UNIVERSITY OF WITWATERSRAND, JOHANNESBURG FACULTY OF HEALTH SCIENCES SCHOOL OF PATHOLOGY

Understanding SARS-CoV-2 vaccine hesitancy among pregnant women in Soweto, South Africa: A qualitative study

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Declaration

I Zwile Zungu declare that this Research Report is my own, unaided work. It is being submitted for the Degree of MSc (Med) in vaccinology at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

(Signature of candidate)_____  _ _____ _____

_____05_____day of__June_____2024_____in_Cape Town, South Africa_____

Dedication

In memory of my grandmother and uncle

Alice Fihlwaphi Zwane née Nxumalo

1940 – 2019

Sinethemba Mciniseli Zwane

1974 – 2019

Abstract

The study focused on understanding SARS-CoV-2 vaccine hesitancy among pregnant women in Soweto, South Africa. Pregnant women are at a greater risk of experiencing COVID-19 complications during pregnancy if infected with the SARS-CoV-2 virus. Vaccination uptake remains low in the population at large. This is a qualitative exploratory study approach using key-informant interviews. A total of sixteen key informant interviews with vaccinated pregnant women, unvaccinated pregnant women, healthcare workers and alternative healers were conducted. This study took place in Soweto townships, South Africa. Thematic qualitative analysis was used to construct themes in NVivo, where the gathered data was reviewed and analysed.

The study found that pregnant women experience barriers and motivations that determine their decision to get vaccinated against COVID-19. Motivators to vaccinate health concerns, monetary benefit and structural motivators such as employment, travelling and education. Barriers included vaccine related fears were the main reason for poor vaccine uptake. The lack of knowledge, healthcare system barriers, misinformation, and lack of trust in the government were some reasons for vaccine hesitancy. The study's findings show that pregnant women's decisions to get vaccinated are significantly influenced by several barriers, perceptions and the motivators they have.

Keywords: COVID-19, pregnant women, vaccination, barriers, motivations, decision-making

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Table Of Contents

List of figures

List of tables

List of Acronyms

CHAMPS	Child Health and Mortality Prevention Surveillance
COVID-19	Coronavirus diseases 2019
HBM	Health Belief Model
KII	Key Informant Interviews
MERS-CoV	Middle East Respiratory Syndrome-Coronavirus
RNA	Ribonucleic acid
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2
Soweto	South-Western Townships
WITS-VIDA	University of the Witswatersrand -Vaccines & Infectious Diseases Analytics

CHAPTER ONE: INTRODUCTION

1.1 Background

The outbreak of SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus) resulted in an unprecedented tragic pandemic globally with more than 772 million positive cases of the virus confirmed worldwide [1]. The virus's high rate of transmission, asymptomatic viral shedding, a significant number of individuals with moderate symptoms, and what have been dubbed "superspreader" events all contributed to the disease's fast spread. The virus further claimed more than 6.9 million fatalities [1]. In South Africa, over 4 million confirmed cases and over a hundred thousand deaths were recorded [1].

This worldwide pandemic has also had a significant impact on every element of society, including politics, the economy, social life, technology, the environment, the health sector, and global economic status [2]. Unemployment levels have increased significantly such that the highest yearly increase in global unemployment happened between 2019 and 2020 [3]. The global unemployment rate rose reaching 255 million [3]. The global collective gross domestic product (GDP) fell by 3.4 percent in 2020 [4].

Severe Acute Respiratory Syndrome Coronavirus (SARS) Description

Three zoonotic coronaviruses (severe acute respiratory syndrome coronavirus (SARS-CoV), Middle East respiratory syndrome coronavirus (MERS-CoV), and SARS-CoV-2) have infected humans in the last two decades [5]. A vast amount of virologic, epidemiologic, veterinary, and ecological evidence indicates that the new virus, SARS-CoV-2, originated directly or indirectly from a sarbecovirus (SARS-like virus) group that normally infects bats and pangolins in Asia and Southeast Asia [6]. Following the spillover event of the virus from animal reservoirs, SARS-CoV originated in China and caused an epidemic in 2003 [6], whereas MERS-CoV is currently causing intermittent outbreaks in the Middle East [5]. The SARS-CoV-2, the COVID-19-causing virus, first appeared in December 2019 in China. Then it quickly became a global pandemic and made its way to South Africa at the beginning of March 2020, when the first laboratory-positive case was confirmed [7]. SARS-CoV-2 has a median incubation period of 4-5 days before the beginning of symptoms and is spread by respiratory droplets, aerosols, and very small particles that carry the virus. Typically, the SARS-CoV-2 virus infects the upper respiratory tract, presenting symptoms similar to those of a common cold [5]. Although the majority of those infected with SARS-CoV-2 experienced mild to moderate symptoms, with the majority of the

virus replication occurring in the upper airways, in some individuals it progresses to develop a potentially fatal pneumonia [5].

Vaccine manufacture

The quick declaration of the outbreak and the early publication of the viral sequence allowed the development of the vaccine solution to begin within weeks after China's initial report of the outbreak to the World Health Organisation on December 31, 2019 [8]. Huge advances in vaccine research and development were achieved quickly. This led to a variety of vaccines being created using different technologies. RNA vaccines from Pfizer/BioNTech and Moderna express the coronavirus disease 2019 (COVID-19) spike glycoprotein, while vaccines from Gamaleya, J&J, and AstraZeneca express spike proteins from adenovirus vector platforms (6). Around 200 candidates in various stages of research were produced as a result of the extraordinary effort [8]. There are over 50 candidate vaccines in human trials, and currently over 18 are undergoing efficacy testing on humans [8]. In the absence of approved treatment, vaccines were then the most useful approach to combating pandemic spread [9]. With the continuous evolution of the virus, more vaccines need to be developed to keep up with the emerging strains while conferring protection. Further, other vaccines with different delivery methods such as nasal delivery are being developed [10].

Vaccine introduction

The introduction of very effective vaccinations has significantly reduced the prevalence of COVID-19 in industrialised countries, and a global effort to distribute these vaccines evenly is currently the only path out of this epidemic [11]. In South Africa, the introduction of the vaccine was a priority-based method that occurred in different phases. Approximately 1.25 million healthcare professionals were targeted in Phase 1 [12]. Then, essential employees followed, e.g., security personnel, persons over 60, adults with co-morbidities, and those residing in community settings, who were part of Phase 2 [12]. The entire South African adult population older than 18 years was part of Phase 3, targeting an estimated 22.5 million people [12].

Johnson & Johnson provided the first doses of the vaccination in South Africa, given that its vaccine was proven effective against the COVID-19 501Y.V2 strain [13]. South Africa also obtained 11 million doses of the Johnson & Johnson vaccine [13]. In South Africa, the COVID-19 vaccine rollout aimed to vaccinate at least 67% of South Africa's 60 million people in hopes of achieving herd immunity [13]. To date, 39,208,847 vaccines have been administered [14]. Although the vaccine obtained emergency authorization for use through Section 21 [15], there

is strong evidence that the World Health Organisation emergency use authorised COVID-19 vaccines are efficacious and safe to use [16]. Furthermore, vaccine testing continues globally to ensure vaccine recipients are safe from the vaccine or any vaccine-related effects. As the South African vaccination rollout gained traction, vaccine hesitancy received greater attention as a significant national public health problem [12]. This affected the vaccine uptake in the country, and the vaccination rate continues to be low for the pregnant population throughout the country [17].

Maternal vaccination

Infections continue to be one of the top causes of morbidity among pregnant women and infants, with vaccine-preventable diseases accounting for a considerable portion of the disease burden. Data from South Africa in 2020 showed a 30% rise in maternal fatalities since the pandemic began [18]. The South African Society of Obstetricians and Gynaecologists stated that COVID-19 vaccinations can be given to pregnant women who are at a higher risk of disease acquisition or the development of serious illness [19]. The South African National Department of Health also stated that all pregnant and lactating women who are eligible for vaccination and have reached 14 weeks of gestation should be provided the vaccine [20]. This was similar to some recommendations made by several countries and the World Health Organisation [21] as shown in *Table 1.1*. Vaccination during pregnancy helps to develop and transfer antibodies that protect the baby during the first months of life before they can be vaccinated with childhood vaccines. When pregnant women get an mRNA COVID-19 vaccination, their bodies produce antibodies against COVID-19 in the same way as non-pregnant women do [22].

During pregnancy, the immune system of the mother experiences substantial modification, which affects how well she responds to vaccinations [23]. Besides the passive transfer of antibodies to the foetus, maternal vaccination is beneficial to the mother as well [23]. Due to the physiological cardiovascular, pulmonary, and immunological adaptations of pregnancy, it is thought that pregnancy has been associated with an increased risk of maternal mortality and morbidity in a COVID-19 infection situation [24]. During the third trimester of pregnancy, pregnant women are more susceptible to developing COVID-19 disease [25]. Therefore, maternal vaccination ensures that the women are protected during pregnancy and after giving birth, which is important given their vulnerability condition.

Vaccine acceptance

Acceptance is determined by how well a new medical intervention or its components will be received by the target population and how well they will be able to satisfy the demands of the target population and the organisational environment, both of which are considered aspects of acceptance. Therefore, the success of a vaccine is defined not only by its efficacy but also by its acceptance by the target population [26]. Scientists can develop a vaccine that confers the highest immunity against a particular disease or condition. If the population does not accept it, all the vaccine work done in the laboratories will be in vain. Only when there are high percentages of acceptance and coverage are vaccination programmes deemed effective [26]. Additionally, education and good communication about a new vaccine need to be done for the population to be well-accepted.

Country	Society/organisation	Date	Pregnancy recommendation	Breastfeeding recommendation
South Africa	National Department of Health[8]	30 January 2021	Not recommended	No information
	South African Society of Obstetricians and Gynaecologists[57]	28 January 2021	Recommends that pregnant and breastfeeding women at high risk of contracting COVID-19 (including HCWs, essential workers and those with comorbidities) should consider vaccination after discussion with their healthcare practitioner	
Australia and New Zealand	Royal Australian and New Zealand College of Obstetricians and Gynaecologists[49]	26 January 2021	Insufficient evidence to recommend routine use of COVID-19 vaccines in pregnancy	No recommendation
Brazil	FEBRASGO[62]	3 February 2021	Recommends that pregnant and breastfeeding women can be vaccinated after assessment of the risks and benefits between the woman and her physician	
Canada	Society of Obstetricians and Gynaecologists of Canada[58]	5 March 2021	Recommends that pregnant and breastfeeding women who are 'eligible due to exposure risk, medical status or other circumstances' should be offered COVID-19 vaccination if no contraindications exist	
Ireland	Health Service Executive[63]	9 March 2021	Recommends COVID-19 vaccination for all pregnant women between 14 and 33 weeks' gestation	Recommends COVID-19 vaccination for all breastfeeding women
UK	Royal College of Obstetricians and Gynaecologists[48]	30 December 2020	Recommend that COVID-19 vaccination only be considered in pregnant women at high risk of unavoidable exposure or severe disease (i.e. HCWs or those with high-risk comorbidities) and that it be given through a maternity unit to allow for reporting to the UKOSS/UKTIS vaccine registry Benefits and risks of COVID-19 vaccination should be discussed on an individualised basis	Recommend that breastfeeding women be offered COVID-19 vaccination Women should be advised on the lack of safety data on COVID-19 vaccinations in pregnancy
	Royal College of Midwives[48]			
	Macdonald Obstetric Medicine Society[48]			
	UK Teratology Information Service[48]			
USA	Society for Maternal-Fetal Medicine[46]	3 March 2021	Recommends that pregnant and breastfeeding women who are eligible be offered COVID-19 vaccination after engaging in shared decision-making with a healthcare professional	
	American College of Obstetricians and Gynecologists[47]	4 March 2021	Recommends that COVID-19 vaccination should not be withheld from pregnant women who meet criteria for vaccination as per ACIP priority groups Recommends consultation with a healthcare provider but that this should not be required prior to vaccination	Recommends that COVID-19 vaccination be offered to breastfeeding women who meet criteria for vaccination as per ACIP priority groups
	Centers for Disease Prevention and Control[64]	12 February 2021	Recommends that women who are pregnant, and in a group eligible to receive the vaccine, may choose to receive the vaccine Recommends a conversation between the woman and her healthcare provider, although this is not required prior to vaccination	Recommends that women who are breastfeeding, and in a group eligible to receive the vaccine, may choose to receive the vaccine
Global	World Health Organization[60,61]	29 January 2021	Recommends that pregnant women at high risk of exposure or with serious comorbidities may be vaccinated (with the Moderna vaccine specifically) in consultation with their healthcare provider No recommendation for other vaccines	Recommends that COVID-19 vaccination (with the Pfizer-BioNTech vaccine specifically) can be offered to breastfeeding women at high risk of exposure

HCWs = healthcare workers; FEBRASGO = Federação Brasileira das Associações de Ginecologia e Obstetrícia (Brazilian Federation of Gynecology and Obstetrics Associations); UKOSS = UK Obstetric Surveillance System; UKTIS = UK Teratology Information Service; ACIP = Advisory Committee on Immunization Practices.

Table 1.1: Guidelines and recommendations for COVID-19 maternal vaccination [21]

Vaccine Hesitancy

Vaccine hesitancy to COVID-19 vaccines was reported to have grown in eight nations, ranging from 1.0% in the United Kingdom to 21.1% in South Africa [27]. Pregnant women were reported to exhibit more COVID-19 vaccine reluctance than the general population. This is despite the efforts that have been made to ensure that vaccination is safe and efficacious at any stage of pregnancy [24]. Hesitancy towards vaccination is influenced by several general characteristics, such as prior vaccination experience, knowledge, risk perception, the perceived value of vaccination, and religious and moral conviction [24]. It is also noted that the amount of vaccine hesitation and reasons for vaccination acceptance may differ depending on the vaccine, vaccine delivery method, geographic location, health system, and accessibility [28]. The individual's willingness to take the vaccine can also be influenced by emotions, knowledge, cultural beliefs, social status, and political affiliation [29, 30]. These variables are just as important as cognitive considerations for vaccine acceptance.

1.2 Problem statement

Currently, there is no medically approved COVID-19 treatment. Only health measures like social distancing, mask-wearing, and good sanitary hand hygiene are recommended to prevent the spread of the virus [29, 31]. The Food and Drug Administration (FDA) of the United States has authorised or licenced several vaccines for use [32]. Vaccination is the best public health measure to prevent or mitigate the effects of diseases [9]. COVID-19 vaccination prevents severe illness, hospitalisation, and mortality, which are associated with some underlying comorbidities such as chronic pulmonary disease, cardiac arrhythmia, hypertension, heart failure, and diabetes [5]. Vaccination does not only protect the vaccinated individual, but it also indirectly protects the unvaccinated from the disease.

Ongoing work and research on the SARS-CoV virus and other Coronaviruses enabled the rapid production of the COVID-19 vaccines. Despite these African countries were at the back of the line when procuring the COVID-19 vaccine during the pandemic due to the high demand for the vaccines and the lack of manufacturing capacity on the African continent [33]. The COVID-19 vaccine alliance, together with GAVI (Global Alliance for Vaccines and Immunization), were the organisations pushing to get the vaccines for Africa [33]. Self-procurement was the other option for some countries such as South Africa that did as a method to ensure their people got the vaccine [34]. Although there were some concerns regarding the testing and safety of the vaccine, the South African Health Products Regulatory Authority (SAHPRA) approved the procurement and use of the vaccine through Section 21 of the Medicines Act [15]. This is a system that allows for emergency usage of medicines and also allows SAHPRA to permit the use of a drug under particular circumstances [15].

Despite all the efforts made by the country to procure the vaccines for its population, official reports reveal that there has been a low vaccination uptake rate. Across the country, vaccine uptake has been low and is decreasing with time [35]. A recent report revealed that just over 19.6 million individuals from the years 12 and

upwards have completed their vaccination doses, with more than 14.7 million individuals having been partially vaccinated or have received at least one COVID-19 vaccine dose [14]. The nationwide numbers are illustrated in *Table 1.2*.

Age Group ▲	Total Population	Total Number of Individuals Vaccinated	Individuals Vaccinated as a % of the Population
12-17	3,096,840	1,220,463	39.41%
18-34	8,775,094	4,057,807	46.24%
35-49	5,874,985	3,533,996	60.15%
50-59	2,691,640	1,767,476	65.67%
60+	3,378,227	2,217,321	65.64%
Total	23,816,786	12,797,063	53.73%

Table 1.2: Total number of females vaccinated against COVID-19 in South Africa [14].

