findings, and outlines the conclusions drawn, along with practical and policy-oriented recommendations. It also proposes directions for future research based on evidence gathered. The study explores ways in which socioeconomic factors, national COVID-19 vaccination guidelines, cultural customs, religious views, personal opinions, and trust in the effectiveness of the vaccine affected pregnant women's vaccination uptake in Nairobi County, Kenya. Initially, this chapter starts by synthesising literature and findings, drawing conclusions as per objectives, and making recommendations and suggestions for further studies as well as highlighting contribution to the body of knowledge.

6.2 SYNTHESISING OTHER LITERATURE AND MY FINDINGS

The use of current and relevant literature in the discussion in Chapter Five is one of the most crucial factor that ensured the achievement of the research objectives. Through useful insights from the selected literature, the research questions were clarified and supported by laying a robust foundation for the research methodology. Chapter Five highlighted that the exclusion of pregnant women during the early phases of the vaccine rollout led to significant delays in vaccination uptake, but scenario changed upon the provision of safety evidence was provided. From the analysis of critical literature in Chapter Two, the delayed inclusion of pregnant women in vaccine programs is a critical barrier but increasing awareness of policy changes through clear communication and utilisation of effective communication sources would enhance the vaccine uptake.

Findings in Chapter Five of the study revealed that media (TV/radio), social media platforms and healthcare providers, play an important role in vaccine decisions among the pregnant women under the study. According to the research presented in Chapter Two, healthcare providers, including nurses,

trusted sources of information and media campaigns significantly fostered informed decision-making in times of vaccine rollout. Chapter Five further revealed that employment status, education and access to healthcare played a significant role in vaccine acceptance. Chapter Two identified that lower socioeconomic status and education levels are associated with vaccine hesitancy. In Chapter Five, this study revealed fear, trust, misconceptions and sterilisation as barriers to COVID-19 vaccine acceptance. These cultural factors are consistent with the literature in Chapter Two which all report that cultural beliefs about vaccine safety, particularly regarding fertility and maternal health, partner disapproval, social norms and traditional beliefs significantly shape vaccine acceptance across geographical settings.

In Chapter Five, this study highlighted that unvaccinated pregnant women rely on non-pharmaceutical interventions attributed to fear and beliefs that vaccine would affect their unborn children. The literature in Chapter Two noted that populations with vaccine hesitancy often turn to alternative protective measures, particularly when vaccine access is limited or there is fear surrounding the vaccine's safety.

Studies in Chapter Two further emphasise that trust in healthcare providers and vaccine efficacy are strong predictors of vaccine uptake. In a nutshell, the literature is highly effective in answering the research questions of your study. The findings of this research are well-supported by previous studies, and the identified themes such as the importance of clear communication, the role of socioeconomic factors, cultural influences, and the impact of trust in vaccine efficacy are thoroughly grounded in existing literature. This alignment not only strengthens the validity of the findings but also provides a comprehensive understanding of the factors influencing COVID-19 vaccine uptake among pregnant women in Nairobi City County, Kenya.

6.3 CONCLUSIONS

Conclusions were drawn from the study findings and presented as per the study specific objectives:

Research Objective 1: To assess pregnant women's awareness of and satisfaction with government communication regarding changes in Kenya's COVID-19 vaccination policy in Nairobi City County.

The study also concludes that healthcare workers, particularly nurses, are key to vaccine uptake among pregnant women. The study showed that pregnant women who interacted with nurses at the ANC during their initial visit were more likely to get vaccinated compared to those who interacted with doctors. This is supported by the findings that the majority of vaccinated women (83.2 per cent) reported being influenced by healthcare workers. Social media and peer networks significantly contribute to vaccine hesitancy, suggesting that it requires targeted interventions. The study concludes that nurses positively affect vaccine uptake, but the proliferation of misinformation on social media undermines these efforts. Nonetheless, while the support of family members played a role in influencing vaccination decisions, it was not as critical as professional or governmental guidance. This group should, however, not be ignored, as they play a secondary yet impactful role, particularly in spreading hesitancy through misinformation and necessitating broader educational outreach. 28.2 per cent of women were influenced by TV and radio programs in their vaccination decisions. This indicates that the government, particularly the Ministry of Health, needs to be strategic about which media channels to use for disseminating information, especially to pregnant women during a pandemic.

Interestingly, the influence of magazines and newspapers was also negative, with an odds ratio of 0.418, implying that reliance on print media may not be effective in promoting vaccine uptake for pregnant women. While media can play a role in informing and encouraging vaccination, it is not as impactful as direct healthcare communication. This aligns with the SCT theory, which includes a construct of expectancy that focuses on the results of engaging in certain actions. Women who interacted with healthcare workers, specifically

nurses, were able to take action towards getting vaccinated. According to the theory, pregnant women evaluated aspects of their physical and social environments based on the information received, which informed their decisions regarding vaccination uptake. The study concludes that limited access to healthcare services and resources, as well as the level of education and source of income, are key predictors of vaccine uptake. Pregnant women without adequate healthcare coverage or with less information were less likely to seek vaccination, meaning that they require improved healthcare infrastructure and support services. This finding emphasises the value of targeted interventions such as mobile vaccination clinics for pregnant women. These conclusions are supported by the Theory of Reasoned Action, which posits that behavioural intention is a key determinant of behaviour and is influenced by an individual's attitude towards the behaviour and subjective norms, which are the perceived social pressures to engage in or refrain from the behaviour. In the context of COVID-19 vaccination acceptance, TRA provides helpful information regarding how attitudes of pregnant women towards receiving the vaccine, coupled with the influence of social norms from their immediate circles, contribute to their intention to get vaccinated. This directly shows the cognitive processes that shape decision-making processes regarding COVID-19 vaccination. This is also supported by the Social Cognitive Theory, which highlights the interplay among individual cognition, the environment, and final conduct as actions.

Research objective 3: To examine how socioeconomic factors influence the uptake of the COVID-19 vaccine among pregnant women in Nairobi City County.

Married pregnant women were less likely to receive vaccination compared to their unmarried counterparts. This highlights the social dynamics within marriages, such as the influence of partners and family decision-making, which may contribute to vaccine hesitancy. The study concludes that while setting campaigns for married pregnant women, the government should not only focus on the pregnant women but also their spouses as they have been proven to have high levels of influence on their vaccine uptake decisions. The

government should engage men in conversations about the benefits of vaccines and address their concerns to reduce barriers related to spousal influence. Pregnant women who had previously vaccinated children also had higher chances of vaccination. This indicates that the government should encourage women to receive vaccinations that benefit both themselves and their children, in order to positively influence their attitudes towards vaccination.

Other social factors included employment status, with employed pregnant women having a lower likelihood of being vaccinated compared to their unemployed counterparts. Single-parent families also had low vaccination ratios compared to nuclear families. This finding concludes that in the campaigns, government should consider different family dynamics in how they design their campaigns so as to reach all groups. In the study, it was evident that the single-parent family lacked social support, unlike those from nuclear families. Therefore, government should have a holistic approach in designing community-based programs for all groups requiring vaccination.

Younger pregnant women aged 18-23 had some receptivity to vaccination campaigns; this underscores the potential for effective strategies targeting younger demographics. Education was also a critical determinant of vaccination, emphasising the urgent need for educational initiatives to improve awareness about vaccine safety and efficacy among all educational levels. This conclusion is supported by the Theory of Planned Behaviour which is based on the supposition that people typically act consciously most of the time by analyse relevant data whether openly or unconsciously and think of the effects of their decisions. This is important to note about how people receive and process their decisions based on information provided.