Before the availability of the vaccine, theoretical acceptance was high for the COVID-19 vaccine among pregnant women and the general population, given that the vaccine was proven to be safe and effective against COVID-19 [35]. This painted a picture that people were willing to accept the vaccine before it was made available [35]. However, by the time the vaccine was available, the actual vaccine acceptance was low, not translating to the hypothetical acceptance; their willingness and acceptance rate had dropped [35]. Various reasons might explain why the vaccine's actual acceptability dropped, such as the many conspiracy theories about the vaccine and the fears associated with vaccination.

It is apparent that a significant section of the South African population is still reluctant to accept the COVID-19 vaccine, although some pregnant women have received the vaccine. This study, therefore, was of great importance as it endeavoured to understand and describe the reasons that influenced some pregnant women to accept the COVID-19 vaccine during pregnancy; their motivations, and the barriers behind vaccine reluctance. Ultimately, the study was intended to give insights into why pregnant women opt not to vaccinate during pregnancy.

A pregnant woman is not only responsible for her own life but also for the life of the unborn child. In the African culture or setting, the child does not belong to the parents alone but to the whole extended family and the ancestors [36, 37]. Therefore, when it pertains to the health of a pregnant woman, there are a lot of players that influence the decision-making process. This ranges from close family members to healthcare workers and alternative healers, including faith-based and traditional healers.

1.3 Rationale of the study

The COVID-19 pandemic taught us the importance of vaccination when it comes to protecting the healthcare system from strain while saving lives. Maternal vaccination is one way of protecting and saving neonates from diseases upon birth as well as preventing strain on the healthcare system through the reduced number of sick and hospitalised babies. Pregnant women are considered a high-risk category because of concerns about COVID-19's effect on them during and after pregnancy, as well as its consequences on their newborn babies. Vaccination does not solely manage a pandemic; it also eases the burden on the healthcare system and prevents further immense pressure. This study offered descriptive information that can assist the appropriate authorities and organisational establishments in implementing a suitable and substantial maternal vaccination approach.

The broader implications of this study included improving public health outcomes by increasing vaccination rates, reducing the spread of preventable diseases, and ultimately saving lives. Additionally, understanding vaccine hesitancy can help policymakers and healthcare providers tailor their messaging and outreach efforts to effectively address concerns and build trust within communities. With the Group B Streptococcus vaccine, which will be given to pregnant women, in the late development phases. This study gives insight into the motivators and barriers pregnant women face regarding maternal vaccination. It also provided data on the decision-making processes that influence the maternal vaccination of pregnant women in Soweto, South Africa.

1.4 Methodology

1.4.1 Study Site

Soweto, an abbreviation for South-Western Townships, is a dynamic and historically significant township in Johannesburg, South Africa. It is one of the country's largest townships and has significant cultural and historical value. The township is home to a diversified and vibrant population comprised of people of many ethnic backgrounds, cultures, and languages. This study was carried out at the following study locations within Soweto, Thulani, Thembelihle, Meadowlands, Freedom Park, and Emdeni, from which data was gathered, the Child Health and Mortality Prevention Surveillance (CHAMPS) Program. These study sites are found in Soweto, which is an urban area made of various townships in Gauteng, South Africa, part of the City of Johannesburg Metropolitan Municipality.

1.4.2 Study design

The study was an exploratory descriptive qualitative study and was carried out between July and August 2023. Exploratory research in social science can be described in several ways, but its foundation consists of the desire to uncover something new and fascinating by researching a topic for study [38]. The purpose of an exploratory descriptive qualitative study is to investigate and describe participant experiences in connection

to the phenomena being studied [39]. The purpose of exploratory research is not to produce definitive and conclusive answers to research questions but rather to investigate the study topic to varying depths. Qualitative research is the approach whereby non-numerical data, such as text, observation, video, or audio, is collected and analysed with the objective of better-comprehending concepts, views, or experiences [40]. This approach may be used to study a subject thoroughly or to generate fresh research concepts. It has been stated that "exploratory research is the preliminary research that serves as the foundation for more conclusive research" [38].

In the main, the study aimed at understanding reasons why pregnant women received or did not receive the COVID-19 vaccination throughout their pregnancy. Furthermore, the study explored pregnant women's SARS-CoV-2 vaccination decision-making process and the decision-making process involved before an individual decides on vaccination. To understand the decision-making process, pivotal professionals involved in health, spirituality, culture, and community well-being were recruited to give us insight and help us better understand the process.

1.4.3 Study Populations

The study population included pregnant women aged between 18 and 45 living in Soweto who got vaccinated for COVID-19 before getting pregnant or vaccinated for COVID-19 during the current pregnancy. Pregnant women who did not get vaccinated against COVID-19 were also included as participants. Women aged above 45 years were excluded from the study. Traditional healers, faith healers, and healthcare workers who attend to pregnant women were also included, to understand and explain the influence they have in the maternal acceptance of the COVID-19 vaccine. Participants who were not willing to take part in this study and pregnant women below the age of 18 years were excluded from the study.

1.4.3.1 Sampling Strategy

These study participants were purposefully, and snowball sampled. Purposive sampling is a qualitative research approach that is widely used to locate and choose information-rich sources to make the most of limited resources [41]. This comprises discovering and selecting individuals or groups of people who are highly educated or experienced in a certain area of interest [41]. Snowball sampling is a strategy in which existing research participants ask prospective participants to participate in a study [42].

The study participants were first identified from the WITS-VIDA pregnancy surveillance database which is a database under the Child Health and Mortality Prevention Surveillance (CHAMPS). Based on the participant's age and COVID-19 vaccination information in the database, participants were selected to be invited to participate in the study. Potential participants were then invited to be part of the study via phone call, where they stated their interest in being part of the study, and then they were recruited based on the inclusion criteria.

In addition, traditional healers, faith healers, and healthcare practitioners were recruited from their respective communities who are regularly consulted by pregnant women. These participants were recruited using purposeful and snowball sampling procedures due to their first-hand knowledge, expertise, and experience with pregnancy and maternal vaccination. Potential participants were referred by the pregnant women others we then approached and invited them to be part of the study. Sampling was also done with the help of foot soldiers, these are people who live in the communities where the study was done and they are well informed about the study and were capable of assisting with participant sampling. Before the potential study participants were enrolled in the study, they had to meet the study inclusion criteria.

The recruitment process of all participants continued until data saturation was reached. Data saturation in qualitative research occurs when the same topics emerge frequently during interviewing [43]. As more and more people are interviewed, new themes, ideas, viewpoints, or patterns run out [43]. Saturation occurs when no further data is discovered from which a social scientist may derive new themes or codes.

1.4.4 Data Collection Method

Key Informant Interviews (KIIs)

To obtain in-depth information, key informant interviews were conducted. These were qualitative, in-depth discussions with individuals who were knowledgeable about a particular matter [44]. Key informant interviews were used to get data from a variety of people, such as locals with firsthand knowledge of the neighbourhood, professionals, and community leaders. An author-created semi-structured interview guide with open-ended questions was used to collect the data. An interview lasting no longer than 60 minutes was conducted. The participant's demographic information was captured during the interview to ensure confidentiality participants were given a unique Study ID number.

The interviews were audio-recorded and transcribed for analysis. During the interviews, notes were taken to ensure all data was captured. The interview was conducted at the participant's convenient location. The interview questions provided logic, flow, the elimination of ambiguity, and a minimal amount of question repetition during the interview. The questions were designed to identify the participants' motivators and barriers to COVID-19 vaccination acceptance. Before being used in the field, the KII guide underwent internal pre-testing among WITS VIDA workers to guarantee tool validity.

Data management and analysis

The objectives of the study were addressed through thematic analysis which is an approach used for qualitative data analysis. Before the data was analysed, the researchers transcribed all audio recordings and notes taken during each key informant interview. The transcriptions for each conversation were reviewed for accuracy. The transcribed data was saved in a password-protected Microsoft Word file that only the researchers had

access to. To determine key themes and ensure consistency thematic analysis was done. Using thematic analysis as a guide by Braun and Clarke, the researchers independently reviewed the transcripts to comprehend their meaning in context and uncover trends [45]. The information gathered was analysed using NVivo, a qualitative analysis programme. This procedure included the generation of codes. The analysis was conducted from a phenomenological perspective. Analyses were compared once the transcripts had been coded, and agreement amongst researchers was obtained for all the final coded data to provide an idiographic interpretation of the data.

Data validity and trustworthiness

To ensure data validity and trustworthiness, the KII interview guide was pre-tested in-house with colleagues at WITS VIDA before being used in the field. These were females who were within the age range, however they were not pregnant but had experience with pregnancy. The order and flow of questions together with some probes were changed to better the tool. A data triangulation approach was also used, this was through the recruitment of various sources of information or informants who were knowledgeable and experienced about the topic being researched, these were the pregnant women, health care workers, traditional healers and faith healers. The transcripts were reviewed by two research assistants for accuracy.

1.5 Conclusion

The primary goal of this study is to evaluate the motivations and barriers of COVID-19 vaccination uptake among pregnant women in South Africa, particularly in Soweto. This chapter has provided background information on the study topic, addressed the problem statement, and offered a rationale for doing this type of research. The chapter described the study's research aims and objectives, as well as the research questions the study aimed to answer. This chapter also included a summary of the research site, study population, and techniques for data collection and analysis.

1.6 The next chapters

The next chapters follow:

Chapter 2: the literature review, and presents literature linked to the research topic to offer insight into the principles applied in this research study. This chapter also has the aim and objectives of the study.

Chapter 3: the theoretical framework that forms the foundation of this research, it also focuses on the Health Belief Model (HBM).

Chapter 4: the methodology which narrates how the study was carried out and the data analysis.

Chapter 5: the study findings from the data analysis.

Chapter 6: the discussion of the study findings based on the study aims and objectives.

Chapter 7: the study conclusion, suggestions and some recommendations for future studies are presented.

CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction

This chapter presents the research phenomena, including the scope of the problem and studies undertaken internationally, in Sub-Saharan Africa, and South Africa. This chapter also discusses gaps in the literature that this study filled.

2.2.SARS-Cov-2

Coronaviruses (CoVs) are a broad family of single-stranded RNA viruses that may infect both animals and humans, causing respiratory, gastrointestinal, hepatic, and neurologic disorders [46]. This family of viruses is bat-borne; however, the transition from bats to humans most likely occurred several hundred years ago [6]. SARS-CoV (severe acute respiratory syndrome coronavirus) is a zoonotic coronavirus that causes respiratory disease [47]. SARS-CoV-2 belongs to the genus Sarbecovirus and exhibits 79% sequence similarity with SARS-CoV [5]. Unlike those infected with SARS-CoV-2, people infected with SARS-CoV do not become infectious before the development of symptoms [5]. In humans, SARS-CoV-2 can cause moderate-to-severe respiratory infections, which can result in death [47]. The primary mode of infection is respiratory droplet transmission; however, contact with an infected individual can also result in transmission [48]. International travel was responsible for the spread of SARS-CoV-2 globally, just as it was for the transmission of MERS-CoV to nations outside of the Arabian Peninsula [49].

2.3. Maternal vaccination

Maternal vaccination can be described as the type of immunisation for women of childbearing age before or during pregnancy [50]. Maternal vaccination has emerged as an important public health approach to preventing and combating maternal, foetal, and neonatal diseases during the last decade [23]. It was intended to protect the mother from infections that may negatively impact a healthy pregnancy and childbirth [23]. It also aimed to develop vaccine-induced maternal antibodies that will be transferred to the foetus via the placenta, in colostrum, and breast milk to the infant for disease protection before routine childhood immunisation can begin [23]. During the first few months of life, infants are susceptible to various diseases because they lack immunity against them [21, 50]. Therefore, maternal vaccination is the only way to protect them from infections. Maternal vaccination has prevented numerous fatalities during the first years of life and continues to do so [21, 50].

Maternal immunisation can induce active immune protection in the mother and elicit systemic immunoglobulin G (IgG) as well as mucosal IgG, IgA, and IgM responses to protect the neonate [23]. Transfer of IgG from mother to foetus begins as early as 13 weeks of gestation and occurs in a linear way as the pregnancy proceeds, with the greatest quantity transferred in the third trimester [51]. Maternal vaccines such as

Tetanus, Diphtheria, and Pertussis (Tdap) as well as inactivated Influenza immunisations are recommended for pregnant women. [52, 53]. Due to widespread disinformation targeting pregnant women, their worries regarding maternal immunisation were high [54]. This was from a study that aimed to understand the knowledge, attitudes, and acceptability of maternal immunisation among pregnant and non-pregnant women in Soweto [54]. There were several indications, nearly 60% of participants were found to have some knowledge of maternal immunisation [54]. Approximately 80% of the research participants reported a hypothetical acceptance after learning more about maternal vaccination [54].

2.4.Vaccine hypothetical acceptance

There was a lot of hypothetical acceptance before the COVID-19 vaccine was available. According to a study conducted in Japan, the population was willing to take the vaccine upon its availability [55]. Some words they mentioned were *"When a vaccine for COVID-19 becomes available, I will get vaccinated"* and *"When everyone gets a vaccine for COVID-19, I will get vaccinated"* [55]. In an online poll done in 16 countries, including the United Kingdom, the United States, and South Africa, it was discovered that more than 60% of pregnant women in South Africa were more likely to obtain the SARS-CoV-2 vaccine when it became available [56]. These studies were conducted during the pandemic's peak. Individuals' perceptions of their susceptibility to contracting COVID-19 and the severity of the illness can influence their decision to get vaccinated [57-59]. However, recent results of another study conducted in Soweto on COVID-19 reported that the hypothetical acceptance has not been converted into actual vaccination acceptance today [35].

Vaccination rates remain low in South Africa, particularly in Soweto [35], where approximately 20% have visited a vaccination location to complete their immunisation [60]. Compared to pregnant individuals in the second and third trimesters, women in the first trimester were reported to indicate increased interest in obtaining the COVID-19 vaccination [26]. As much as studies reported high SARS-CoV-2 vaccination willingness, this did not translate to vaccine uptake, despite the vaccine being widely available nationwide. Additionally, as per the Health Belief Model (HBM) for people to accept a vaccine belief about the effectiveness of the vaccine in preventing illness and its benefits in terms of personal and community protection play a significant role [57-59].

2.5.Pregnant women and the COVID-19 vaccine

The exclusion of pregnant women from the COVID-19 clinical trials when the pandemic started, and the newness of the vaccine raised concerns [61] and scepticism towards accepting the vaccination [62]. Rumours making the rounds on social media and in the community instigated fear and promoted reluctance to get vaccinated [60]. The lack of proper government communication regarding the pandemic is one of the reasons why the public lost trust in health authorities and their capacity to manage the circumstances [63]. Furthermore, the state's approach to the pandemic resulted in a lack of confidence in the healthcare system and any decision

that was made related to the COVID-19 pandemic [64]. Therefore, this led to the population being vulnerable and exposed to every form of confusion and misinformation [63], anything said by anyone was believed to be true. This made it hard for the population at large to differentiate between facts, rumours, and people's perceptions.

Pregnant women are considered a high-risk population because of concerns regarding COVID-19's effect on them during and after pregnancy, as well as its effects on their neonates [65]. Pregnant women with COVID-19 are more likely to give birth prematurely [24]. Babies born to COVID-19-infected mothers are more likely to be stillborn or admitted to a neonatal facility [65]. COVID-19 infection also increases the risk of admission to the intensive care unit and caesarean section compared with pregnant women without COVID-19. New-born babies born to COVID-19-infected mothers have a higher chance of being admitted to the neonatal critical care unit [65]. Studies have reported that, unlike non-pregnant women of reproductive age with COVID-19, pregnant and recently pregnant women with COVID-19 infection have a higher risk of being admitted to an intensive care unit and needing invasive ventilation, which may result in fatality [65].

The Centres for Disease Control and Prevention advised that all individuals aged 6 months and older, including those who are pregnant, breastfeeding, or attempting to get pregnant right now or in the future, receive the COVID-19 vaccine [66, 67]. According to growing evidence, COVID-19 vaccination during pregnancy has been reported to be safe and effective [67]. Although there have been some myths, COVID-19 vaccinations have not been linked to infertility issues in either men or women [63]. Researchers discovered that the COVID-19 vaccine significantly decreased the probability of developing a severe COVID-19 illness [66]. Another study found that receiving a booster dose of an mRNA COVID-19 vaccination during pregnancy significantly increased the levels of antibodies found in the umbilical cord and neonatal blood samples [68]. This implies that taking a COVID-19 booster during pregnancy may help protect newborns from COVID-19 [66]. All pregnancy-related vaccination hazards are outweighed by the advantages of obtaining the COVID-19 vaccine.

This suggestion is consistent with new research on COVID-19 vaccination in pregnant and breastfeeding women, which shows that these vaccinations are well tolerated, provide substantial protection in recipients, and pass immunity to neonates via placenta and breastfeeding [69]. COVID-19 vaccinations are now suggested throughout pregnancy to avoid complications [70]. Regardless of these findings, there are still some pregnant women who have not taken the COVID-19 vaccine, despite it being proven to be safe when given to pregnant or breastfeeding women [24]. Studies have reported some of the reasons why these pregnant women are not accepting the COVID-19 vaccine. There were concerns about the negative effects on the foetus and breastfed infant, adverse reactions, the trustworthiness and effectiveness of the vaccine components, and mistrust in the government [71]. One of the aspects lacking regarding COVID-19 vaccination by pregnant women is education. For the women to accept the vaccine, they need to know about the vaccine and the advantages of vaccinating while pregnant. A Jordanian study discovered that pregnant women's awareness of COVID-19 vaccination

after receiving a tele-education programme reduced their hesitancy and increased their readiness to engage in the COVID-19 vaccine [67].

2.6.Vaccine acceptance amongst pregnant women

A South African-based study discovered that vaccine acceptability was higher (87%) among more educated pregnant women [29]. This finding was similar to those from a study in Nepal, which discovered that pregnant women with higher education levels were 1.773 times more likely to accept the COVID-19 vaccination compared to pregnant women with lower education levels [24]. A possible reason would be that education causes women to be more concerned about their health and gives them greater autonomy in making health-related decisions. However, these studies contradict the findings of a Chinese research, which found that pregnant women in western China with greater education levels had more vaccine reluctance and women with lower education levels had higher COVID-19 vaccination intentions [72]. This might be attributed to education, which ultimately improved their understanding of the COVID-19 vaccination and the fact that they received negative information regarding the COVID-19 vaccine. Another reason might be that literate pregnant women are more exposed to technology like the internet, where more of the COVID-19 conspiracy theories are circulating in the media and on social platforms. Therefore, this influences their perception of the vaccine.

Individuals with 2-3 prior pregnancies had a higher COVID-19 vaccination acceptance rate of 75.3% compared to first-time pregnant women as per a study conducted in Durban, South Africa [29]. This was because non-first-time mothers know the difficulties of pregnancy and decide to protect themselves from possible infection by the virus [29]. However, this was contradictory to another study that demonstrated low acceptability of the COVID-19 vaccination among pregnant women and mothers of babies and toddlers [70]. One probable explanation could be that women who were pregnant for the second time or had only one child were more likely to have less concern about pregnancy effects, as well as greater experience and information from prior pregnancies and deliveries.

It was reported that the employment status of participants positively correlated with vaccine acceptance [29]. This might be because of the mandatory vaccination policies some employers put in place for their workers [73]. Therefore, individuals would get vaccinated to save their spot at work because being unvaccinated would raise a lot of criticism towards them. Another possible explanation would be that these participants were working on the frontlines during the pandemic, such as healthcare workers or security forces [73]. To protect themselves and others, they decided to take the vaccine.

2.7.Vaccine hesitancy

Vaccination hesitancy is the refusal or reluctance to receive a vaccine despite the availability of vaccines [74]. This phenomenon threatens the global advances made in the battle against vaccine-preventable diseases [74].

According to the World Health Organisation, vaccine hesitancy is listed among the top ten significant threats to global health in 2019 [74]. Vaccination hesitancy is not a recent phenomenon, but the rapid dissemination of misinformation by a minority group of people and the active anti-vaccination movement that utilises social media to influence people's vaccine decisions have increased the chances of people being vaccine-hesitant [75]. The reasons for vaccine hesitancy are not well explained, however some of the primary causes of vaccination reluctance include fear or mistrust of the vaccine, ignorance about the vaccine's advantages, the uncontrollable spread of either misinformation or disinformation, and other significant factors [26, 35].

There is a spectrum in vaccine hesitancy, vaccine-hesitant individuals may refuse or postpone certain vaccinations but accept other vaccines, while other individuals may refuse all vaccines [76]. The term "COVID-19 vaccine hesitance" refers to the overall tendency to avoid receiving the COVID-19 vaccination for whatever reason, including needing more information before making a decision [77]. Hesitancy to get vaccinated is not exclusive to the COVID-19 vaccines [12]. While some hesitancy may be due to the newness of the COVID-19 vaccine, anti-vaccination sentiment, in general, has remained high, and anti-vaccine reasoning remains a stubborn public health problem even though the national and global health burden from the COVID-19 pandemic and other vaccine-preventable infections remains high [69, 78]. Vaccination hesitation is a behaviour that is driven by a variety of variables, such as a lack of confidence, which is a lack of trust in the vaccine or provider [76, 79]. The other variable is complacency, where individuals do not see the necessity for vaccination and do not place a value on the vaccine [76, 79]. Convenience, which is the ability to have access to the vaccine or vaccination site, is another factor that affects vaccine hesitancy [76, 79].

An investigation into the vaccination rate, reasons for vaccination, and vaccine hesitancy among Japanese pregnant women reported that vaccination hesitation was highly related to a lack of faith in the government [71]. Another survey on pregnant women's COVID-19 hesitancy reasons reported that several people who had already had the influenza vaccination or planned to do so were nonetheless apprehensive about getting the COVID-19 vaccine [69]. This shows that it is not merely that these women were hesitant to receive any vaccine while pregnant. However, the lack of knowledge about the COVID-19 vaccine specifically, and particularly how the vaccine affects pregnant and lactating women and their children, was reported to be likely the primary driver of their hesitancy [69]. News and information about the frequency of the side effects such as severe headaches, Bell's palsy, seizers and Guillain–Barre syndrome (GBS) [80] that affect those who received the COVID-19 vaccination was another factor that drives hesitancy [69].

Other factors contributing to vaccination reluctance were underestimating the vaccine's efficacy and the lack of confidence [26]. Both of these factors can be explained by mistrust, lack of faith, or belief that the vaccine works by protecting an individual from infection or disease [26]. Therefore, communities with more vaccine confidence have higher vaccination rates, which reduce COVID-19 infections, hospitalisations, and deaths [81]. It is the duty of those in the health care system to increase the community's confidence in vaccination so that

the vaccine can be well received by the target population. For pregnant women to be well educated about any medical intervention to be introduced, they have to be targeted at antenatal care facilities and also do some community drives to ensure that the information gets to everyone. This approach will increase confidence and faith in any intervention introduced.

2.8. The Infodemic

An infodemic is a significant rise in the volume of information linked to a particular topic that can expand exponentially in a short time as a result of a specific prevalence, such as the current pandemic [82]. According to WHO, there has been a significant infodemic in conjunction with the COVID-19 pandemic and response. This infodemic has resulted from an excess of information, some of which is true and some of which is not, making it difficult for the general population to locate reliable sources and information when they need it [82]. The increase in global access to cell phones with internet access, as well as social media, has resulted in an exponential fabrication of information and an increase in the number of possible platforms to obtain it, resulting in an infodemic. In other words, this is a situation in which a large amount of unverified information is created and distributed around the entire globe, reaching billions of individuals [63, 83]. Most of the time, this knowledge harms a good course for the recipients.

An infodemic worsens the pandemic in various ways. There is a lack of quality control over the information published and, often, the basis on which some decisions are made [63]. Anyone can create or publish anything on the internet, such as podcasts and blogs, especially on social media channels, whether individual or institutional [84]. Another way is that it results in people being anxious, experiencing despair, information overload, emotional exhaustion, and an inability to cope with key responsibilities [82]. A study conducted in the United Kingdom discovered a relationship between trust in social media and vaccine hesitancy [85]. The regulation and verification of information posted online is a strategy that works to fight an infodemic [83]. This was experienced during the COVID-19 pandemic when giant online platforms like YouTube and Twitter were taking down posts that were spreading unverified information about the virus [86]. In March 2020, South Africa passed legislation making spreading harmful lies about the virus illegal and punishable by up to six months in prison [86].

2.9. Vaccine safety concerns

Despite the vaccine being studied and found to be safe, there have been several safety concerns associated with the vaccine. However, the advantages of getting vaccinated against COVID-19 outweigh any possible dangers of vaccination while pregnant [87]. According to research, no evidence getting vaccinated causes male or female infertility, and no proof getting a non-replicating virus while pregnant puts the embryo in any danger [22]. Other common speculations about the vaccine are not true, the COVID-19 vaccine does not transmit the disease to recipients or their unborn babies in the case of pregnant women [22]. Furthermore, all the COVID-

19 vaccines do not contain any live virus in them [22]. All approved and available vaccines cannot infect anyone with COVID-19, even expectant mothers or their unborn children [22]. According to research, pregnant women who got an mRNA COVID-19 vaccination before or during early pregnancy were not associated with an increased risk of miscarriage [22]. The purpose of the vaccine is to protect its recipients and the people around them indirectly by preventing the spread of the virus [11].

2.10. Alternative healing

In Africa, there are many healing systems, including those that are indigenous and based on religious beliefs, as well as biomedical healthcare systems [88]. All these systems are used by numerous people in many different African countries when an individual is seeking healthcare [88]. Alternative healing practises aim to stimulate the body's potential to heal itself through herbal supplementation, energy alignment, and several balancing approaches [89]. To better understand why the medical healthcare system is not being accepted by the population as expected given the pandemic state, the study explored other alternative healthcare options available.

Faith healers are often declared Christians from missions or African independent churches in the form of spiritualists who cure mostly via prayer, laying hands on patients, and supplying holy water and medicinal plants [90]. The faith-healing approach to curing illnesses focuses on faith rather than medical therapy. Praying to "divine beings" is usually applied in faith healing [88]. Every religion has its form of faith-based healing. Faith healers believe that their healing abilities are bestowed by God through ecstatic states and trance encounters with the Christian Holy Spirit [90]. Faith healers believe that religious faith could heal illness and disability through prayer or other rituals that activate a spiritual presence and power, such as the giving of charms, feathers, and other similar items [88]. In the community, these faith healers are also known to give counsel and guidance [88]. A study on the role and importance of faith healers reported that numerous patients preferred to seek the services of faith healers since faith healing is readily accessible to potential clients [90]. Moreover, faith healing services are inexpensive, and decisions to use them are driven by trust, availability, accessibility, recommendations by relevant others, and belief in the supernatural origin of diseases [90].

African traditional medicine has been practiced for many generations [91, 92]. African traditional healing encompasses all theories, knowledge, and practices used to diagnose, prevent, or eliminate a physical, mental, or social imbalance [91, 92]. It includes spiritual treatments, physical methods, and exercise used to cure, identify, and prevent illnesses or maintain well-being [91]. African traditional healing also includes medications made from plants, animals, and minerals [91]. Traditional healers consult bones and the spirits of ancestors to diagnose and treat various physiological, psychological, and spiritual conditions [91]. Traditional healing is not a uniform healing method rather, it varies from culture to culture and area to region [91, 92]. Traditional healers play various roles in the community, including being guardians of traditional African religion and practises, cultural educators, counsellors, social workers, and psychologists [91].

Traditional healers and faith healers are, in most cases, regarded as the leaders of the community [91]. They perform vital educational roles in traditional culture, religion, cosmology, and spirituality [91]. Faith healers believe that they are guided by God, the holy spirit, and the Angels, whereas traditional healers are guided by ancestral spirits [91]. This is the primary contrast between the two kinds of healers. As "medical knowledge storehouses," African traditional healers are extremely resourceful and important in many aspects of people's lives [91]. A study found that the primary causes of vaccine reluctance are cultural and religious attitudes that oppose vaccination [93]. Due to their position in the community and health-seeking, traditional and religious healers are major influences when it comes to health-related decision-making in the African environment [91].

2.11 Decision-making/ influence.

Decision-making is the process of finding and selecting options based on the decision-makers' values and preferences [94]. Making a decision indicates that there are alternatives to consider. When one is in this situation, they do not want to choose as many of these options as possible but also select the one that best matches their aims, ambitions, preferences, values, and so on [94]. A person's decision concerning their health can be impacted by various elements [95]. Concerns about vaccine safety, side effects, or access to the vaccine can act as barriers to vaccination, while external cues to action, such as recommendations from healthcare providers or social influences, can prompt individuals to get vaccinated. For starters, internal motivations are the sentiments and thoughts that drive an individual's decision-making choices and behaviour; they are the polar opposite of barriers [96]. Internal barriers are the ideas, beliefs, and feelings that surround an individual and are the aspects that make altering behaviour, perception, and thinking difficult [96]. External barriers and motivations are influential elements that impact people's actions that are outside their control. This includes the social, cultural, economic, and religious environments [96].

According to research on the uptake of pertussis and influenza vaccines during pregnancy, concern over vaccination safety is one of the most significant variables when an individual is deciding whether to get a recommended vaccine during pregnancy or not [69]. The main factor influencing pregnant women’s vaccination decisions was the safety of their unborn child [69]. When the safety of the unborn child from the vaccine effect was guaranteed, the expecting mother was motivated to take the COVID-19 vaccine [69]. This is well understood because mothers have a caring a protective nature towards their children. Therefore, the life of the unborn child is important, and the mother protects it rather than taking a risk.

It was discovered that pregnant women trusted individual healthcare practitioners, such as doctors, nurses, midwives, and pharmacists, to provide them with vaccination information [69, 97, 98]. According to earlier findings, pregnant women preferred to discuss immunisation with a trusted healthcare provider face-to-face [98]. Healthcare personnel who work one-on-one with pregnant patients appear to be well-positioned to increase vaccination education therefore, vaccine acceptability among pregnant women was reported to be high [69]. The

involvement of healthcare professionals, particularly midwives, is considered critical in the delivery of reliable information and in reassuring pregnant women about the vaccine's safety and advantages to them and their children [98].

Most of the time, participants get their vaccination information from doctors and midwives, but they also get it from friends and relatives. The majority of pregnant women who were not vaccinated stated that certain medical experts were unable to answer their queries on maternal vaccination [98]. Some did not spend enough time outlining the benefits and disadvantages of vaccination [98]. In general, a pregnant woman's decision to get the COVID-19 vaccine is significantly influenced by her degree of knowledge and understanding about the vaccinations, which reduces her hesitancy [70]. Several unvaccinated individuals indicated that if a healthcare professional had suggested the vaccination, they would have received it [98]. This clearly shows that health professionals have an impact on the vaccination of pregnant women therefore, they should be well educated on the topic so that they can give informed advice.

Health care professionals' recommendation for regular maternal vaccines such as seasonal influenza and pertussis immunization, was a strong factor influencing these maternal vaccine uptake [99]. Those who received a health care professional recommendation had ten times the odds of getting vaccinated as those who did not [99]. Furthermore, knowing that their healthcare practitioner is vaccinated against COVID-19 motivated pregnant women to get vaccinated as well [97]. This study clearly showed the significant role played by healthcare workers as vaccine advocates and influencers in the decision-making of pregnant women regarding accepting vaccines [97].

Pregnant women's decision-making cues before taking any maternal vaccines are also influenced by the media [100]. The reporting of vaccine consequences in the media and the sensational coverage of negative events result in women being more skeptical and reluctant to take the vaccine [100]. Having sufficient knowledge about the vaccine is a motivator for pregnant women to get vaccinated [100]. Unvaccinated participants stated that they wanted more information from the healthcare practitioner they trusted to make an informed decision [100]. Pregnant women have largely been misinformed, which has led to an increase in their fears regarding the COVID-19 vaccination [101]. Nonetheless, knowledge about the vaccine's benefit to the baby made the mother-to-be more receptive if the vaccine provided the newborn with immunity and antibodies for defense against the virus [100].

When it comes to health, most pregnant women do not make medical decisions as individuals, rather their decisions are influenced by different factors and certain individuals. One unvaccinated lady said that her partner, who opposed vaccination for reasons she attributed to his cultural background, had influenced her decision not to get vaccinated [98]. Cultural beliefs are part of African heritage and remain a way of life for most families.

In the Soweto population, it was discovered that COVID-19's random mediatization created a "field of mistrust" towards authorities and vaccination [35]. This was exacerbated by disinformation and misinformation, which significantly increased othering, reluctance, and denialism [35].