Research objective 4: To determine the ways in which cultural attitudes and practices influence the willingness to accept COVID-19 vaccine

Cultural factors, such as religious beliefs and social stigma, influence women's decisions regarding vaccination. The study concludes that religious leaders have a pivotal role in advocating for vaccination. Moreover, women who fear social repercussions or misunderstand the vaccine's safety are less likely to get

vaccinated. In the study, many women who were unvaccinated stated that they feared adverse reactions to the vaccine as well as the potential risk of sterilisation, although this was not statistically significant. Public health messaging can leverage this key and positive finding to enhance vaccine acceptance. It was interesting to note that women were also influenced by a female authority figure to get vaccinated, especially if their role model had been vaccinated without experiencing adverse effects. The study found and concluded that there is a negative correlation between social stigma and vaccine uptake. Fear of judgement had a profound impact on pregnant women's decisions, and therefore the study concludes that addressing stigma is important in health messaging and community outreach initiatives.

Research objective 5: To identify alternative methods employed by unvaccinated pregnant women in Nairobi County, Kenya, to protect themselves against COVID-19

The study concludes that while many unvaccinated pregnant women in Nairobi County take proactive measures to protect themselves against COVID-19, these measures are largely non-pharmaceutical. Wearing masks and social distancing were the most common practices, reflecting an understanding of the importance of these protective actions. Married pregnant women used herbal remedies, which suggests insights into the cultural practices surrounding medicine in marital settings. The study also concludes that pregnant women who have had more children might be more inclined to explore homeopathic options due to previous experiences or established beliefs in alternative medicine. The Social Cognitive Theory, which asserts that self-efficacy beliefs and perceived risks influence behaviour, supports these conclusions. The theory of planned behaviour also show behavioural intentions changed toward non-pharmaceutical interventions as a result of negative attitudes about vaccines and inadequate perceived behavioural control.

Research objective 6: To assess the level of trust and confidence that pregnant women have in the efficacy of COVID-19 vaccine and how it shapes their decision-making

The study concludes that there is a significant positive association between the level of trust in the COVID-19 vaccine and vaccine uptake, as evidenced by the chi-square and paired sample test results. This was mainly influenced by their perception of vaccine safety, a primary concern. Vaccination rates were higher among women who trusted the vaccine. Communication through nurses and trusted social circles plays a key role in building trust and promoting vaccine acceptance. There are opportunities to enhance trust through tailored educational campaigns and improved accessibility to vaccination services to address barriers such as access and misinformation to increase vaccine uptake among pregnant women. Trust interacts with all the theories in the study; in social-cognitive theory, it encourages self-efficacy and increases outcome expectations, while in the theory of planned behaviour, it influences pregnant women's attitudes towards the vaccine. In the theory of reasoned action, the female leaders in this study, who are viewed as credible authorities, serve as effective advocates for increasing vaccination decisions. Lastly, the Social Ecological Model demonstrates that trust is linked to institutional legitimacy within both the policy and healthcare system tiers.

6.3 CONTRIBUTION TO THE BODY OF KNOWLEDGE

While most studies highlight the importance of healthcare workers in shaping vaccination decisions, this study specifically demonstrated that nurses, as the first contact for pregnant women at antenatal clinics, are more influential in vaccine decisions compared to doctors. This, therefore, shapes how future vaccination pathways can be planned, especially in a pandemic setting aimed at vaccine acceptance. This highlights the concept of maternal trust, with nurses identified as the primary trust brokers among pregnant women in urban African settings.

The study also found that married pregnant women were less likely to be vaccinated and recommends engaging their spouses, as men act as

gatekeepers to achieve higher vaccination rates. This is an interesting gender dynamic that influences how we plan our campaigns, considering the strong power dynamic held by spouses and connected with SDG 5, which looks at gender equality. While most studies cumulate media exposure together in influencing decisions, this study ranked nurses having the strongest influence, TV and radio had positive influence, social media had negative influence and print media was significantly negative therefore refining hierarchically prioritization model for communication during a pandemic.

Most studies are general about the measures taken by women who do not vaccinate. The studies that have slightly highlighted also generalize as homeopathic measures. This study showed that there are alternative measures, including masking, herbal remedies, and spiritual coping. Therefore, when women refuse vaccination, they often adopt alternative behaviours influenced by marital and cultural contexts, rather than remaining inactive.

In conclusion, the study has developed an integrated socio-ecological trust and communication framework that explains vaccine uptake among pregnant women in urban settings in Kenya. The study demonstrated nurses as the most trusted person in this pathway, spouses having significant influence and has disaggregated media influence hierarchically which all combined have shaped maternal decision-making decision towards vaccine uptake. The study therefore combined structural policies, communication strategies, gender dynamics, cultural belief systems, behaviour theories, and, most importantly, trust theories.

6.4 RECOMMENDATIONS OF THE STUDY

- 1) The study identified challenges related to access to vaccination centres and information about vaccine availability, particularly among unvaccinated women. Policy efforts should focus on improving vaccine accessibility, especially in under-served or rural areas. This could include mobile vaccination units, extended vaccination hours, and outreach programs that bring vaccination services directly to pregnant women. Additionally,

ensuring that healthcare workers are well-informed and available to discuss vaccine concerns could increase trust and reduce vaccine hesitancy.

- 2) In future pandemics, nurses should be at the frontline in vaccination campaigns for pregnant women. In the study nurses played a key role in ensuring pregnant women got vaccinated. This was clear from the FGD and KII as well as from the pregnant women's questionnaire. All variables analysed, nurses had the highest odds ratio of 3.148 which supports this recommendation that when pregnant women are influenced by nurses, they are more likely to get vaccinated.
- 3) Based on the findings, there is a need to improve the clarity, accessibility, and reach of information about COVID-19 vaccination for pregnant women. Policymakers should prioritise developing communication materials that are easy to understand, culturally sensitive, and available in multiple languages. Training healthcare workers to deliver consistent and empathetic messaging during antenatal care visits is essential to build trust and address concerns. Government should also be keen in choosing which outlet to use to disseminate information during a pandemic as most pregnant women were influenced by both TV and radio program positively and were influenced negatively by social media. Government should partner with TV and radio stations to effectively communicate information regarding vaccination to the mass populations and avoid social media as a main source of information dissemination.
- 4) This study identified misconceptions such as beliefs that COVID -19 vaccine could cause sterilisation and negatively affect fertility. Therefore ,community-based campaigns targeting misconceptions and misinformation about COVID-19 vaccination should be implemented. These campaigns should leverage local leaders, influencers, and media platforms to ensure accurate information reaches underserved populations. Community leaders and vaccinated individuals should give their testimonies to help mitigate negative impacts from these social factors . religious leaders who were also a big influence on vaccine decisions should be used in enhancing vaccination campaigns since they act as significant

social structures for the communities. This recommendation is important because awareness gaps significantly affected vaccination rates, as identified in the findings.

- 5) Given the significant role of socioeconomic factors like income and family structure in vaccine uptake, future policies should aim to address the financial and social challenges pregnant women face in accessing healthcare. For instance, providing conditional cash transfers or social support like transport to access health centres or better yet to set up vaccination drives in areas with low income for pregnant women who choose to get vaccinated could be an effective way to increase vaccine uptake in lower-income communities. This approach would not only incentivise vaccination but also alleviate the financial burdens that may deter women from seeking healthcare services. Government should also include spouses of pregnant women in the vaccination campaigns as they have been proven to have negative influence towards vaccination decisions.
- 6) Since social stigma was found to play a significant role in vaccine hesitancy, community engagement strategies are essential. The creation of safe spaces for discussion, led by community leaders and healthcare providers, could help reduce stigma. These platforms would allow women to share their concerns and receive accurate information about the vaccine in a non-judgmental environment. Reducing social stigma is critical for improving vaccine uptake, as women who fear social repercussions are less likely to be vaccinated. Encouraging open dialogue and peer support could alleviate these concerns. The widespread use of traditional remedies underscores the need for education on the effectiveness of scientifically supported health interventions. Policies should focus on integrating education about the risks and benefits of alternative remedies into public health campaigns. This will enable pregnant women to make informed choices about their health. Healthcare providers should be equipped with the knowledge and tools to discuss the risks associated with unproven.