2.12 Population Barriers and Motivations Towards vaccine uptake

During the current epidemic, it is possible that a lack of clear and consistent communication of this information confused audiences, damaged scientific credibility, and decreased vaccination adoption [27]. Vaccination can manage the COVID-19 pandemic [11]. However, the effectiveness of these vaccines heavily relies on community health behavioural patterns [29, 30], which can be influenced by how well the vaccine information is communicated [100].

2.13 Barriers

Anything that prevents an individual, a population, or a community from having access to health services or from receiving the best possible healthcare service is considered a health barrier [102]. Several factors can be considered health barriers. Low levels of health literacy, stigma, discrimination, and incomplete perceptions of health are some of the reasons why people do not get healthcare [102]. Some barriers include cultural and social norms, which are associated with health behaviours [102]. The working class finds the long working hours a barrier to getting healthcare [102]. Other individuals cannot afford health care or the indirect costs that come with vaccination, such as transportation [102]. The higher rates of poverty may also make it a challenge for people to pay for healthcare services or programmes.

2.14 Accessibility

Acceptability is described as a multifaceted concept that represents the extent to which a person receiving a healthcare intervention believes it is suitable based on expected or experienced cognitive and emotional responses to the intervention [103]. There is growing consensus that ‘acceptability’ should be taken into account when developing, assessing, and implementing solutions in healthcare [103]. Patients’ decisions on their desire to complete treatments and willingness to engage in an intervention can be explained by the acceptability of the medical treatment [103]. The perspective of healthcare professionals is that, if a certain intervention is offered to patients with poor acceptability, it may not be delivered as anticipated by the intervention designers, which might influence the intervention’s overall efficacy [103]. Patients’ perceptions of the acceptability of an intervention are influenced by a number of factors, such as how well it manages the clinical condition, how well it integrates into the patient’s lifestyle, and how convenient it is [103].

2.15 Disinformation and misinformation

Disinformation is known as purposely making misleading statements about facts with the goal of spreading false information to mislead [82]. While misinformation is defined as erroneous information that is spread without the purpose of causing damage or harm, this is done through rumours, conspiracy theories, parodies, misleading statements, and unsubstantiated facts [82]. Misinformation and disinformation regarding COVID-19 are significant fields of research not only theoretically but also because erroneous ideas have the potential to have practical repercussions in the real world.

Many conspiracy theories have surfaced regarding the COVID-19 vaccine. Some of the concerns that were raised linked the vaccine with the use of implanted tracking devices, including microchips and digital IDs, the emergence of social credit systems, and the suppression of information on the internet by technology corporations and government security agencies [73]. Another was the 5G narrative, although viruses cannot be transmitted via wireless technology, conspiracy theories linking 5G wireless technology to COVID-19 emerged, leading to the destruction of more than 70 cell towers in Europe (mostly the United Kingdom) and Canada [104]. There is also the narrative that the virus was developed in the laboratory. According to research, COVID-19 is a zoonotic virus [105]. However, authorities in both the United States and China have accused the other of purposely producing COVID-19 in a laboratory, frequently implying that the military was involved [105]. This confirmed people's perception that the COVID-19 pandemic was all about global power or influence, and they were just pawns in the elite's game [106, 107].

Misinformation has the power to swiftly spread, altering people's behaviour and maybe even motivating them to take bigger risks (73). All of these actions worsen the pandemic, affecting more people while endangering the viability and efforts of the global health system [82]. Following erroneous claims of vaccine side effects from the media in Denmark and Italy between 2013 and 2018, misinformation was shown to be the main factor contributing to the considerable decline in young females receiving HPV vaccines in Denmark and Italy [108]. Misinformation and disinformation have the potential to do serious harm and hinder vaccination uptake. False information may be difficult to rectify in the public domain because it demands faith in the source of the information, yet the nature of disinformation frequently assumes that experts or authorities are trying to hide the truth from the public [104].

2.16 Motivators

The primary motivators for COVID-19 vaccination have been suggested to be the following, the belief that the vaccine is efficacious, and the wide population's willingness to take the vaccine if the vaccine is proven or believed to work against that particular disease [35, 109]. The potential benefits of relaxing COVID-19 restrictions like social distancing and travel limitations were also motivators towards vaccination [109]. Individuals had the hope that if they got vaccinated, they would go back to their normal livelihoods before the

pandemic. Other people were vaccinated because they wanted to be responsible citizens in the world and assist in the fight against the virus [109]. Some individuals were vaccinated because it was a requirement at their workplace or educational institution [73]. Even sports personnel had to be vaccinated to compete in their respective sporting tournaments in different countries which required all individuals visiting to be vaccinated [73].

2.17 Knowledge

Elements that can help in successfully promoting vaccine acceptance and adoption are knowledge and awareness [70, 100]. Knowledge is the understanding or awareness of information obtained from learning, studying, or experience [110]. Knowledge can also be explained as a highly valued condition of being in cognitive contact with reality [111]. Knowledge may be tacit or explicit [110]. Tacit knowledge is perceived and implemented unconsciously, it is difficult to describe, and it is acquired by direct experience and practice [110]. Most often, tacit knowledge is passed on through highly interactive discussion, story-telling, and experiences that are shared [110]. Contrarily, explicit knowledge may be expressed more accurately and explicitly [110]. As a result, although it is more abstract, it may be more readily defined, documented, transferred, or shared [110]. Additionally, knowledge may be both general and specific. General knowledge is extensive, frequently made available to the public, and unrelated to specific events. On the other hand, specific knowledge is situation-specific [110].

2.18 Perception

Perception is the way sensory data is organized, analysed, and consciously perceived by an individual [112]. This generates a meaningful awareness of the surrounding world. Personal experiences, emotions, motives, and expectations may all impact perception, which may result in perceptual illusions and misinterpretations of reality [112]. Perceiving includes several cognitive processes, including attention, sensation, and memory, which allow us to recognize, comprehend, and interpret our environment [112]. How individuals perceive themselves may significantly impact their behaviour, emotions, and overall well-being [112]. This may change over time as a result of influence from both new experiences and other people's suggestions. Other cognitive, emotional, and cultural elements that impact perception include expectations, personal biases, and stereotypes [112]. In some cases, past experiences shape how individuals perceive something.

2.19 Mandatory vaccination policies/ travel passports

Current COVID-19 vaccinations appear to have considerably influenced lowering COVID-19 morbidity and mortality [81]. Vaccination policies have evolved substantially during the COVID-19 outbreak, with the quick rise of population-wide vaccine requirements, domestic vaccine passports, and various limitations on individuals depending on their vaccination status [73]. The year 2021 saw governments, together with the science

community, implement mandatory proof of vaccination policies as a strategy to get people vaccinated to control the COVID-19 pandemic [73]. These policies have led to numerous debates from a scientific, ethical, legal, practical, and political point of view [73]. Some countries had laws requiring everyone entering the country to be vaccinated against COVID-19 [73]. Some work and academic institutions put down mandatory vaccination laws for workers or students working or studying within the institution's premises [73]. These mandatory laws or policies prompted mass protests on the streets and social media platforms from both the community and political oppositions in various countries.

Vaccine mandates are not new to the COVID-19 vaccine, they have existed in some settings, such as schools e.g., the measles vaccine, and travel for vaccines like Yellow fever, Japanese encephalitis virus, and Typhoid vaccine [113]. In the workplace, the Hepatitis B vaccine (HBV) is mandatory for healthcare workers or those in medical laboratories [114]. Mandating vaccination of people is one of the most powerful and effective public health approaches; however, it comes with huge potential negative effects that can cause nearly irreversible damage and erosion of trust in the healthcare system [73]. Therefore, authorities should be careful when using this approach to ensure they still withhold ethics and maintain trust in health institutions [73]. Mandatory vaccinations, passports, and segregation limitations create an atmosphere in which reluctance effects are amplified because people with low vaccine confidence interpret contradictory information as reinforcing their suspicions and fears.

2.20 Conclusion

The literature on COVID-19 vaccines has been examined in this chapter. The basic ideas used in this investigation were established from the literature. This chapter began with a worldwide overview of SARS-CoV-2, then maternal vaccination, before exploring the challenges of COVID-19 maternal vaccine rollout globally, especially in South Africa. The chapter emphasised the significant incidence of vaccine hesitancy, which accounted for poor vaccination rates. The chapter went on to describe the many health behaviour obstacles, drivers, and decision-making processes that influence vaccine acceptance rates.

2.21 Research Aims and Objectives

2.21.1 Research aim

The study aimed to understand the barriers and motivators for pregnant women's uptake of the SARS-CoV-2 vaccine in Soweto, South Africa.

1.21.2 Specific Objectives

The study has three following objectives:

1. To understand barriers to SARS-CoV-2 vaccine uptake among pregnant women in Soweto.

2. To understand motivators for SARS-CoV-2 vaccine uptake among pregnant women in Soweto.
3. To explore the decision-making process of vaccine acceptance, particularly looking at factors that or significant others who influence the decision-making process for women in Soweto.

1.21 Research question

What are the motivators, barriers, and decision-making processes that influence acceptance of the SARS-CoV-2 vaccine among pregnant women in Soweto, South Africa?

CHAPTER THREE THEORETICAL FRAMEWORK

3.1 Introduction

The theoretical framework on which this study is based is discussed in this chapter. This theoretical framework provides a basic review of current concepts, serving as a blueprint for the Health Belief Model (HBM). The HBM is a theoretical phenomenon that many academics have used to characterise the healthcare system.

3.2 The Health Belief Model

The Health Belief Model was developed in the 1950s by social psychologists Godfrey Hochbaum, Irwin Rosenstock, and Rosenstock and Kirscht [59]. These social scientists developed the HBM to comprehend why people fail to use disease prevention programmes or screening procedures for early illness diagnosis. According to the HBM, a person's chance of adopting a behaviour may be predicted by how much they believe that they are at risk of contracting an illness or disease as well as how much they believe in the recommended health behaviour [57, 58]. The idea is supported by five basic structures and foundations: perceived susceptibility, perceived severity, perceived benefit, perceived self-efficacy, and cue of action [57-59].

3.3 Perceived susceptibility/ perceived vulnerability

A person's perception of their vulnerability to developing a certain illness is referred to as perceived susceptibility [115]. A person must feel they are at risk of disease, sickness, or unfavorable health consequences to take action [57, 58]. If people feel they are susceptible to an illness and believe that taking a certain course of action will help them reduce their vulnerability to the disease, they will take action to protect themselves. When they feel like the expected advantages of taking action outweigh any barriers or costs of action, people are more inclined to act in ways that they believe would lower their risks. People are more inclined to take action to avoid contracting an illness when they feel they are at risk of it [57]. The inverse is also true: individuals prefer to act in less healthy ways when they think their risk is minimal or nonexistent [115]. In the context of COVID-19 vaccination, individuals with a high perception of susceptibility to the virus decide to vaccinate to protect themselves from the health threat [116].

3.4 Perceived Severity

Perceived severity refers to a person's perception of the seriousness or severity of an illness [57]. Severity can be determined by medical implications, such as death or disability, or by personal views about how the medical condition or sickness will influence their life [115]. Social factors such as family life and interpersonal connections are considered when an individual is assessing the severity of a disease. When it comes to accepting the COVID-19 vaccine, a person must believe that the virus or infection would have serious consequences and that vaccination is the best way to reduce the severity of the illness [116]. The idea that getting

COVID-19 infection can cause serious complications to their health and the fear that they will be very sick if they get infected by the virus was a reason individuals took the COVID-19 vaccine [116].

3.5 Perceived Benefits

The significance or effectiveness of a new behaviour in decreasing the risk of disease is referred to as perceived benefits. Individuals need to have faith in the change's ability to produce beneficial outcomes if they are to make that change. A person's ideas about the perceived benefits of the potential actions for reducing the disease risk will determine whether or not their perception of personal susceptibility to a significant health threat leads to a change in behaviour [57]. Even when someone thinks they are susceptible to a disease, there are situations when the advantages of altering behaviour are not substantial enough to prompt a change [115]. Individuals with ideal beliefs in susceptibility and severity are not likely to accept any advised health activity unless they regard the action as possibly beneficial by reducing the risk to themselves [57]. In the context of COVID-19 vaccination, people take the vaccine because it lowers the chance of them getting infected by the virus [116], hospitalization as well as reducing the chances of mortality [5]. There can also be other non-health-associated perceptions such as financial benefit linked to behavioural change or acceptance of a medical intervention [57]. COVID-19 uptake was motivated by giving financial incentives to the vaccine recipients [117], this is an example of perceived benefit.

3.6 Perceived Barriers

The most important component in influencing behaviour change is perceived barriers. Perceived barriers are a person's perception of the difficulties of behaviour change, these barriers can be both tangible and intangible [57]. On the one hand, tangible constraints may include a lack of resources like finances and transportation [57]. On the other hand, inconvenience, fear of pain, resentment, or anxiety are examples of intangible obstacles [57]. To adopt a new behaviour, a person must feel that the advantages of the new behaviour exceed the possible barriers of the current behaviour. People engage in a form of unconscious cost-benefit analysis when they compare the anticipated advantages of an action against any perceived barriers [57]. They will acknowledge that the intervention might be beneficial to them but also consider factors that could be costly, have undesirable side effects, be uncomfortable, inconvenient, or time-consuming [57]. With regards to the COVID-19 vaccine uptake, perceived barriers documented include concerns about the efficacy, safety of the vaccine and side effects associated with taking the vaccine [116].

3.7 Cues to Action

Cue to action can be defined as the “readiness to change” [58]. Cues to action are events, persons, or objects that cause individuals to alter their behaviour [115]. Social media, peer advice, and advice from an ill family member all serve as indicators. Changes in confidence, attitude, and motivation to change behaviour are sparked by

experiences and social influence from health habits [118]. A cue to action might come from one or several of the components that make up an individual's entire being [118]. It might result from new information, the individual adopting something new, social influence, experience, shifted self-confidence, attitude, or underlying readiness to change [118]. Elements that influence an individual's readiness to accept the COVID-19 vaccine are, having sufficient knowledge about the vaccine and the vaccine being accepted by many people around them [116].

3.8 Self-Efficacy

Self-efficacy refers to a person's confidence and belief in his or her capacity to take action or accomplish a specific behaviour [115]. People often do not attempt to acquire new behaviours unless they feel they can do so. A person who believes that changing their behaviour is worthwhile (such as being a perceived benefit) but is doubtful of their capacity to do so is unlikely to try to modify their way of life. After considering all factors, individuals decide whether to engage in certain behaviours, such as treatment linkage or adherence. A person also evaluates their level of ability (self-efficacy) to carry out the recommendations in light of the obstacles [58]. According to a study conducted in Vietnam, self-efficacy has a substantial influence on an individuals views about COVID-19 vaccinations and has had a major role in determining one's desire to take the COVID-19 vaccination [119].

3.9 Conclusion

This chapter outlined the theoretical framework that serves as the foundation for this investigation. This study used the health belief model to explore the motivators, barriers and decision-making process to COVID-19 vaccination. Perceived barriers are the primary reason why individuals are vaccine hesitant. While perceived benefits, perceived susceptibility and perceived severity could be the key factors in vaccine uptake. Vaccination decisions are shaped by perceived benefits, self-efficiency, and cues to action. However, in the context of COVID-19 vaccination, these elements of the HBM could fit in either as a factor for vaccine acceptance, vaccine hesitancy or even decision-making.

CHAPTER FOUR METHODOLOGY

4.1 Introduction

The study's research methodology, which includes a description of the study location, population, research design, sampling technique, design of the research instrument, and data collection and analysis, is covered in this chapter. The research questions, the study's purpose, its aims, and its objectives formed the foundation of the methodological methods used in this study. This section contains background information about the research site, the community where the study participants are from, and the inclusion and exclusion criteria used to enrol participants. Discussing the data collection approach in this section was intended to justify the use of Key Informant Interviews (KII). The ethical guidelines that were followed throughout the study procedure are also described. This chapter also has a description of data transcription, translation, and analysis, as well as the study's limitations.

4.2 Study Design

This study was cross-sectional qualitative research using exploratory research methods. A cross-sectional study is a form of research design in which data is collected from participants at one point in time and the variables are observed without being influenced [120]. Qualitative research is known as the technique used to answer questions about a participant's perspective, experience, meaning, and point of view on a certain issue [40]. In contrast to quantitative research approaches, qualitative investigations collect, organise, describe, and analyse written, vocal, or visual evidence systematically. Qualitative research enables the researcher to identify the concerns of the participants from their point of view [40]. This allows the researcher to comprehend and analyse particular behaviours displayed by participants. This is sometimes referred to as an interpretative approach [45]. Qualitative research involves studying people's natural settings to understand how social, cultural, religious, and physical surroundings impact their experiences and behaviours [121].