- 7) Healthcare institutions and personnel should be more proactive in building trust with pregnant women. This could involve having healthcare promoters, particularly those who have been vaccinated, share their experiences and educate patients about vaccine safety. The government should work on fostering trust in health care initiatives. Incorporating these trust-building strategies into routine prenatal care would help normalise vaccine uptake and create a supportive environment where pregnant women feel confident in making informed decisions.

6.5 SUGGESTIONS FOR FURTHER RESEARCH

- 1) Future studies should explore the role of logistical and systemic factors, such as vaccine supply chains and healthcare worker communication, to provide a holistic understanding of vaccine uptake among pregnant women.
- 2) There is a need to conduct a study on the role of digital platforms in disseminating accurate vaccine information during public health emergencies.
- 3) There is a need for a study on geographical and ethnic variability in vaccine uptake among women in Kenya.
- 4) An in-depth study is recommended to establish the role of religious beliefs in shaping public health decisions.

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APPENDICES

APPENDIX A:GLOSSARY OF TERMS USED

Alternative traditional strategies: A combination of masks, cleaning hands with soap or detergents, and keeping physical distance to protect oneself from COVID-19 infection. Alternative traditional strategies are those methods and practices, including essential oils and herbal therapies, among others, that pregnant women consider effective for preventing them from passing the COVID-19 infection from one person to another in a population.

Binary logistic regression:- A fundamental machine learning and statistical algorithm employed to predict the probability of a binary outcome (0 or 1, true or false) based on one or more predictor variables (i.e., having education or no education as predictors of the COVID-19 vaccine uptake dichotomised as 'yes' or 'no'). The probability of the prediction stays between 0 and 1.

Chi-square test:- A non-parametric statistical analysis used to establish if there is a significant association between two categorical variables (test of independence) or to find out if observed frequencies fit an expected distribution. Chi-square test of independence determines if there is a significant relationship between two categorical variables by comparing observed frequencies in a 2 by 2 contingency table to expected frequencies

COVID-19 Coronavirus disease of 2019: A contagious illness affecting the respiratory tract and brought on by the SARS-CoV-2 virus. It is a virus whose symptoms include an elevated temperature, coughing, shortness of breath, discomfort in the muscles and joints, headaches, and weariness associated with respiratory problems.

COVID-19 vaccine: A biological preparation that induces active acquired immunity to the SARS-CoV-2 virus, causing COVID-19. The injection is given to the population as a way of training the immune system to produce antibodies when exposed to the coronavirus.

Cultural practices and beliefs: The norms and values that influence the likelihood of choosing to be vaccinated against the virus. Aspects like cultural

beliefs affect patients' vaccination decision-making, so the healthcare provider must have the capacity to accept different cultural needs and beliefs.

Guidance on National Policy:-Refers to a published document of official directives or frameworks provided by a government to inform and direct actions, behaviours, or decisions within a specific sector. These guidelines aim to standardise practices while ensuring public safety and welfare. This study examines the national policy guidance pertaining to the Kenyan government's official directives and frameworks regarding vaccination with the COVID-19 vaccine for pregnant women.

Level of confidence: The degree of trust or assurance people have in a specific information source, intervention, or procedure. In this study, the level of confidence specifically relates to pregnant women in Nairobi City County and their trust in the information provided about the COVID-19 vaccine. This includes their faith concerning the overall efficacy and safety of the vaccination itself, as well as the reliability of the sources, including medical professionals, official statements, and media campaigns.

Multiple logistic regression analysis: A statistical technique that models the relationship between two or more continuous independent variables and a single dichotomous (binary) outcome variable (e.g., vaccine uptake coded as yes or no). It measures the relative contribution of each variable in the regression model.

Null hypothesis:- A fundamental statistical assumption that proposes no relationship or effect exists between independent variables (determinants) and dependent variable (outcome, i.e., COVID-19 vaccine uptake)

Pearson Correlation Analysis: Measures the strength and direction of the linear relationship between two continuous variables. The coefficient value ranges from -1 to 1, where 1 is a perfect positive, -1 indicates no linear relationship, 0.5 shows that the relationship is within the boundary and 0 shows no linear relationship. The analysis assumes linearity, normal distribution with no outliers.

Pharmacokinetics: a branch of pharmacology that is studied to establish the effects it can cause to a living organism.

Pregnant women: Individuals who carry one or more foetuses or embryos in their uterus. Pregnant women are those residing in Nairobi City County who were in any stage of pregnancy during the study period.

Socioeconomic Determinant:- This term pertains to the social and economic factors that affect individual behaviours, attitudes, and access to resources and services. Factors may encompass income, education level, employment status, housing conditions, and social class.

Teratogenic effects refer to either drugs or chemicals that have the potential to create or cause abnormalities in a foetus as it develops and grows inside a mother's womb. They cause babies to be born with birth defects.

T-Test-A parametric statistical method used to establish if there is a significant difference between the means of two groups (can be independent or paired) or between one group and a known value. A higher mean difference value indicates a more significant difference.

Vaccine hesitancy: Refers to when a vaccine is delayed or refused notwithstanding the existence of vaccination services. It comprises elements like dissatisfaction, ease, and certainty.

APPENDIX B: GANTT CHART

Duration Activity	1-2 months	3-4 mont h	1 month	1-3 mont hs	2 month s	2-3 month s	1 mont h
Topic finalization							
Literature review							
Instrument development							
Ehica; approval provsess							
Piloting							
Training of enumerators							
Data collection							
Data cleaning and coding							
Daya analysis							
Report writing							
Review by supervisor							
Review and editing							
Final submission							

APPENDIX C: LETTERS OF INTRODUCTION

Appendix C.1: Participant Information Sheet-Pregnant Women

Date: 19/02/2024

Title: COVID-19 VACCINE UPTAKE AMONG PREGNANT WOMEN IN NAIROBI COUNTY, KENYA

Dear Prospective Participant,

My name is Lilian Mabonga, and I am conducting research under the supervision of Dr. Victor Madziakapita, Professor in the Department of Development Studies at the University of South Africa (UNISA), as part of my Doctor of Philosophy in Development Studies at UNISA. You are invited to participate in a study titled "COVID-19 Vaccine Uptake among Pregnant Women in Nairobi County, Kenya."

WHAT IS THE PURPOSE OF THE STUDY?

This research aims to investigate how socioeconomic variables, national vaccination guidelines, trust, and cultural customs could affect pregnant women's uptake of the COVID-19 vaccine in Nairobi County, Kenya. Additionally, we aim to identify conventional options used by unvaccinated expectant mothers and assess the Ministry of Health's methods for informing expectant mothers about policy modifications related to vaccination.

WHY AM I BEING INVITED TO PARTICIPATE?

You are being invited as a pregnant woman to provide insights as to why or why not you participated in taking or not taking the COVID-19 vaccine uptake. The results will help us understand the vaccine uptake and what informed these decisions.

WHAT IS THE NATURE OF MY PARTICIPATION IN THIS STUDY?