Exploratory study focuses on research questions that have not before been thoroughly investigated [38]. Explanatory research questions often ask the "why" or "how," aspect of the research topic, to explain why or how a previously investigated event occurs. Exploratory research is done to identify the problem's nature; it is not meant to offer validation that the problem exists [38], but rather to give us a better understanding of it. Preliminary findings are frequently used to provide the framework for further investigation [38]. The benefits of exploratory research include lower study expenses, flexibility, and adaptability to change. For this study, this form of research approach was typically undertaken to investigate an issue that has not yet been fully characterised.

4.3 Study Site

This study was undertaken in five clusters Thulani, Thembelihle, Meadowlands, Freedom Park, and Emdeni, which are found in Soweto.

4.3.1 Soweto

Soweto which is an acronym for "South-Western Townships" is mostly a black African community, with 98.5% of the population being black Africans. The area of Soweto which was the suggested research location for data collection is made up of a group of 29 townships South-West of Johannesburg, South Africa. A population of over 1,7 million individuals, with a diversity of religious views as well as cultural, social, and racial origins, as reported by Statistics South Africa [122]. It is mostly a black African community, with 98.5% of the population being black African. Females account for 50.4% of all people in the area. Females of reproductive age account for 29.3% of the population, there are 40,3% female-headed households [122]. The populace speaks a variety of languages, the most common of which is isiZulu (37.7%), followed by Sesotho (15.5%), Setswana (12.9%) other languages include IsiXhosa, Xitsonga, and Tshivenda (12.9%) [122]. At all ages, the degree of education varies, with 9.8% having higher education, 38.3% having matric, and 37.5% holding some secondary education [122].

4.3.2 Thulani

Thulani township is located close to the Doornkop and Dobsonville townships respectively. Thulani is one of many new townships, such as Bram Fischerville, which were built in the mining region northwest of Soweto in the 1990s and early 2000s [123].

4.3.3 Thembelihle

Thembelihle is an informal settlement with approximately 7000 households, located in Lenasia, which is South of Johannesburg. This settlement was established in the early 1980s as a result of a land invasion, which was pushed by politicians in the latter days of apartheid [124].

4.3.4 Meadowlands

Meadowlands is a township located in the Northern part of Soweto. Meadowlands is one of the more established areas, such as Orlando township. During the Apartheid period in the early 1950s, the government built Meadowlands to shelter families who were moved from Sophiatown and the neighbouring areas [123].

4.3.5 Freedom Park

Freedom Park is situated around 30 kilometres South of Johannesburg. Freedom Park rose out of informal settlements that emerged around hostels that sheltered migrants working in Devland's industrial district [125]. Freedom Park is a structured community with a mix of Reconstruction and Development Programme (RDP) homes, bonded stock, and shacks. The region has a long history of small-scale agriculture, stock, and dairy production [125].

4.3.6 Emdeni

The Emdeni township residents moved in following the relocations from Eastern Native Township and George Goch to Emdeni and other areas such as Senaone and Zola townships, as well as the establishment of hostels in the late 1950s to accommodate migrant workers [123].

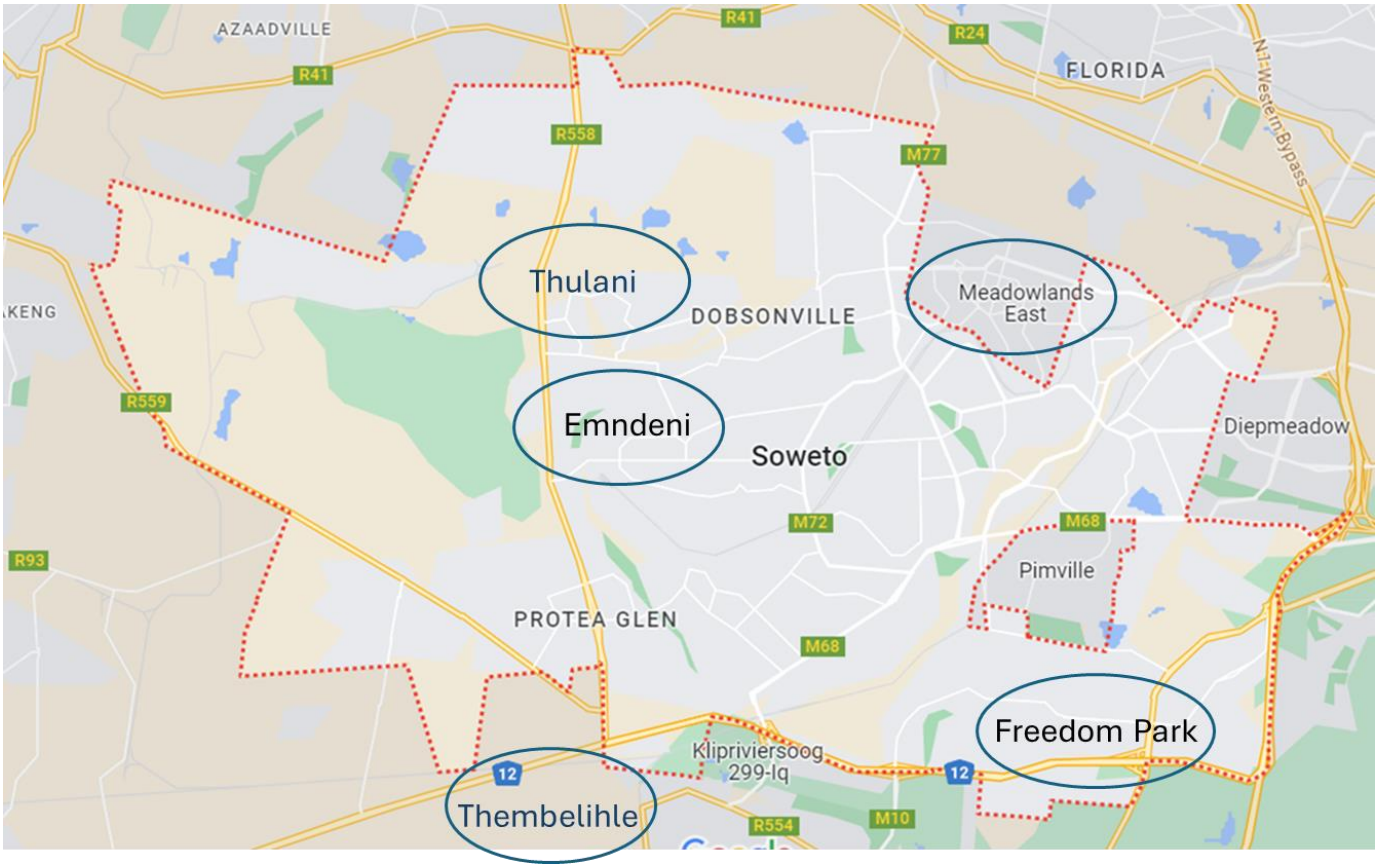

Figure 4: Map of Soweto [126].

4.4 Study population

The study population were pregnant women above the age of 18 years who live in Soweto. This age range was chosen because individuals under the age of 18 are considered minors and require parental consent to participate in research studies. By focusing on pregnant years women above 18 years, the study can ensure that participants can legally provide informed consent for themselves. A portion of these pregnant women

were not vaccinated against COVID-19 and some were vaccinated against COVID-19 before getting pregnant or during the current pregnancy. Local traditional healers, faith healers, and healthcare workers in the community and clinics were also included participants in the study, this was done to gain understanding and explain their influence based on the SARS-CoV-2 vaccination recommendations they offer pregnant women. Individuals under the age of 18 years were excluded, and those who did not want to be part of the study.

Table 4.1: Study participants demographic

Participants	Total number
Unvaccinated women	5
Unvaccinated women	5
Traditional healers	2
Faith healers	2
Healthcare workers	2
	Total =16

4.4.1 Sampling Strategies

Purposive sampling and snowball sampling were the techniques used to recruit participants in the study. Purposive sampling is a non-probability sampling strategy in which participants are chosen because of the attributes they possess, and which are required for the study. In other words, participants are selected "on purpose" in purposive sampling [41]. In qualitative research, purposeful sampling is commonly employed to identify and choose information-rich participants linked to the topic of interest. Participants were selected from the Pregnancy surveillance database under the Child Health and Mortality Prevention Surveillance (CHAMPS). Snowball sampling is one of the most used qualitative research sampling methods. Snowball sampling is a technique in which already enrolled research participants invite new participants for a study [42]. It is utilized when finding suitable participants which were difficult to find [42]. This strategy was used to recruit the traditional healers and faith healers. The study used people who are referred to as "foot soldiers," these are well-respected people from the community who served as the neighbourhood's gatekeepers and were essential when recruiting participants.

4.5 Methods of Data collection

Methods of data collection are techniques of acquiring and evaluating information used by researchers to solve the research problem. The section that follows gives a description of the research population, the sampling strategy, and the data collection approach using Key Informant Interviews (KII).

4.5.1 Key informant interviews (KIIs)

Key informant interviews are qualitative, in-depth discussions with individuals who are knowledgeable about the community around them and know what's going on [44]. The goal of key informant interviews is to gather information from a diverse group of people who have first-hand knowledge about the surrounding environment, event, or experience, such as citizens facing the challenge, community leaders, or professionals. A series of open and closed questions were used during key informant interviews, these are pre-planned but not always strictly followed. They were a practical technique for gathering raw data. The advantages of KIIs include collecting rich and detailed data [44], making it suitable for investigating perceptions, viewpoints, attitudes, barriers, and motivations making it a preferable method for qualitative data collection. KIIs are also a great approach for providing cultural and religious insights. In this study, all the participants were KIIs who gave insight into the motivators, barriers, and decision-making process regarding the vaccination of pregnant women against COVID-19. To achieve this, a semi-structured interview (SSI) with open-ended and closed-ended questions was conducted. The KIIs lasted less than 60 minutes each.

Healthcare workers (HCWs) play a pivotal role in the healthcare system, and have, and remain in the frontline response against the COVID-19 outbreak. The input of HCW regarding vaccination was reported in previous studies to be motivating for some expecting women [100]. Healthcare workers monitor the mother's and foetus' health, give emotional support, and educate the pregnant woman and her family on physiological and psychological changes throughout pregnancy, foetal development, labour and delivery, and infant care. Therefore, to understand how the decision to vaccinate during pregnancy is influenced by HCW, they were interviewed.

Traditional and spiritual healing methods are widely used, even though there are prenatal and perinatal methods utilised throughout the African continent [127]. Particularly in the African environment, where diseases have long been connected to spiritual consequences, religion, and health are thought to be associated, and faith healing is also an alternative method of healing [128]. Understanding regional cultural perspectives and conventional healthcare systems is necessary to understand why pregnant women are motivated or demotivated to take the COVID-19 vaccine.

In qualitative research, saturation is used as a criteria for stopping data collection and analysis [43]. Saturation occurs when there is no more data available for social scientists to extract new themes or codes [43]. When a

researcher observes comparable cases repeatedly, the individual gains empirical confidence that saturation has been reached. Saturation may refer to the degree to which specified codes or themes are effectively represented in the data. [43]. This study reached saturation after interviewing 10 study participants.

4.5.2 Research tool

A research tool is a device or equipment used in the data-gathering process to address the research topic. In this study, in-depth face-to-face interviews with key informants (KIs) and observation were used. These were semi-structured interviews that included open-ended questions and prompts that acted as a guide for the facilitator to use during the interview. After asking a question, the researchers gave the participants some opportunity to reply and comment. The interview guide was divided into multiple sections, each with a separate collection of questions and related prompts related to the primary study topic. There were statements in the interview guide that ensured a smooth transition to the next section of questions. The guide was structured in a way that made it possible for the conversation to move naturally among the participants and facilitator while avoiding repetition.

4.6 Ethics Considerations

The study was carried out following ethical research guidelines, and the researchers ensured that no ethical difficulties emerged. The study observed the four fundamental principles of ethics. Autonomy, which is every participant had the independence to make choices based on their views and values. The study avoided maltreatment, minimised harm, and promoted beneficial conduct toward participants which was beneficence. Non-maleficence was maintained during the study, the study participants were not harmed before or during the interviews. For the duration of the study all participants were treated fairly on both a personal and societal level, hence there was justice in the study. The study ensured that any person experiencing emotional distress would have access to a bereavement therapist. Throughout the study, the subjects were not subjected to any kind of harm.

Anonymity

To ensure that the identity of the study participants remained anonymous, a unique study ID number was given to each study participant. Any information such as the demographic information that could be used to identify the study participants was not included in the data analysis and write-up.

Confidentiality

Participants were assured that the information collected from the study was only for academic purposes and solely to answer the study's research question. Information in the form of audio or transcripts was not shared with anyone, and the confidentiality of the participants was always maintained.

Informed Consent

Before enrolling in the trial, participants were given verbal and written information about the study. The information sheet included a statement of confidentiality and anonymity as well as the aim, scope, and objectives of the study. An informed consent form was given to the participants to sign if they were willing to be enrolled in the study. Participants were made to understand that it was voluntary to take part in the study. Participants were also informed that they were free to withdraw from taking part in the study whenever they decided to do so without incurring any consequences. The participants were given an incentive of 250 South African Rands and a meal to compensate them for their time.

The study was reviewed and granted ethical clearance on the 14th of March 2023 by the University of the Witwatersrand Human Research Ethics Committee – Medical (reference no. M221106). The WITS-VIDA pregnancy surveillance management team granted consent and permission for their database usage.

4.7 Data Translation, Transcription, and Analysis

The following section demonstrates the researcher's data analysis approach used during the analyses and interpretation of the key informant interview data.

4.7.1 Translation and Transcription

After the collection of data from interviews, transcription, and translation are essential, which are the initial stages of data analysis for qualitative research. According to Poland, verbatim transcription is the process of accurately reproducing spoken components in writing word for word from audio recordings [129]. On the other hand, translation is the process of identifying the equivalent meaning of a text in a second language [130]. Nonverbal cues, such as silences and body language, and emotional elements, such as sobbing, coughing, and sighing, were incorporated into the transcribed text in addition to spoken words as has been discussed by publications [131]. Meaning equivalency during translation was emphasised since meaning is the main subject to be reproduced from the source language text into English. In this study, the researcher was assisted by research assistants with the transcription and translation of the interviewers. Notes taken during each key informant interview were incorporated into what was on the before the data was analysed. Only the researchers had access to the transcriptions, which were stored in password-protected Microsoft Word files. The transcriptions for each conversation were reviewed for quality before data analysis.

4.8 Data Analysis

Data was analysed using thematic analysis' technique called thematic analysis entails going over transcribed data sets from KIIs to look for patterns and then methodically establishing codes following the patterns found [45]. Data analysis was done following the step-by-step guidelines illustrated by Braun and Clarke [45]. The two

researchers familiarised themselves with the data, through transcription, reading and re-reading the transcripts, and making notes from initial ideas from the data. The transcripts were then uploaded on a qualitative analysis software NVivo. On this software initial codes were generated; codes identify and designate a component of the data that may be important to answer the research topic. Interesting extracts of the transcript speaking to that code were grouped under that code. Then, searching and creating themes was done by grouping codes that have the same meaning. These themes are profound, significant, and descriptive of the subject matter. The themes enabled the construction of a narrative-based interpretative analysis and made arguments based on the evidence [45].

The analysis focused on themes as well as codes that answered the research question. The themes were then reviewed to ensure that they were still about the codes under them. Reviewing the themes also included the addition, removal, and merging of some codes. Moving from codes to themes, analysis begins to take shape. Codes are the foundation of analysis, while the themes provide the "thematic map" towards analysis [45]. These themes were then defined and named, these entailed determining the 'essence' of what each theme was about and determining what part of the data each theme captured. The final phase of data analysis was producing the report. To tell a compelling story based on the theme map and analysis, extracts answering the research question were selected and the report was written.

4.9 Data management

A system which organized the audio files, transcripts, and any other related documents was created. A folder structure on the computer was created and there was also a cloud-stored backup version. Develop a coding system to categorize and analyze the data from the transcripts. To protect the confidentiality and privacy of the study participants the folders were encrypted and limited access to authorized personnel only.