Your participation will involve participating in a phone interview to answer a set of open and closed ended questions in the questionnaire. The phone interview

is expected to take 30-45 minutes. The questionnaires will contain both close-ended and open-ended items seeking to collect data on socioeconomic factors, personal perception on culture and how these factors impacted on their willingness to get the COVID-19 vaccine.

CAN I WITHDRAW FROM THIS STUDY?

Participation is voluntary, and you may withdraw at any time without providing a reason. However, once you consent and sign the agreement form, withdrawal will not be permitted to maintain the integrity of the study framework.

WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THIS STUDY?

While there are no monetary benefits, your participation will contribute to improving future vaccine programs among pregnant women by providing insights into factors influencing vaccination uptake.

ARE THERE ANY NEGATIVE CONSEQUENCES FOR ME IF I PARTICIPATE IN THE RESEARCH PROJECT?

Participation poses minimal to no risks, and care will be taken to prevent any discomfort or harm during the interview process.

WILL THE INFORMATION THAT I CONVEY TO THE RESEARCHER AND MY IDENTITY BE KEPT CONFIDENTIAL?

Your identity will remain anonymous, and confidentiality will be maintained throughout the study. Your responses will be coded or anonymized, and only authorized persons will have access to your data.

HOW WILL THE RESEARCHER(S) PROTECT THE SECURITY OF DATA?

Data will be securely stored for five years, and access will be restricted to authorised persons. Any future use of the data will require additional ethical review.

WILL I RECEIVE PAYMENT OR ANY INCENTIVES FOR PARTICIPATING IN THIS STUDY?

No monetary payments or rewards will be provided. However, any costs incurred will be explained and justified according to fair procedure principles.

HAS THE STUDY RECEIVED ETHICS APPROVAL?

This study has received written approval from the Research Ethics Review Committee of UNISA. A copy of the approval letter can be obtained from the researcher if you so wish.

HOW WILL I BE INFORMED OF THE FINDINGS/RESULTS OF THE RESEARCH?

Name: **Dr. Victor Madziakapita**

Telephone No: +254 732 700 707

Email address: vmadziakapita@water.cc

Website: www.unisa.ac.za

The findings will be available in form of a published report from the University e-library. Should you require any further information or want to contact the researcher about any aspect of this study, please contact the researcher's contact details here:

Email: 69969655@mylife.unisa.ac.za

Internal phone number: +254720401046

Should you have concerns about the way in which the research has been conducted, you may contact: my supervisor under below contact details:

Name: **Dr. Victor Madziakapita**

Telephone No: +254 732 700 707

Email address: vmadziakapita@water.cc

Website: www.unisa.ac.za

Alternatively, contact the research ethics chairperson of the College of Human Sciences Research Ethic Committee, Prof Khatija Khan at:

Email address: khankb@unisa.ac.za

Tel number: 0124296549

Thank you for taking time to read this information sheet and for participating in this study.

Thankyou.

A handwritten signature in blue ink, appearing to be 'Lilian Mabonga', written in a cursive style.

Lilian Mabonga

Appendix C.2: Participant Information Sheet-Nurses

Date: 19/02/2024

Title: COVID-19 VACCINE UPTAKE AMONG PREGNANT WOMEN IN NAIROBI COUNTY, KENYA

Dear Prospective Participant,

I am Lilian Mabonga, conducting research under the supervision of Dr. Victor Madziakapita, Professor in the Department of Development Studies at the University of South Africa (UNISA), as part of my Doctor of Philosophy in Development Studies at UNISA. You are invited to participate in a study titled "COVID-19 Vaccine Uptake Among Pregnant Women in Nairobi County, Kenya."

WHAT IS THE PURPOSE OF THE STUDY?

This research aims to investigate how socioeconomic variables, national vaccination guidelines, trust, and cultural customs affect pregnant women's uptake of the COVID-19 vaccine in Nairobi County, Kenya. Additionally, we aim to identify conventional options used by unvaccinated expectant mothers and assess the Ministry of Health's methods for informing expectant mothers about policy modifications related to vaccination.

WHY AM I BEING INVITED TO PARTICIPATE?

You have been selected because your insights as a nurse can provide valuable information regarding the uptake of COVID-19 vaccines among pregnant women in Nairobi County, Kenya. The study involves 377 vaccinated pregnant women from 167 level 5 government health facilities and an equal number of unvaccinated pregnant women selected from MOH ANC booklets for comparison. You are also invited to provide expert opinion to some of the response provided by the pregnant women in the study as a means to triangulate the information for clarity.

WHAT IS THE NATURE OF MY PARTICIPATION IN THIS STUDY?

Your participation will involve engaging in Focused Group Discussions (FGDs). The FGDs will consist of 11 open-ended items discussing COVID-19 vaccine uptake among pregnant women, providing an opportunity for in-depth discussions facilitated by the researcher. These discussions will take place over two days in the second week of the study.

CAN I WITHDRAW FROM THIS STUDY?

Participation is voluntary, and you may withdraw at any time without providing a reason. However, once you consent and sign the agreement form, withdrawal will not be permitted, as it may affect the study's integrity. Additionally, withdrawal after questionnaire submission will not be possible due to the use of non-identifiable materials.

WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THIS STUDY?

While there are no monetary benefits, your participation will contribute to long-term solutions for future vaccine programs among pregnant women, addressing concerns by identifying factors influencing vaccination uptake.

ARE THERE ANY NEGATIVE CONSEQUENCES FOR ME IF I PARTICIPATE IN THE RESEARCH PROJECT?

Participation poses minimal to no risks, and care will be taken to prevent any discomfort or harm during data collection.

WILL MY INFORMATION AND IDENTITY BE KEPT CONFIDENTIAL?

Your identity will remain anonymous, and only the research team will have access to your data. Your answers will be coded or anonymised, and confidentiality will be maintained throughout the study.

HOW WILL THE RESEARCHER(S) PROTECT THE SECURITY OF DATA?

Data will be securely stored for five years, and electronic information will be password-protected. Any future use of the data will require additional ethical review.

WILL I RECEIVE PAYMENT OR ANY INCENTIVES FOR PARTICIPATING IN THIS STUDY?

No monetary payments or rewards will be provided. Any costs incurred will be justified according to fair procedure principles.

HAS THE STUDY RECEIVED ETHICS APPROVAL?

This study has received approval from the Research Ethics Review Committee of UNISA.

HOW WILL I BE INFORMED OF THE FINDINGS/RESULTS OF THE RESEARCH?

Name: **Dr. Victor Madziakapita**

Telephone No: +254 732 700 707

Email address: vmadziakapita@water.cc

Website: www.unisa.ac.za

The findings will be available in form of a published report from the University e-library. Should you require any further information or want to contact the researcher about any aspect of this study, please contact the researcher's contact details here:

Email: 69969655@mylife.unisa.ac.za

Internal phone number: +254720401046

Should you have concerns about the way in which the research has been conducted, you may contact: my supervisor under below contact details:

Name: **Dr. Victor Madziakapita**

Telephone No: +254 732 700 707

Email address: vmadziakapita@water.cc

Website: www.unisa.ac.za

Alternatively, contact the research ethics chairperson of the College of Human Sciences Research Ethic Committee, Prof Khatija Khan at:

Email address: khankb@unisa.ac.za

Tel number: 012 429 6549

Thank you for taking time to read this information sheet and for participating in this study.

Thankyou.

A handwritten signature in blue ink, appearing to be 'Lilian Mabonga', written in a cursive style.