4.10 Limitations

The decline in COVID-19 cases and fatalities led people including pregnant women to stop worrying about the virus, and there was a decline in the SARS-CoV-2 vaccine uptake. The result of people losing interest in the COVID-19 topic led to poor cooperation from the potential study participants when asked to participate in the study. The testing of the tool was supposed to be done on pregnant women.

4.11 Conclusion

This chapter discussed the methods and techniques used to conduct the study and collect the data essential to meet the study objectives. The chapter gave background information on the research study site along with a brief history and geographical information for the five study areas. The chapter was able to give the two types of sampling strategies that were used for enrolling appropriate participants for the study. In addition, the chapter also included a detailed overview of the data collection methods, including the study design and the

chosen research tool, which were key informant interviews. The ethical guidelines that this study adhered to were covered in this chapter. The chapter concluded by examining the qualitative data analysis techniques used to produce the findings from the key informant interviews. It also discussed various challenges encountered throughout the research process.

CHAPTER FIVE RESULTS

This chapter covers the results of the data analysis as well as an interpretation of the data obtained from the key informant interviews. The data will be presented in alignment with the study objectives and the theoretical frameworks covered in the third chapter.

5.1 Demographic information

Age

Five of the study respondents were aged between 18-24 years, 4 participants were aged between 25 and 34 years, while only 1 participant was aged above 34 years. All the pregnant women were in the last two trimesters of their pregnancy, with half of the participants in their second trimester and the other half in the third trimester. The study found that half of the respondents were dating or had boyfriends, while the other half were single. There were 5 vaccinated pregnant women and 5 unvaccinated pregnant women. In the study a majority of 7 pregnant women were unemployed, 2 were students, and only 1 participant was employed. All this is illustrated in Table 2 below.

Table 5: Pregnant women demographic frequency table

Variables	**Frequency (n)**
Age range (years)	
18-24	5
25-34	4
35-44	1
Trimester	
1st trimester	0
2nd trimester	5
3rd trimester	5
Marital status	
Single	5
Dating (have a boyfriend)	5
Vaccination status	
Vaccinated	5
Unvaccinated	5
Employment status	
Employed	1
Unemployed	7

Student	2

The education level of all study participants

Education level was not taken into consideration throughout the selection process. Most of the study's respondents went to high school and/or have some high school education. A very small number of individuals were able to pursue higher education and finish tertiary. This can be seen in figure 5 below.

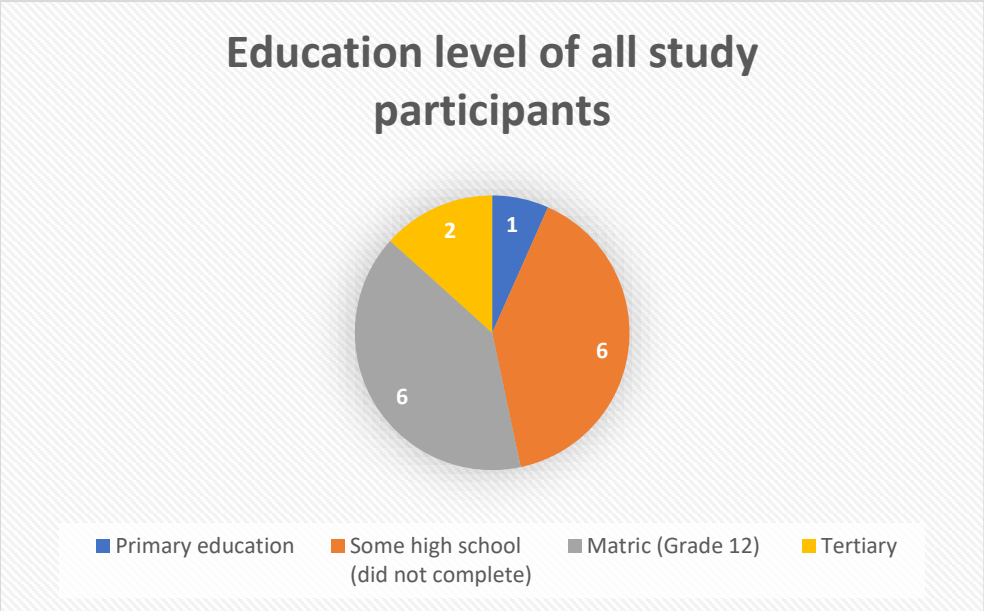

Figure 5: The education level of all study participants

5.2 Motivators for SARS-CoV-2 vaccine uptake among pregnant women

The study explored the motivators or facilitators for taking the COVID-19 vaccination as per the study objectives. These are the reason(s) that made the pregnant women get vaccinated against COVID-19 and they include positive views of pregnant women towards the vaccine, health concerns, influence from others, structural requirements, and monetary benefits.

5.2.1 Positive views on pregnant women getting the COVID-19 vaccine.

Participants reported different views on pregnant women getting the COVID-19 vaccine. These were opinions from the participants that were in favour of vaccination because participants felt it is safe to vaccinate and it will protect both mother and child.

Views in support of pregnant women getting the COVID-19 vaccines.

A faith healer who supported the vaccination of pregnant women stated that prevention is better than cure and that doctors are to be trusted because they would not put the lives of a mother and child in danger.

"*What I can say sir is that we trust the Lord that prevention is better than cure. So, doctors would never put the lives of the child and mother at risk. That's why we trusted them, as long as the doctor approves it, then everything is approved"- Faith healer 001*

A vaccinated pregnant woman showed support for the maternal vaccination against the COVID-19 virus, given that the vaccine does not harm the foetus and does not cause side effects to the mother.

"If ever it's something that has to happen and if it won't harm the foetus then she can be vaccinated, but if there will be an after-effect no"-Vaccinated pregnant woman 002

An unvaccinated woman stated that the COVID-19 maternal vaccination was the right thing to do.

"I think it is the right thing to do"-Unvaccinated pregnant woman 001

She added that she thinks that vaccination during pregnancy against COVID-19 is the right thing to do for the protection of both the mother and child.

"So that both the mother and the baby can be protected"- Unvaccinated pregnant woman 001

The participants showed a positive view regarding the administration of the COVID-19 vaccine to pregnant women.

5.2.2 Health concerns

From the health concerns, pregnant women protecting themselves from the COVID-19 virus was one of the reasons that made them take the vaccine.

"but I had to go and vaccinate because I believe that it (vaccine) protects you right"-Vaccinated pregnant woman 003

"that we need to vaccinate because we wanted to protect ourselves, so we all went to get vaccinated"- Vaccinated pregnant woman 004

The drive to protect the baby from the virus was another motivator that made a pregnant woman take the COVID-19 vaccine.

"I wanted to protect myself and my baby"-Vaccinated pregnant woman 005

The desire to protect those around them by preventing the spread of the virus was a facilitator that made one pregnant woman get vaccinated against COVID-19. She said,

"I wanted my family and children to be protected and we all went there (to vaccinate)" -Vaccinated pregnant woman 003

Another pregnant woman got vaccinated to avert death from COVID-19 sickness.

"I saw it fit for me to get vaccinated because I didn't want to die [laughs]"- Vaccinated pregnant woman 004

It was found that several individuals were motivated to vaccinate because they cared about their overall health and wanted to protect it.

5.2.3 Structural motivators

The study found some structural motivators that made pregnant women get vaccinated these were the following:

Travelling requirements

Most countries implemented COVID-19 vaccination laws for visitors entering their country. This prompted this particular pregnant woman to get the COVID-19 vaccine because her whole family was visiting another country. She said,

"As I have said before that you cannot go to another country to visit, they require the certificate (COVID-19 Vaccination certificate)"-Vaccinated pregnant woman 003

Educational institution requirements

It was found that a study participant needed to take the COVID-19 vaccine to be admitted to school, regardless of her personal preference not to receive the vaccine, she ended up taking the vaccine.

"So really, I didn't want to risk my life like that, but I had to take it to gain entry at school". -Vaccinated pregnant woman 001

Employment opportunities

In some cases, job seekers were required to be vaccinated for them to stand a chance of being employed. These reasons shifted the participants towards wanting to get vaccinated against COVID-19.

"They didn't say we will lose our jobs, but they said we should get vaccinated"-Vaccinated pregnant woman 002

An unvaccinated job seeking pregnant woman said that the only reason for her to consider vaccination was because she wanted to be employed as employers want proof of COVID-19 vaccination.

"For me, it is a job I won't lie, it is only a job"-Unvaccinated pregnant woman 005

The study found that employment opportunities were motivators to get pregnant women vaccinated. Some employers put in place mandatory COVID-19 vaccination policies for all workers.

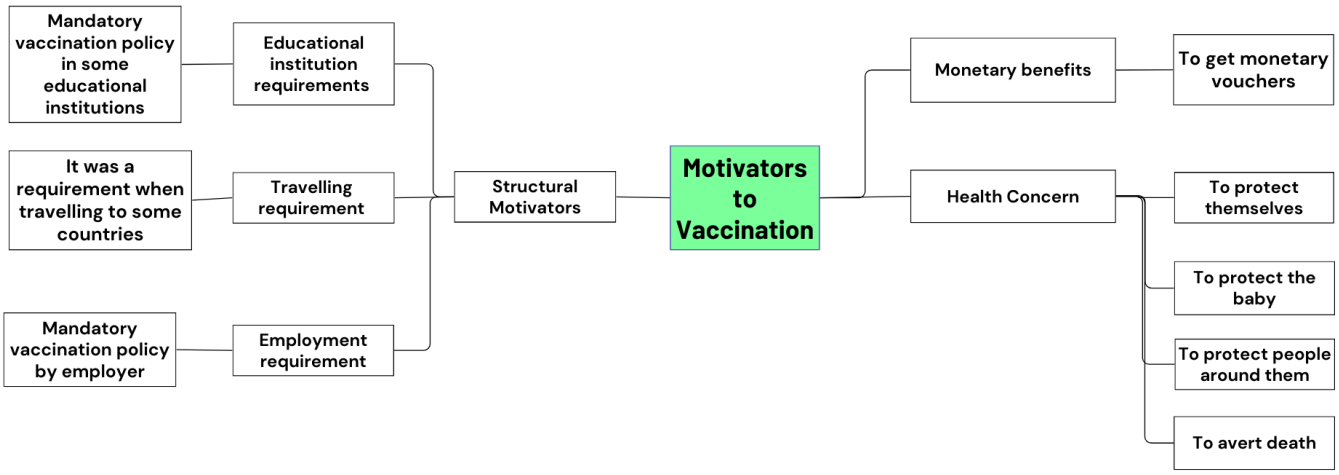

Figure 5.2: Motivators towards COVID-19 vaccination.

5.3 Decision-making process of vaccine acceptance among pregnant women

The study explored the decision-making process involved in the COVID-19 maternal vaccination, to understand this participant's knowledge on COVID-19 and the COVID-19 vaccine of was explored.

5.3.1 Sources of COVID-19 and COVID-19 vaccine information

Understanding where the participants acquired the information from, painted the picture of how the pregnant women get to decide on vaccination.

These traditional media outlets like television and radio, and social media sites like Facebook and WhatsApp were among other sources.

> *"They were mentioning it on radios"- Vaccinated pregnant woman 004*

> *"I got most of it from social media"- Unvaccinated pregnant woman 002*

Some participants reported to have also obtained information from schools, their workplaces, the government, and medical professionals. The Vaccine App which is a mobile App that provides the latest news on the COVID-19 vaccine was also a source of information for some pregnant women. A vaccinated participant mentioned that internet search engines were also a source of information for her.

> *"Most of the time there is a Gazette from the government when there is this new disease"- Healthcare Worker 001*

"No, I don't, I rely on Google"-Vaccinated pregnant woman 001

The study participants reported to have been obtaining COVID-19 and vaccine information from a variety of sources.

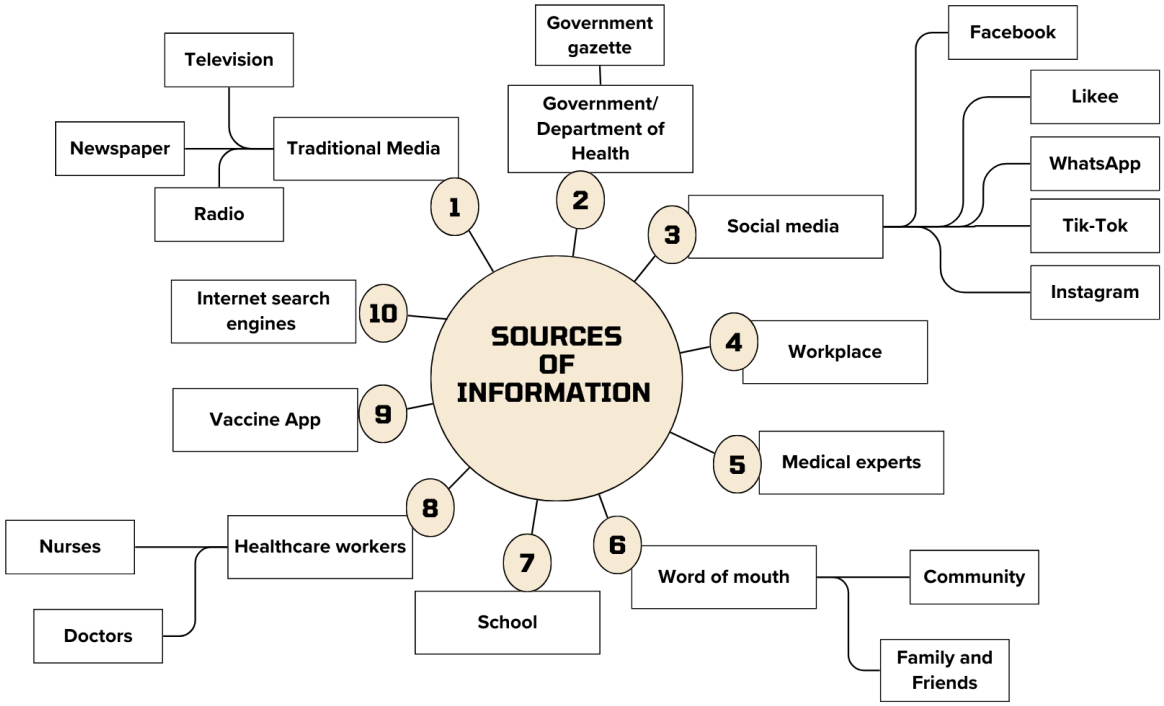

Figure 5.3: Sources of COVID-19 disease and vaccine respectively.

5.3.2 Knowledge on COVID-19 and vaccine

Participants' knowledge on COVID-19 and the COVID-19 vaccine was explored. This theme provides and discusses the knowledge of participants about COVID-19 and how it is transmitted. This theme also offers information on COVID-19 preventative strategies that participants were aware of and those that they are adopting to protect themselves against COVID-19. The study explored the knowledge of participants regarding COVID-19 and the COVID-19 vaccine. Participants were found to have some information on the COVID-19 disease, prevention, symptoms, vaccine, and transmission.

Knowledge on COVID-19 disease

Unvaccinated and vaccinated participants knew the country where the pandemic started, they mentioned that it originated in China and spread throughout the whole world.

"I know that it is a disease which comes from China and spread worldwide…"- Vaccinated pregnant woman 002

"Well, COVID was a disease, what did they say, it was discovered in China, it was 2019 or 2020 somewhere there"-Unvaccinated pregnant woman 004

One pregnant woman said that she knows that COVID-19 is a disease that makes people sick.

"I know that COVID-19 is a disease that affects people, and it makes them sick"-Unvaccinated pregnant woman 001

One participant described COVID-19 as a Flu that kills.

"*Well, I know that COVID-19 is a flu that kills people"- Vaccinated pregnant woman, 001*

Another pregnant unvaccinated woman said that she knew that COVID-19 was a disease that just came and according to her, the disease was a natural cause likening it to other diseases such as HIV.

"I know that COVID-19 is a disease that just came, and we don't know where it came from. As we don't know where it is coming from, it is like HIV and all these other diseases, according to me, it is a natural cause…"-Unvaccinated pregnant woman 003

A traditional healer highlighted that sees COVID-19 as an ancient disease, that is curable with indigenous methods such as herbs. She elaborated that since most people have abandoned indigenous healing methods the disease gained momentum and started spreading.

"According to me, COVID-19 disease is an ancient disease that was curable using traditional medicine. But now we have deserted the traditional ways only a few still follow traditional faith, and that is why the disease gained momentum and spread, according to my understanding." -Traditional healer 001

Knowledge on COVID-19 prevention

Participants had some knowledge of how to prevent the spread of the virus, they reported the use of face masks, social distancing, and sanitizers as a way of preventing contracting and spreading COVID-19.

"We were wearing masks and using sanitizers as well as keeping the social distance"-Vaccinated pregnant woman 001

"Using masks, social distancing, limiting the number of people in a venue, and sanitization of surfaces"- Vaccinated pregnant woman 002

Some participants stated that the elbow greeting instead of handshaking was a way of preventing COVID-19.

"You are not allowed to touch someone, you have to do the elbow greeting"-Vaccinated pregnant woman 003

Staying indoors and washing hands was another way of preventing COVID-19 spread that a participant knew.

"Staying indoors, when you go out wear a mask and by always washing your hands"-Vaccinated pregnant woman, 004

Knowledge on COVID-19 symptoms

Most participants described COVID-19 symptoms as a disease that is similar to Flu or a Flu-like disease.

"It is a disease that just came and makes you suffer from Flu, eish what can I say about the symptoms"-Pregnant woman vaccinated 005

"It is sort of a Flu, I think. As far as I know, it is sort of a Flu"-Unvaccinated pregnant woman 002

Another participant likened the COVID-19 symptoms to Tuberculosis and Swine Flu symptoms.

"...with similar symptoms with TB and swine flu it is a similar thing."-Pregnant woman vaccinated 005

Suffocation and failure to breathe were other symptoms mentioned by a traditional healer.

"...I had symptoms like suffocation and failing to breathe the body would be the other way around like it would be weak, and you had to rush and go test..."-Traditional healer 002

The participants said that COVID-19 symptoms vary from person to person, and some individuals may be asymptomatic hence the disease must be taken seriously.

"Remember the symptoms are very different. So sometimes it will be possible for one to assume that they don't have it while they do. So, it is something scary you would assume you don't have it while you do. So, you have to take it seriously"- Pregnant woman vaccinated 005

Knowledge of the COVID-19 vaccine

The knowledge of the COVID-19 vaccine from the participants was explored, and vaccinated participants reported that they knew that the COVID-19 vaccine prevents infection.

"I have heard that the vaccine helps through the immune system, so when you are vaccinated you won't get infected by COVID-19 easily"-Vaccinated pregnant woman 002

"I know that vaccines prevent the disease from infecting you. Even if it does, you won't get sick." Vaccinated pregnant woman 005

Regardless of the vaccination status, the study found that several pregnant women understood that the COVID-19 vaccination was a cure against the COVID-19 virus, which would eliminate the virus and prevent the death of people.

"And about COVID-19 vaccines I know that it is a cure that they brought which is meant to kill the COVID-19 virus."-Vaccinated pregnant woman 001

"And if you were able to vaccinate you will be cured, so you won't die."-Vaccinated pregnant woman 004

"The vaccines are a way of cure that must be given to people…"-Unvaccinated pregnant woman 001

One unvaccinated pregnant woman had some knowledge of some of the different vaccines that are available in South Africa, she knew that for a certain vaccine type, two doses needed to be administered at two-time intervals, while there was another vaccine type where the was only one dose to be administered.

"Yeah, I know Johnson & Johnson, and the other one I don't know its name"-Unvaccinated pregnant woman 004

"Yes, the one [Pfizer] you needed to take two shots for, they gave you dates to visit maybe today and then maybe after a month or two for you to come back and get a shot of that vaccine"- Unvaccinated pregnant woman 004

A healthcare worker who engages with pregnant women during antenatal care classes knows how the vaccine works, and that a vaccinated individual can get infected by COVID-19, but the severity of the disease will be milder compared to an unvaccinated individual.

> *"Nonetheless having vaccinated does not say you won't get COVID-19. But you might get it, but it's not going to be as harsh as it was going to be if you are non-vaccinated because you see non-vaccinated people dying. But for those who have vaccinated their numbers were like they were not bad. They would go get admitted to the hospital, but they would survive"-Healthcare worker 002*

A traditional healer mentioned that the vaccine works if an individual's immune system is strong, if the individual's immune system is weak vaccine will not have a significant impact.

> *"Eish, some survived because of the vaccine while some didn't. As I see it the vaccine was helping somewhere somehow, I would say that it would help you only if your immune system is strong, but if your immune system is weak then there isn't much that the vaccine can do for you, it is done with you"-Traditional healer 001*

Knowledge of COVID-19 transmission

Several participants knew how the COVID-19 virus is transmitted, participants mentioned that coughing is the way COVID-19 is transmitted.

> *"When someone who has it coughs and is not covering their mouth you get it"-Vaccinated pregnant woman 001*

> *"I forgot most of the things, but if another person is infected and starts coughing, yah"-Vaccinated pregnant woman 002*

One participant stated that COVID-19 transmission is similar to Tuberculosis (TB), whereby the disease agent remains in your hands if the hands are not washed.

> *"I don't know if you don't wash your hands and someone's germs, it is the same as TB...."-Pregnant woman vaccinated 005*

Views against pregnant women getting the COVID-19 vaccine.

Pregnant women preferred to take the vaccine after they have given birth because it is unknown whether she will experience side effects or not. This view was also supported by a traditional healer.

> *"They should take it when they have finished (given birth) [laughs]"-Vaccinated pregnant woman 004*

> *"According to me pregnant mothers are not supposed to get vaccinated they are supposed to follow the regulations and procedures of protecting themselves from getting infected by the virus and then vaccinate after they have given birth." -Traditional healer 001*

An unvaccinated participant believed that vaccination against COVID-19 is harmful, and it is like killing yourself and the feotus. This participant elaborated to state that she will never vaccinate because she does not even know where COVID-19 is coming from.

> *"When I think about that, I also think about the baby, seriously you are killing yourself and you are killing the baby as well. If it really kills it (vaccine) it is a risk"-Unvaccinated pregnant woman 003*

Despite being vaccinated herself a pregnant woman stated that, because she has seen some people experience side effects, she does not support the vaccination of pregnant women against COVID-19.

5.3.3 Decision-making process

The study aimed to identify the key individuals that influence pregnant women's decision-making concerning getting the COVID-19 vaccines were identified.

The study found that irrespective of vaccination status, most of the study participants expressed that they made their own decisions about vaccinating.

> *"Yes, we must take that decision ourselves"-Unvaccinated pregnant woman 003*

> *"No hey, it was my choice"-Vaccinated pregnant woman 005*

Other pregnant women voiced out that although they had discussions and sought advice from family members about the COVID-19 vaccines, this did not influence their decision-making at all since the power to decide whether or not to get vaccinated lay with them. They said:

"I do. But when it comes to advice, I always ask my mom. So, she will give me whatever advice I ask from her, but the power of decision-making lies with me"-Unvaccinated pregnant woman 001

"Here in the house, we used to discuss it because we were always indoors, we spoke about it and almost everyone in the house is vaccinated. Except for the young ones but all the grown-ups we discussed that we should get vaccinated, but it was that person's decision to get vaccinated or not"-Vaccinated pregnant woman 002

The study identified that mothers, aunts and mothers of the partners as the key individuals that pregnant women asked for advice. One participant stated that she asks and discusses everything regarding her pregnancy with her mother. However, she is the one to make the choice regarding her health.

"I do. But when it comes to advice, I always ask my mom. So, she will give me whatever advice I ask from her, but the power of decision-making lies with me"-Unvaccinated pregnant woman 001

This participant elaborated that she will also discuss health issues regarding her pregnancy with the mother of her partner if she needs to.

"... I always communicate with my mom and his (partner) mom if need be"-Unvaccinated pregnant woman 001

A pregnant woman mentioned that her aunt who is a retired nurse is the one who advises her regarding her pregnancy, and she always seeks advice from her regarding any health issues.

"It is my aunt because she was a nurse, so I discuss most of the things with her because I think she understands most of the things."-Vaccinated pregnant woman 002

The study also identified dual decision-making when it regards maternal vaccination. The participants below stated that they consult with their partners before making any decisions concerning their unborn child.

"Obviously, I must speak to the father of my child since I don't have parents. I must ask him to know that he is comfortable because the child is ours, not mine alone. So, I must communicate with

him to know if he is comfortable with 1,2,3, and then he will tell me if he is comfortable or not. Because sometimes you do things as a female while your male partner is against it"- Unvaccinated pregnant woman 002

"I don't have friends, but I did discuss with my partner, and he is vaccinated"-Unvaccinated pregnant woman 001

A healthcare worker mentioned that educating pregnant women about the COVID-19 vaccine influences them to decide against vaccination because as much as they are reluctant to vaccinate some will come to vaccinate.

"Yes, they do, because when you look at the stats. I always say to the sisters (nurses) in a month if we get 1 or 2 we have worked]"- Healthcare worker 001

Healthcare workers also advise pregnant women to get vaccinated to protect themselves and their unborn from infections. However, the decision to vaccinate ultimately lies with the pregnant woman:

"My advice is you need to take the vaccine, I'll give you all the benefits to say no, remember, the vaccine will help you with 12345. And also, that there are fewer side effects than not taking it. I give the best information where I can then the person will decide to say that I consent to take the vaccine. I don't want to consent because of whatever"-Healthcare worker 002

The study found that recommendation and information given to pregnant women by healthcare workers promotes vaccination. A participant stated that the information given to her influenced her decision to get vaccinated:

"Obviously, there were some who were telling you that the vaccine is helpful. And explain to you how it helps you and you will realize yourself that because you don't want to get sick it's better for me to take the vaccine"-Vaccinated pregnant woman 004

On the contrary, the study identified challenges pregnant women face at the clinics, for some participants, healthcare workers' attitudes make it difficult to even seek healthcare advice.

"The thing is they are very rude and very cheeky. Especially when you are young and pregnant, they don't even have time for you or to explain things in detail"-Unvaccinated pregnant woman 001

"At the clinic, the thing is they don't explain everything they have attitude…"-Unvaccinated pregnant woman 005

It was identified that traditional and faith-based healers advised pregnant women to get vaccinated instead of relying on traditional remedies for protection. They also encouraged clinic attendance for any pregnancy-related issues.

"So, it is very important for people when they are pregnant to take whatever as long as they get it from the clinic, I am sure that whatever they give to them is safe. Because she would come to me, I would just look at them I do not have the tools to inspect them [laughs] to see what the problem is, you understand…."-Faith healer 002

"I would continue to say she can take the vaccine"-Traditional healer 001

Some pregnant women decided to vaccinate on their own, others' decision-making was shaped by discussions and advice sought from family and friends, healthcare workers, and traditional and faith healers.

5.4 Barriers to SARS-CoV-2 vaccine uptake among pregnant women

The reasons or obstacles that pregnant women experienced which resulted in them not receiving the COVID-19 vaccine were referred them as the barriers to vaccination. There were several barriers noted from the study and they include the following.

5.4.1 Rumours, misinformation, and conspiracies around COVID-19 and the vaccine

The study found that rumours and misunderstandings concerning COVID-19 and COVID-19 vaccinations influence whether participants take the vaccine or not.

There were numerous rumours about COVID-19 and the vaccine, some mentioned that the vaccine is killing people. A participant said that the only thing she knew about the COVID-19 vaccine was that after you get vaccinated you die. Another participant said that there are a lot of people in her community who died because of the vaccine.

"*...we had a lot of people that we lost after the vaccine, especially those who had High blood (hypertension), TB, and other diseases we had a lot of people, here around my neighbourhood. I am talking about these 3 streets 2 streets not mentioning going down the road we have a lot"- Unvaccinated pregnant woman 005*

"It is because some of them are saying that it is going to kill them"-Vaccinated pregnant woman 004

Common rumours were that the vaccine was a population reduction strategy, which meant reducing the world population because they were over-reproducing. A vaccinated women and a traditional healer said:

"Those people just want to reduce the population, we are overpopulated"- Vaccinated pregnant woman 004

"There were a lot of concerns and fears because we told ourselves that this vaccine is here to finish us off because they wanted to wipe out half of the black population because they say we are many."-Traditional healer 002

Some rumours mentioned by a healthcare worker were that the COVID-19 disease is man-made from the laboratory, and other rumours were that COVID-19 is used as a biological warfare agent towards world domination.

"People are concerned that it is man-made. It was man-made from the lab"- Healthcare worker 002

"Others say it involves countries fighting amongst each other. They said that it is from China, so China did it in the lab so that it can affect the American economy so that they can take over"- Healthcare worker 002

An unvaccinated pregnant lady suggested drinking alcohol and smoking as a preventive therapy against the disease.

"They were saying that when you drink alcohol or smoke you won't get COVID-19, so eish we don't know"-Unvaccinated pregnant woman 001

A vaccinated pregnant woman highlighted the virus infection depends on one's economic status, she said COVID-19 only infects the rich.

"We did nothing, I mean there was a perception that COVID-19 was for rich people, those who uses Airplanes as their mode of transport. Look around here in my community, who gets to the

airport. No one, so we never thought that one day it would get to us"-Vaccinated pregnant woman 001

Some participants questioned the existence of the COVID-19 virus and reported that the sickness does not exist based on the fact that they have not seen anyone get infected.

"Yes, that it doesn't exist"- Unvaccinated pregnant woman 004

"Yes, it did. But still, I have never seen anyone who had it. I just heard rumours of people suspecting others"-Vaccinated pregnant woman 001

Misinformation and conspiracies about the COVID-19 virus and vaccines created fear of the pandemic, making individuals more likely to believe incorrect information about COVID-19 vaccines. These rumours spread across the community by word of mouth, social media, or misconceptions about what has been reported in the news. This resulted in people being more skeptical about receiving the COVID-19 vaccine.

5.4.2 Alternative healing methods

Due to the availability of different health options, some participants turned to alternate healing measures of protection against COVID-19 rather than vaccination.

Most participants stated that they were using, lemon, ginger, garlic, and honey as an alternative way of preventing COVID-19 infection.

"We would drink the garlic and lemon mixture"- Unvaccinated pregnant woman 001

"But honey and lemon were something we had readily made in a bottle"-Vaccinated pregnant woman 002

"Yes, it helped because we were not sick, we were not coughing…"-Vaccinated pregnant woman 004

The boiling of "Vicks" and letting the aroma fill the house was one method a participant used to protect herself and the family. Another participant stated that the rubbing of "Vicks" on the chest was also another method of protection.

"No, we used to boil Vicks"-Vaccinated pregnant woman 005

"…then rubbed Vicks on her chest…"-Unvaccinated pregnant woman 004

The study found that *umhlonyane* was one of the most commonly used and mentioned alternative healing herbs by the participants. This herb was either boiled and used as a drink or put in boiling water and used for steaming.

"We were just using Umhlonyane because of my grandmother"-Unvaccinated pregnant woman 002

"We were also drinking it [umhlonyane]!! [laughs]"-Vaccinated pregnant woman 004

Traditional healers who were part of the study suggested that *umhlonyane* be mixed with gumtree, mint, marijuana, and incense (Impepho) then the mixture be used either as a boiled drink or steaming.

"Umhlonyane, mint, and gumtree, just the Flu trees as our grandmothers used to go to the forest, gather, mix them then cook and steam"-Traditional healer 001

"…I would mix umhlonyane with garlic and a little bit of dagga (marijuana) and a little bit of Impepho, so people were healed"-Traditional healer 002

An unvaccinated woman said that she only goes to the clinic so that she has the clinic attendance card to enable her to give birth at the public hospital. However, she does not trust the services from the clinic since she lost her first baby while going to the clinic rather prefers going to her pastor who only prays for her and sees things before they happen.

"I go to the pastor as a way of caring for my pregnancy, I go to the clinic just for a checkup and just to have that card and to follow their process so that I can give birth at the public hospital because without that card they wouldn't take you to give birth. But most of the time I go to the pastor when I feel pain or cramps, I always go to the pastor. I tried going to them but still, I lost the baby, and now the same thing come back and if it wasn't for the church, I doubt you would be interviewing me today the way you are doing now."- Unvaccinated pregnant woman 005

"He prays for me but sometimes he sees before I come. So, he prays for me he doesn't give me any guidance the only thing he says is that he will carry you and then he prays for us on our behalf."-Unvaccinated pregnant woman 005

When asked what the pastor gives her, such as charms she said that he only prays for her.

No, he doesn't use water only prayer"- Unvaccinated pregnant woman 005

A faith healer mentioned that he only prays for individuals who consult him and ask God to guide them.