Lilian Mabonga

Appendix C.3: Participant Information Sheet-Doctors

Date: 19/02/2024

Title: COVID-19 VACCINE UPTAKE AMONG PREGNANT WOMEN IN NAIROBI COUNTY, KENYA

Dear Prospective Participant,

I am Lilian Mabonga, conducting research under the supervision of Dr. Victor Madziakapita, Professor in the Department of Development Studies at the University of South Africa (UNISA), as part of my Doctor of Philosophy in Development Studies at UNISA. You are invited to participate in a study titled "COVID-19 Vaccine Uptake Among Pregnant Women in Nairobi County, Kenya."

WHAT IS THE PURPOSE OF THE STUDY?

This research aims to investigate how socioeconomic variables, national vaccination guidelines, trust, and cultural customs affect pregnant women's uptake of the COVID-19 vaccine in Nairobi County, Kenya. Additionally, we aim to identify conventional options used by unvaccinated expectant mothers and assess the Ministry of Health's methods for informing expectant mothers about policy modifications related to vaccination.

WHY AM I BEING INVITED TO PARTICIPATE?

You have been selected because your insights as a doctor can provide valuable information regarding the uptake of COVID-19 vaccines among pregnant women in Nairobi County, Kenya. The study involves 377 vaccinated pregnant women from 167 level 5 government health facilities and an equal number of unvaccinated pregnant women selected from MOH ANC booklets for comparison. You are also invited to provide expert opinion to some of the response provided by the pregnant women in the study as a means to triangulate the information for clarity.

WHAT IS THE NATURE OF MY PARTICIPATION IN THIS STUDY?

Your participation will involve engaging in Key Informant Interview (KII). The KII will consist of 13 open-ended items discussing COVID-19 vaccine uptake among pregnant women, providing an opportunity for in-depth discussions facilitated by the researcher. These discussions will take place in the second week of the study.

CAN I WITHDRAW FROM THIS STUDY?

Participation is voluntary, and you may withdraw at any time without providing a reason. However, once you consent and sign the agreement form, withdrawal will not be permitted, as it may affect the study's integrity. Additionally, withdrawal after questionnaire submission will not be possible due to the use of non-identifiable materials.

WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THIS STUDY?

While there are no monetary benefits, your participation will contribute to long-term solutions for future vaccine programs among pregnant women, addressing concerns by identifying factors influencing vaccination uptake.

ARE THERE ANY NEGATIVE CONSEQUENCES FOR ME IF I PARTICIPATE IN THE RESEARCH PROJECT?

Participation poses minimal to no risks, and care will be taken to prevent any discomfort or harm during data collection.

WILL MY INFORMATION AND IDENTITY BE KEPT CONFIDENTIAL?

Your identity will remain anonymous, and only the research team will have access to your data. Your answers will be coded or anonymised, and confidentiality will be maintained throughout the study.

HOW WILL THE RESEARCHER(S) PROTECT THE SECURITY OF DATA?

Data will be securely stored for five years, and electronic information will be password-protected. Any future use of the data will require additional ethical review.

WILL I RECEIVE PAYMENT OR ANY INCENTIVES FOR PARTICIPATING IN THIS STUDY?

No monetary payments or rewards will be provided. Any costs incurred will be justified according to fair procedure principles.

HAS THE STUDY RECEIVED ETHICS APPROVAL?

This study has received approval from the Research Ethics Review Committee of UNISA.

HOW WILL I BE INFORMED OF THE FINDINGS/RESULTS OF THE RESEARCH?

Name: **Dr. Victor Madziakapita**

Telephone No: +254 732 700 707

Email address: vmadziakapita@water.cc

Website: www.unisa.ac.za

The findings will be available in form of a published report from the University e-library. Should you require any further information or want to contact the researcher about any aspect of this study, please contact the researcher's contact details here:

Email: 69969655@mylife.unisa.ac.za

Internal phone number: +254720401046

Should you have concerns about the way in which the research has been conducted, you may contact: my supervisor under below contact details:

Name: **Dr. Victor Madziakapita**

Telephone No: +254 732 700 707

Email address: vmadziakapita@water.cc

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Alternatively, contact the research ethics chairperson of the College of Human Sciences Research Ethic Committee, Prof Khatija Khan at:

Email address: khankb@unisa.ac.za

Tel number: 0124296549)

Thank you for taking time to read this information sheet and for participating in this study.

Thankyou.

A handwritten signature in blue ink, appearing to be 'Lilian Mabonga', written in a cursive style.

Lilian Mabonga

APPENDIX D: CONSENT FORMS

Appendix D.1: Consent to Participate in This Study (Pregnant Women)

I _____ grant consent that the information I provide in the questionnaire may be used by LILIAN MABONGA and other co-researchers for research purposes. I understand that my responses will be collected anonymously and will be kept confidential. I undertake not to share my responses with any unauthorized person in order to maintain confidentiality.

Participant Name (Please print): _____
Participant _____ Signature: _____

Researcher's _____ Name: _____ (Please _____ print): _____

Researcher's _____ Signature: _____

Date: _____

If you are an adult who gives permission, you consent then delete assent
If you are a learner who gives permission, you assent and then delete consent

Appendix D.2: Consent to Participate in This Study (Nurses)

I _____ grant
consent/assent that the information I share during the focus group may be used
by LILIAN MABONGA and other co-researchers for research purposes. I am
aware that the group discussions will be digitally recorded and grant
consent/assent for these recordings, provided that my privacy will be protected.
I undertake not to divulge any information that is shared in the group
discussions to any person outside the group in order to maintain confidentiality.

Participant Name (Please print): _____
Participant _____ Signature: _____

Researcher's _____ Name: _____ (Please _____ print): _____

Researcher's _____ Signature: _____

Date: _____

If you are an adult who gives permission, you consent then delete assent
If you are a learner who gives permission, you assent and then delete consent

Appendix D.3: Consent to Participate in This Study (Doctors)

I _____ grant consent that the information I provide during the Key Informant Interview may be used by LILIAN MABONGA and other co-researchers for research purposes. I am aware that the interview will be digitally recorded and grant consent for this recording, provided that my privacy will be protected. I undertake not to disclose any information shared during the interview to any person outside the research team in order to maintain confidentiality.

Participant 'Name (Please print): _____
Participant _____ Signature: _____

Researcher's _____ Name: _____ (Please _____ print): _____

Researcher's _____ Signature: _____

Date: _____

If you are an adult who gives permission, you consent then delete assent.
If you are a learner who gives permission, you assent and then delete consent.

Appendix D.4: Confidentiality Agreement Contract with Medical Social Worker

I, Brenda Imali, (medical social worker) with Nairobi County government commit to offer psychosocial support to the interviewees in the study undertaken by Lilian Mabonga dubbed 'COVID-19 Vaccine Uptake among Pregnant Women in Nairobi County. I undertake not to disclose any information shared during the interview to any person in order to maintain confidentiality with the interviewees of this study.

Researcher's Name: (Please print): BRENDA IMALI

Title: MEDICAL SOCIAL WORKER-NAIROBI COUNTY

Social Workers name: BRENDA IMALI KEYA

Social Workers Signature: 

Researcher's Name: LILIAN NEKESA MABONGA

Researcher's Signature: 

Date: 20th April, 2024.

APPENDIX E: QUESTIONNAIRE (PREGNANT WOMEN)

Dear Valued Respondent,

I am carrying out research on the uptake of COVID-19 vaccines among program women in Nairobi County. This is in fulfilment of the requirement of requirement for the award of the degree of Doctor of Philosophy in Development Studies at the University of South Africa.

Below is a questionnaire which you will be taken through by the interviewer via phone. Please answer to the best of your knowledge. There are no wrong responses for any of these statements. All information given in the questionnaire will be treated with strict confidentiality and used for the purpose of this research only.

Thank you for taking your time to fill in the questionnaire.

Thank you in advance,

Yours sincerely,



Lilian Mabonga

GENERAL INFORMATION

The primary goal of this research is to investigate the factors influencing the uptake of the COVID-19 vaccine among pregnant women in Nairobi City County between October 2021 and September 2022. The study aims to understand the impact of socioeconomic variables, national vaccination guidelines, trust, and cultural customs on pregnant women's decision-making process regarding COVID-19 vaccination. Additionally, the study seeks to explore conventional options used by unvaccinated expectant mothers and the methods employed by the Ministry of Health to inform expectant mothers about policy changes. Your honest responses to the questions in this questionnaire are crucial for our research.

Instruction: The following questions refer to the period beginning September 2021 to October 2022.

SECTION A: PERSONAL AND DEMOGRAPHIC DATA

1. What was your Sub County from September 2021 to October 2022?

Makadara ☐ Ruaraka ☐ Dagoretti South ☐

Embakasi West ☐ Embakasi North ☐ Starehe ☐

Embakasi Central ☐ Mathare ☐ Roy Sambu ☐

2. Indicate your age during the period indicated under the instruction:

18-23 years [☐]

24-29 years [☐]

30-35 years [☐]

36-40 years [☐]

41 years and above [☐]

3. Level of education

a) Primary School ☐ Mid-Level College/Technical School/Polytechnic ☐

b) High School ☐ University ☐

4. What was your marital status?

a) Single [☐]

b) Married [☐]

c) Divorced [☐]

d) Widowed [☐]

e) Separated [☐]

f) Other (please specify)

5. What was your religion?

a) Christian [☐]

b) Hindu [☐]

c) Islam [☐]

d) Other [☐]

6. How many children did you have before this pregnancy?

0 [☐]

1 [☐]

2 [☐]

3 [☐]

4 [☐]

5 and above.

Indicate _____

7. Had any of your children been vaccinated before this time?

Yes [☐] No [☐]

8. If your children were vaccinated, what influenced you to get them vaccinated?

a) Government

b) Spouse

c) Family

d) Friends

e) Other, please

specify _____

1. What was your employment status at that time:

- a) Employed []
- b) Unemployed []
- c) Student []
- d) Homemaker []
- e) Other

(Specify) _____

10. What was the main source of your income during the period of vaccination?

Formal Employment []

Owned a Business []

Other (Specify) _____

11. What was the monthly Household Income at that time?

Less than Ksh 10,000 []

Ksh 10,000 - Ksh 30,000 []

Ksh 30,001 - Ksh 50,000 []

More than Ksh 50,000 []

12. How would you describe your family structure at that time?

- a) Nuclear family (parents and children) []
- b) Extended family (includes relatives beyond parents and children) []
- c) Blended family (combining two separate families through marriage) []
- d) Single-parent family []
- e) Other (please specify)

PREGNANT VACCINATED WOMEN

SECTION B: INFORMATION AND POLICY AWARENESS _

13. Who influenced you to get COVID-19 vaccine?

- a) Health workers []
- b) TV/Radio programs []
- c) Social Media []
- d) Magazines/Newspapers []
- e) Government []
- f) Family member []
- g) Other []

Specify _____

14. Did you have confidence in the above source you mentioned? If no skip to

28

Yes [] No []

15. Did you get enough information before you were vaccinated? If no skip to question 30

Yes ☐ No ☐

16. Who gave you that information?

- a. Nurse ☐
- b. Friend ☐
- c. Media ☐
- d. Doctor ☐
- e. Other ☐

17. Were you informed about any policy changes related to COVID-19 vaccines for pregnant women by the Ministry of Health?

a) Yes ☐

b) No ☐

If yes answer question 17 if not answer skip to question 28.

	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
19. How satisfied were you with the information provided by the Ministry of Health regarding COVID-19 vaccines for pregnant women?	①	②	③	④	⑤

SECTION C: SOCIO- ECONOMIC SITUATIONS OF THE RESPONDENT

20. Did your socioeconomic status (e.g., income, education) influence your decision to receive the COVID-19 vaccine while pregnant?

a) Yes ☐

b) No ☐

21. If yes which of the below factors influenced your decision to receive COVID-19 vaccine? Tick all that apply.

- a) Access to better healthcare coverage or private health insurance ☐
- b) The availability of childcare support or assistance ☐
- c) Better understanding of the benefits and risks of vaccination. ☐

- d) Access to more influential or informed social networks that encourage vaccination []
- e) Trust in Healthcare System []
- f) Education and Awareness []
- g) Mandates by the employer []

SECTION D: CULTURAL SITUATION OF THE RESPONDENT

22. What _____ is _____ your tribe?.....

23. Did your religion allow uptake of COVID-19 vaccine? If not skip to 32

- a) Yes []
- b) No []

Probe: What was your religion affiliation promoting at the time you were vaccinated? Some religious groups may have beliefs that discourage medical interventions, including vaccination.

SECTION E: LEVEL OF TRUST ON THE VACCINE AMONG PREGNANT WOMEN

24. Do you have trust in the COVID-19 vaccine?

- a) Yes []
- b) No []

If yes, proceed to question 24, if no proceed to question 36

Question 25	Very Little Trust	Little Trust	Neutral	Trust	Strong Trust
How much trust did you have in the effectiveness of the COVID-19 vaccine during pregnancy?	①	②	③	④	⑤

26. What factors contributed to your level of trust in the COVID-19 vaccine's effectiveness? Tick all that apply.

- a. General Trust in Vaccine Effectiveness []
- b. Information Source Trust (social media, family, healthcare provider) []
- c. Personal Experience and Observation []
- d. Influence of Recommendations (from healthcare providers, family, healthcare provider, community, culture) []

- e. Comparison with Other Preventive Measures []

PREGNANT UNVACCINATED WOMEN
SECTION B: INFORMATION AND POLICY AWARENESS

27. What/who influenced your decision not to get COVID-19 vaccine?

- a) Health workers []
b) TV/Radio programs []
c) Social Media []
d) Magazines/Newspapers []
e) Government []
f) Family member []
g) Other []
Specify _____

28. Did you have confidence in the above source you mentioned?

- a) Yes [] No []

29. If no which of the following reasons may have influenced you?

- a) Lack of clear communication by healthcare providers and limited access to healthcare services. []
b) Social Media and Misinformation, the spread of misinformation or rumors on social platforms []
c) Negative Healthcare Experiences from previous negative healthcare experiences []
d) Distrust of government agencies and perceived government interference in healthcare decisions. []
e) Family members' own biases or beliefs influencing advice []

Other [] Specify _____

30. Did you get enough information before you were vaccinated?

- Yes [] No []

31. Who gave you that information?

- a. Nurse []
b. Friend []
c. Media []
d. Doctor []

e. Other ☐

32. Were you informed about any policy changes related to COVID-19 vaccines for pregnant women by the Ministry of Health?

c) Yes ☐

d) No ☐

Question 33	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
How dissatisfied were you with the information provided by the Ministry of Health regarding COVID-19 vaccines for pregnant women?	①	②	③	④	⑤

SECTION C: SOCIO- ECONOMIC SITUATIONS OF THE RESPONDENT

34. Did your socioeconomic status (e.g., income, education) influence your decision to receive the COVID-19 vaccine while pregnant?

a) Yes ☐

b) No ☐

35. If yes which of the below factors influenced your decision not to receive COVID-19 vaccine? Tick all that apply.

- a) Access to better healthcare coverage or private health insurance ☐
- b) The availability of childcare support or assistance ☐
- c) Better understanding of the benefits and risks of vaccination.
- d) Access to more influential or informed social networks that encourage vaccination ☐
- e) Trust in Healthcare System ☐
- f) Education and Awareness ☐
- g) Mandates by the employer ☐

SECTION D: CULTURAL SITUATION OF THE RESPONDENT

36. What _____ is _____ your tribe?.....

37. Did your religion allow uptake of COVID-19 vaccine?

- a) Yes []
- b) No []

38. What cultural beliefs or taboos influenced you not to get vaccinated?

- a) Fear of Sterilisation []
- b) Misinformation []
- c) Social Stigma []
- d) Lack of Female Autonomy []
- e) Traditional Healers []

Probe: In some cultures, traditional healers or herbal remedies are preferred over Western medicine. People might seek alternatives to vaccines from traditional healers.

- f) Other []
Specify _____

39. Did your religion limit the uptake of COVID-19 vaccine?

- g) Yes []
- h) No []

Probe: What was your religion affiliation promoting at the time you were vaccinated? Some religious groups may have beliefs that discourage medical interventions, including vaccination.

SECTION E: CUSTOMARY DIFFERENT TECHNIQUES USED BY UNVACCINATED PREGNANT WOMEN.

40. If you did not get vaccinated, what alternative methods did you use to combat COVID-19? (Select all that apply)

- a. Wearing masks []
- b. Social distancing []
- c. Herbal remedies []
- d. Homeopathic treatments []
- e. Vitamin supplements []
- f. Other _____ methods (Specify)

41. Why did you not receive the COVID-19 vaccine (select all that apply)

- a) Concerns about vaccine safety during pregnancy []
- b) Lack of information about vaccine availability []
- c) Difficulty accessing vaccination centres []

- d) Fear of side effects []
- e) Cultural or religious belief []
- f) Other (specify) _____

42. Did any of the below cultural factors influence you not to take the vaccine?
(Tick all that applied)

- a) Fear of Adverse Reactions []
- b) Influence from spouse as head of the house []
- c) Stigma and Discrimination []
- d) Community Pressure and Norms
- e) Cultural Conspiracy Theories (Rituals and Beliefs) []
- g) Other (specify) _____

SECTION F: LEVEL OF TRUST ON THE VACCINE AMONG PREGNANT UNVACCINATED WOMEN

43. Did you have trust in the COVID-19 vaccine?

- c) Yes []
- d) No []

If no proceed to question 41

Question 44	Very Little Trust	Little Trust	Neutral	Trust	Strong Trust
On a scale of 1 to 5, where 1 indicates 'Very Little Trust' and 5 indicates 'Strong Trust,' please rate your trust in the effectiveness of the COVID-19 vaccine during pregnancy."	①	②	③	④	⑤

45. What factors contributed to your level of distrust in the COVID-19 vaccine's effectiveness? Tick all that apply.

- a. General mistrust in Vaccine Effectiveness []

- b. Information Source mistrust (social media, family, healthcare provider) []
- c. Personal Experience and Observation []
- d. Influence of Recommendations (from healthcare providers, family, healthcare provider, community, culture) []
- e. Comparison with Other Preventive Measures []
- Probe: Were you influenced by your spouse, social media, family or friends about the vaccination?

APPENDIX F: INTERVIEW FOR KEY INFORMANT (DOCTORS)

The following questions will be used by an assessor during meetings with various group leaders to solicit information for purposes of conducting a Key Informant Interview.

LILIAN MABONGA

UNIVERSITY OF SOUTH AFRICA

P.O. BOX 392

0003

SOUTH AFRICA

Dear Valued Respondent,

I am carrying out research on the Uptake of COVID-19 Vaccine among pregnant women in Nairobi County. This is in fulfilment of the requirement of requirement for the award of the degree of Doctor of Philosophy in Development Studies at the University of South Africa.

Below is the Key Informant Interview. I will take you through the tool, please answer all the questions as per your knowledge and experience. There are no wrong responses for any of these statements. All information given in the KII will be treated with strict confidentiality and used for the purpose of this research only.

Thank you for taking your time to participate in the Key Informant Interview.

Thank you in advance,

Yours sincerely,

Lilian Mabonga

NOTE: The following questions refer to the period beginning September 2021 to October 2022.

- 1) How confident were expectant mothers in the safety of the COVID-19 vaccine for themselves and their unborn child during that period?
- 2) What were the major sources of information that pregnant women in Nairobi relied on when making decisions about COVID-19 vaccination?
- 3) Can you identify any specific cultural practices or beliefs that influenced pregnant women's decisions regarding COVID-19 vaccination?
- 4) What role did healthcare providers play in educating pregnant women about the benefits and risks of COVID-19 vaccination?
- 5) Were there any misconceptions or myths circulating among pregnant women in Nairobi that might have impacted their willingness to get vaccinated?
- 6) What role did social media and online information play in shaping pregnant women's perceptions of COVID-19 vaccination?
- 7) Were there any specific religious beliefs that influenced pregnant women's decisions regarding COVID-19 vaccination?
- 8) Do you believe family members and spouses had an influence on pregnant women's COVID-19 vaccine decision?
- 9) How did family members and partners influence pregnant women's choices about getting vaccinated against COVID-19?
- 10) What strategies or initiatives were implemented to address the concerns of pregnant women who were hesitant to receive the COVID-19 vaccine?
- 11) What were the most common reasons pregnant women gave for not wanting to receive the COVID-19 vaccine?
- 12) Were there any socioeconomic factors that seem to be associated with higher or lower rates of COVID-19 vaccine uptake among pregnant women?
- 13) Had there been any notable changes in pregnant women's attitudes towards COVID-19 vaccination over time?

APPENDIX G: FOCUSED GROUP DISCUSSION (NURSES)

The following questions will be used by an assessor during meetings with various group leaders to solicit information for purposes of conducting Focus Group Discussions.

LILIAN MABONGA

UNIVERSITY OF SOUTH AFRICA

P.O. BOX 392-003

SOUTH AFRICA

Dear Valued Respondent,

I am carrying research on the uptake of COVID-19 vaccine among program women in Nairobi County. This is in fulfilment of the requirement of requirement for the award of the degree of Doctor of Philosophy in Development Studies at the University of South Africa.

Below is the FGD guide where you will participate in the discussion with other nurses. Please answer all the questions as per your knowledge and experience. There are no wrong responses for any of these statements. All information given in the questionnaire will be treated with strict confidentiality and used for the purpose of this research only.

Thank you for taking your time to participate in the discussion.

Thank you in advance,

Yours sincerely,

Lilian Mabonga

The questions underlined here refer to the period beginning September 2021 to October 2022. Note that these are exemplary questions, but the final guide will be determined by the findings.

1. From your experience working closely with pregnant women, how well do you think Kenya's current national policy addressed the specific needs and concerns related to COVID-19 vaccination during pregnancy?
2. In your interactions with pregnant women, what were the primary reasons they expressed for choosing to receive the COVID-19 vaccine? Were there any common misconceptions or concerns that needed to be addressed?
3. How did you observe cultural beliefs, taboos, or practices influencing pregnant women's decisions regarding COVID-19 vaccination? Can you provide examples of how these factors contributed to the decision to take or not to take the vaccine at that time?
4. In your opinion, how did the social environment, including family support and community attitudes, impact pregnant women's willingness to get vaccinated against COVID-19 at that time?
5. From your experience, how did the economic status of pregnant women affect their access to and acceptance of COVID-19 vaccination? Were there any additional support measures that could have been implemented to improve access?
6. How did you perceive the relationship between a pregnant woman's level of education and her decision to receive the COVID-19 vaccine? Were there ways to better tailor information for different educational backgrounds at that time?
7. Can you describe the strategies or communication methods the Ministry of Health employed to inform pregnant women about policy changes related to COVID-19 vaccination? How effective do you think these strategies were?
8. In your interactions with pregnant women who were hesitant about receiving the COVID-19 vaccine, what alternative methods or practices did you observe them using to protect themselves from the virus?
9. Did you encounter instances where pregnant women's confidence in the COVID-19 vaccine was positively influenced by their interactions with healthcare providers, spouses, religion? If so, could you share some examples of effective communication strategies?
10. Can you identify any specific challenges that pregnant women faced when trying to access COVID-19 vaccines at government facilities? Were there potential solutions to address these challenges?
11. Based on your experience, what recommendations did you have for improving COVID-19 vaccine uptake among pregnant women in Nairobi City County?

APPENDIX H: ETHICAL CLEARANCE CERTIFICATE



COLLEGE OF HUMAN SCIENCES RESEARCH ETHICS REVIEW COMMITTEE

20 May 2024

Dear Ms Lilian Nekesa Mabonga

NHREC Registration # :

Rec-240816-052

CREC Reference # :

69969655_CRECHS_2024

Decision:

Ethics Approval from 29 May 2024 to 19 May 2025

Researcher(s): Name: Ms. L. N. Mabonga
Contact details: 69969655@mylife.unisa.ac.za
Supervisor(s): Name: Dr. Z. V. Madziakapita
Contact details: VMadziakapita@water.cc

Title: COVID-19 Vaccine Uptake Among Pregnant Women in Nairobi County, Kenya

Degree Purpose: PhD

Thank you for the application for research ethics clearance by the Unisa College of Human Science Ethics Committee. Ethics approval is granted for one year.

The *medium-risk application* was reviewed by College of Human Sciences Research Ethics Committee, in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.

The proposed research may now commence with the provisions that:

1. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the College Ethics Review Committee.
3. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.
4. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the



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confidentiality of the data, should be reported to the Committee in writing, accompanied by a progress report.

5. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.
6. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data require additional ethics clearance.
7. No fieldwork activities may continue after the expiry date (**19 May 2025**). Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

Note:

*The reference number **69969655_CREC_CHS_2024** should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.*

Yours sincerely,

Signature:



Prof. KB Khan
CHS Research Ethics Committee Chairperson
Email: khankb@unisa.ac.za
Tel: (012) 429 8210

Signature: PP



Prof ZZ Nkosi
Exécutive Dean: CHS
E-mail: nkosizz@unisa.ac.za
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APPENDIX I: RESEARCH PERMIT (MOH, NAIROBI CITY COUNTY)



NAIROBI CITY COUNTY
www.nairobi.go.ke

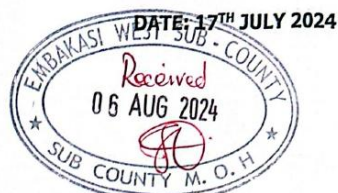
HEALTH, WELLNESS AND NUTRITION

Office of the County Chief Officer – Medical Services

REF: NCCG/HWN/REC/607

LILIAN NEKESA MABONGA
UNIVERSITY OF SOUTH AFRICA

Dear Ms. Lilian,



RE: RESEARCH AUTHORIZATION

This is to inform you that the Nairobi City County – County Health Research Ethics Committee (REC) reviewed the documents on the study titled "COVID-19 VACCINE UPTAKE AMONG PREGNANT WOMEN IN NAIROBI CITY COUNTY, KENYA".

I am pleased to inform you that you have been authorized to carry out the study in Nairobi County. The researcher will be required to adhere to the ethical code of conduct for health research in accordance with the Science Technology and Innovation Act, 2013 and the approval procedure and protocol for research for Nairobi.

On completion of the study, you will submit one hard copy and one copy in PDF of the research findings to the REC. In addition, you are required to disseminate the research findings to health sector in liaison with the county REC. By copy of this letter, all the Sub County Medical Officers of Health are to accord you the necessary assistance to carry out this research study.

Yours sincerely,

DR. IRENE MUCHOKI
CHIEF OFFICER MEDICAL SERVICES

Cc: Chief Officers – Public Health and Health Facilities
All Sub County Medical Officers of Health

LET'S MAKE **NAIROBI** WORK

TELEPHONE: +254 725 624 489; +254 738 041 292 | EMAIL: INFO@NAIROBI.GO.KE | CITY HALL, CITY HALL WAY, P.O. BOX 30075 00100, NAIROBI, KENYA

APPENDIX J: RESEARCH PERMIT (NACOSTI)

 REPUBLIC OF KENYA Ref No: 984514	 NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION Date of Issue: 14/May/2024
RESEARCH LICENSE	
	
This is to Certify that Ms.. LILIAN NEKESA MABONGA of University of South Africa, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: COVID-19 VACCINE UPTAKE AMONG PREGNANT WOMEN IN NAIROBI CITY COUNTY, KENYA for the period ending : 14/May/2025.	
License No: NACOSTI/P/24/35373	
984514 Applicant Identification Number	<i>Walter Mwangi</i> Director General NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Verification QR Code 	
NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.	
See overleaf for conditions	

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013 (Rev. 2014)
Legal Notice No. 108: The Science, Technology and Innovation (Research Licensing) Regulations, 2014

The National Commission for Science, Technology and Innovation, hereafter referred to as the Commission, was established under the Science, Technology and Innovation Act 2013 (Revised 2014) herein after referred to as the Act. The objective of the Commission shall be to regulate and assure quality in the science, technology and innovation sector and advise the Government in matters related thereto.

CONDITIONS OF THE RESEARCH LICENSE

1. The License is granted subject to provisions of the Constitution of Kenya, the Science, Technology and Innovation Act, and other relevant laws, policies and regulations. Accordingly, the licensee shall adhere to such procedures, standards, code of ethics and guidelines as may be prescribed by regulations made under the Act, or prescribed by provisions of International treaties of which Kenya is a signatory to
2. The research and its related activities as well as outcomes shall be beneficial to the country and shall not in any way:
 - i. Endanger national security
 - ii. Adversely affect the lives of Kenyans
 - iii. Be in contravention of Kenya's international obligations including Biological Weapons Convention (BWC), Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), Chemical, Biological, Radiological and Nuclear (CBRN).
 - iv. Result in exploitation of intellectual property rights of communities in Kenya
 - v. Adversely affect the environment
 - vi. Adversely affect the rights of communities
 - vii. Endanger public safety and national cohesion
 - viii. Plagiarize someone else's work
3. The License is valid for the proposed research, location and specified period.
4. The license any rights thereunder are non-transferable
5. The Commission reserves the right to cancel the research at any time during the research period if in the opinion of the Commission the research is not implemented in conformity with the provisions of the Act or any other written law.
6. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research.
7. Excavation, filming, movement, and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
8. The License does not give authority to transfer research materials.
9. The Commission may monitor and evaluate the licensed research project for the purpose of assessing and evaluating compliance with the conditions of the License.
10. The Licensee shall submit one hard copy, and upload a soft copy of their final report (thesis) onto a platform designated by the Commission within one year of completion of the research.
11. The Commission reserves the right to modify the conditions of the License including cancellation without prior notice.
12. Research, findings and information regarding research systems shall be stored or disseminated, utilized or applied in such a manner as may be prescribed by the Commission from time to time.
13. The Licensee shall disclose to the Commission, the relevant Institutional Scientific and Ethical Review Committee, and the relevant national agencies any inventions and discoveries that are of National strategic importance.
14. The Commission shall have powers to acquire from any person the right in, or to, any scientific innovation, invention or patent of strategic importance to the country.
15. Relevant Institutional Scientific and Ethical Review Committee shall monitor and evaluate the research periodically, and make a report of its findings to the Commission for necessary action.

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