"I only pray, and ask Jehovah to show the way, and tell you what to do."-Faith healer 002

Different factors influence participants to either take or refuse vaccination. The use of indigenous and spiritual healing practices for the prevention, cure, or treatment of COVID-19 was explored to determine its influence on the acceptance of the COVID-19 vaccine. Some individuals did not think that they were susceptible to COVID-19 infection but rather relied on alternative health methods for protection against the virus. The study found that the lack of susceptibility in participants was caused by the usage of alternative therapies and herbs like *umhlonyane* and homemade mixtures to prevent and cure COVID-19 symptoms by the participants.

5.4.2.1 Safety concerns

The study found that some participants had concerns and worries about using alternative remedies. Healthcare workers, in particular, were concerned about the safety of using herbal medicines such as *umhlonyane.* One healthcare worker reported that he would not recommend it, but rather take the vaccine because it is available for them to take it.

"Because we have vaccines why not go for the vaccine? And save yourself from getting into steaming and drinking that bitter Umhlonyane"-Healthcare worker 001

Another healthcare worker was concerned about the use of the use of alternative remedies might do to the kidneys of the individual taking them, since they are not scientifically tested.

"But remember when you start inducing remedies that are not lab tested everything that you take is metabolized in the liver and goes through the kidney. They can cause a renal failure…"-Healthcare worker 002

The healthcare worker also elaborates on his concerns about how the developing feotus which is under development might react to the remedies taken by the pregnant woman. He suggested that this might lead to the baby being born with deformities.

"…Yes, because you might have a child with abnormalities because of what you might have taken. Remember something that you drink passes through the placenta and then through the baby just like that"-Healthcare worker 002

Even though healthcare workers are concerned by the use of *umhlonyane,* there were different views from faith healers, traditional healers and some pregnant women believe that alternative healing remedies are safe to use by pregnant women.

A faith healer who had a pregnant relative staying with his family spoke from experience and said that the ginger concoction they were drinking as a way to protect themselves from COVID-19 was safe for a pregnant

woman to drink. He stated that after drinking the concoction, she recovered, and she went on to give birth to a child who is still living.

> *"Yeah, it is safe, it is safe. Because these ingredients we used can even be consumed by children that is why we didn't have any problem. There is someone who visited and had a common cold they gave it to her. And she drank it and was cured she even gave birth, and the child is still alive"- Faith healer 002*

When asked about the safety of the alternative remedies an unvaccinated pregnant woman said that a ginger drink was recommended and safe while pregnant.

> *"No, the ginger one was recommended, and I think it is safe to drink"-Vaccinated pregnant woman 005*

A traditional healer stated that the remedies are not harmful to pregnant women and the foetus as the doses vary with age and the state of the person.

> *"What I usually prescribed can even be consumed by foetus in the womb, because it is safe. Again, both the mother and child become protected because the traditional remedy does not kill, the dosage depends on the age, for example, a two-year-old would take a teaspoon, and someone my age would take a cup"- Traditional healer 001*

A vaccinated pregnant woman highlighted that *umhlonyane* was strong for her and she was advised not to take it because she is living with a chronic condition.

> *"Yes, for me umhlonyane was deemed strong, so they advised me not to drink it at the clinic because of my chronic"-Vaccinated pregnant woman 003*

5.4.3 Trypanophobia, or needle phobia

The study found that vaccine-related fears were the most commonly identified barriers to vaccination. Trypanophobia, or needle phobia, was one of the vaccine-related fears that prevented people from receiving the vaccine.

> *"It is the injection that's my main problem, from how I see it"-Unvaccinated pregnant woman 003*

> *"You know as black people we believe more in pills over an injection because you can stop taking pills but for the injection, once it is in your system it is in your system"-Unvaccinated pregnant woman 004*

5.4.4 Fear of side-effects

The fear of experiencing side effects from vaccination was reported as a barrier that made some participants not vaccinate against COVID-19.

> *"They were frightened by the side effects we experienced as people who got vaccinated. That is the reason people didn't get vaccinated"-Faith healer 001*

> *"...it has a lot of after-effects, and people are getting sick"-Unvaccinated pregnant woman 002*

Another barrier that kept a pregnant woman from vaccinating was the fear of death following receiving the vaccine. She said:

> *"As I have said a lot was said about the vaccine. They were saying people are dying..."-Unvaccinated pregnant woman 002*

It was found that the fear of other people's vaccine experiences, a participant said that she would not get vaccinated because she saw her sister get infected by COVID-19 after taking the COVID-19 vaccine. She continued and said that her sister got the second vaccine shot and experienced severe side effects and ended up losing her job opportunity.

> *"...like my sister vaccinated and got it afterward (COVID-19) and they said if you vaccinate you won't get it..." -Unvaccinated pregnant woman 005*

> *" ... She fell ill and she did not even start the job. How was she going to start while ill, they replaced her..." -Unvaccinated pregnant woman 005*

> *"Yes, that is one of the reasons, for the fact that I saw her like that. The eyes were of a living person, but they were like that, being pale like you don't have blood in your body it was a lot. And for the fact that she got admitted..." -Unvaccinated pregnant woman 005*

Some pregnant women remarked that they feared the unknown, they didn't take the vaccine because they feared how they would react to the vaccine. They were concerned about the state of their immune system, and whether it would be able to cope with the vaccine given to them or not.

> *"Because they said that when it comes to these vaccines you will never be sure since it goes with your immune system. Apparently, if your immune system is weak then you are at risk, so really that also made me doubt these vaccines a bit"-Unvaccinated pregnant woman 001*

If you are weak just like me they can vaccinate you with this one which is not strong, maybe it becomes too strong for other people's bodies. So, that is what I know, hence I didn't even vaccinate, because I am afraid, I know my immune system, I am weak, sadly"- Unvaccinated pregnant woman 005

One pregnant woman chose not to receive the COVID-19 vaccination out of concern about experiencing problems during her pregnancy or delivery.

"Yes, I am also a bit sceptical since I heard that you might have problems when it is time for delivering the baby"- Unvaccinated pregnant woman 001

Another vaccine-related fear was a participant who didn't vaccinate because she was worried about the in-utero baby's life. She continued to say that she was worried about taking the vaccine and that something might happen to the unborn child.

"So, I am now a bit scared of that what if I take it and then something happens to my baby"- Unvaccinated pregnant woman 001

5.4.5 Lack of sufficient knowledge

Poorly clearly understanding where COVID-19 originates from or how the vaccine works was a barrier that made participants not take the vaccine.

"But even the COVID-19 I don't understand its story, where is it coming from, I have never heard anyone explain it to me straight. Even when I tried watching on TV, remember they were always talking about it. Seriously, I never heard where it came from"-Unvaccinated pregnant woman 003

The same participant elaborated and said that she has not been vaccinated and is not planning to get vaccinated against COVID-19 because she believes COVID-19 does not exist.

"Yes, because I don't believe that it exists"-Unvaccinated pregnant woman 003

Besides the belief or idea that COVID-19 does not exist, a healthcare worker suggested that recently there has been a perception that COVID-19 no longer exists, maybe due to the fewer reported positive COVID-19 cases.

"Yes, because there is this belief that says COVID-19 no longer exists"- Healthcare worker 001

The study found that the lack of knowledge influenced some participant's decision not to vaccinate, the lack of knowledge was noted to be a barrier to vaccination.

5.4.6 Lack of access to COVID-19 vaccines

Not having access to vaccination services was reported to be a barrier stopping pregnant women from vaccinating against COVID-19. One pregnant woman reported that she was not able to be vaccinated because she did not possess the South African legal documents.

> *"Yes, because I really wanted to vaccinate but I couldn't because I don't have proper documents. I am from Lesotho so I couldn't because I don't have an ID"-Unvaccinated pregnant woman 001*

A willing participant did not receive the vaccination as a result of being turned away from the clinic because the clinic did not want to vaccinate pregnant women.

> *"No when I went to the clinic, they told me that they don't vaccinate pregnant women, so I didn't ask any further"-Unvaccinated pregnant woman 001*

The closing of a vaccination site was discovered as a reason why a pregnant woman was not vaccinated.

> *"No, those people who were doing vaccinations are no longer there at the clinic"-Unvaccinated pregnant woman 001*

5.4.7 Lack of perceived benefit

Some participants expressed their views on the COVID-19 effectiveness, with some mentioning that vaccinated people still get infected by the virus.

> *"They still have that mentality, they are not sure whether it is protecting, not sure is it safe."-Healthcare worker 001*

> *"There is nothing that can convince me. Because as much as others are vaccinated, they are still getting sick, so this simply means that we are all at risk. Vaccinated or not we are all the same"-Unvaccinated pregnant woman 002*

> *"…like my sister vaccinated and got it afterward (COVID-19) and they said if you vaccinate you won't get it…"-Unvaccinated pregnant woman 005*

The lack of perceived benefit from the COVID-19 vaccine was a barrier to vaccination, some people still believe that the COVID-19 vaccine is not efficacious, and that is why they are not taking the vaccine.

5.4.8 Lack of motivation

The lack of motivation from pregnant women to get vaccinated was another barrier to vaccination. According to one healthcare professional, the lack of motivation is because pregnant women were not the target population when the COVID-19 vaccination was first introduced.

> "*…there is nothing or any motivation in me that would make me go to the clinic to get vaccinated"- Unvaccinated pregnant woman 003*

> *"I would say that they were never the target. From my perspective they were never the target they didn't think they were at risk"- Healthcare worker 002*

5.4.9 Lack of trust in government

Lack of trust was fundamental factor, this resulted in the lack of vaccination uptake thus being a barrier to vaccination.

> *"The governments' results have no balance, and they will never balance [laughs], I never pay attention to them [laughs]. Because when they (government) like they increase them or decrease them, so the government [laughs] no"- Unvaccinated pregnant woman 005*

The study discovered that there was an element of poor trust in the government, an unvaccinated pregnant woman stated that the statistics released by the government regarding the COVID-19 pandemic didn't balance and the government manipulated the numbers.

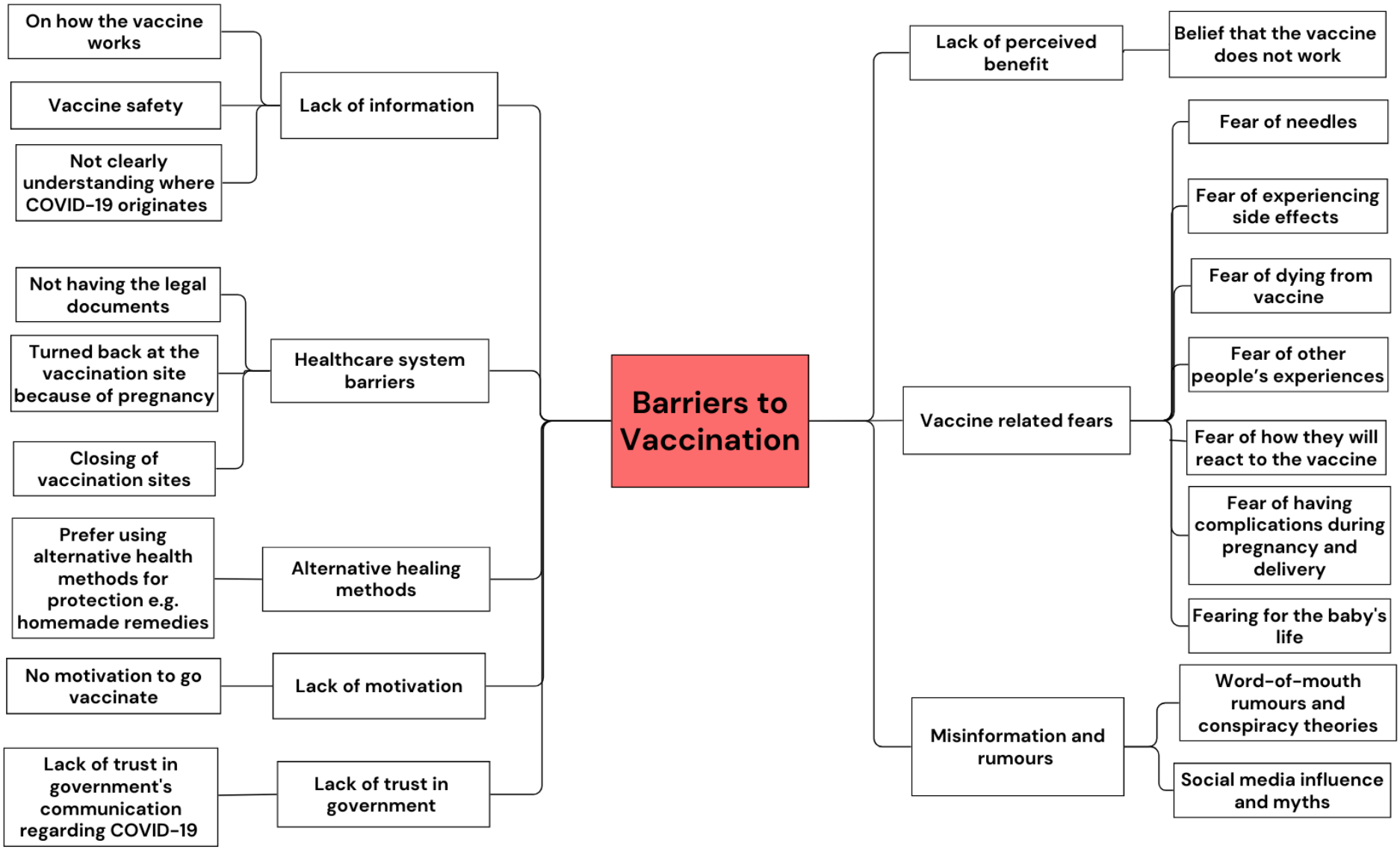

Figure 5.4: Barriers to COVID-19 vaccination uptake

CHAPTER SIX: DISCUSSION

Introduction

This discussion chapter explains the study's findings, which were mainly intended to understand the motivators, barriers, and decision-making process surrounding COVID-19 vaccination among pregnant women in Soweto, South Africa. This discussion is based on the Health Belief Model (HBM) theoretical framework.

6.1 Social demographics

Sixteen participants were interviewed for the key informant interviews, 10 of those were pregnant women while the other 6 were made up of, 2 healthcare workers, 2 faith healers, and 2 traditional healers. Of the interviewed pregnant participants, half of them reported being between the ages of 18 to 24 years. Seven of the pregnant women were unemployed, while all the pregnant women were between 4 to 9 months pregnant. Five of the pregnant women had boyfriends while the other five pregnant women were single. Seven participants from all the participants in the study had some high school education while only six participants completed high school. A small number of two participants had a tertiary qualification and one participant only had primary education.

6.2 Motivators towards COVID-19 vaccination

One of the study objectives was to understand the motivators for SARS-CoV-2 vaccine uptake among pregnant women in Soweto. The participants took the vaccine because they were motivated by the following health concerns, structural motivators, and monetary benefits.

The study's concerns about health and well-being were identified as a motivator for vaccinations in the study. These women took the vaccine to protect themselves, to protect the people around them which were their families and the community. Protection of self was a major reason for vaccine uptake by individuals [132]. Vaccination to protect other people was an extrinsic motivator for the COVID-19 acceptance [132] which concurred with the findings of this study. Perceived risk from COVID-19 was a motivator for vaccination [57-59]. It is important to note that Soweto pregnant women prioritise their health, this was a key answer to why a pregnant woman in Soweto decided to take the COVID-19 vaccine.

Pregnant women value their unborn child's safety, hence in this study, the pregnant women received the vaccination to prevent the baby's life. Perceived severity of the virus and protection of the foetus was a major motivator of why Soweto pregnant women take a maternal vaccine, this is not only limited to the COVID-19 vaccine[57-59]. Vaccinations intended to protect the unborn child from COVID-19 and to reduce the potential

severity of the illness were paramount reasons for vaccination previously reported [133, 134]. These pregnant women were also taking other maternal vaccines to protect their unborn babies. Pregnant women wanted to protect their unborn babies because they perceived that their babies were at risk because of the virus. Averting death was another driver for pregnant women to vaccinate against COVID-19 because they feared that they would die together with their unborn child if they got infected. Another thought was them dying and leaving their newborn baby. COVID-19 vaccination was reported to lower the rates of mortality in those who got vaccinated [81].

The belief that there is a perceived benefit from vaccination influenced the participants to take the vaccine, this was also demonstrated in another study where individuals believed that there are benefits from taking the COVID-19 vaccine [135]. Structural motivators were some reasons for vaccine uptake by the pregnant women, this included travelling, employment, and gaining access to educational institutions. Mandatory COVID-19 vaccination for pregnant women travelling to other countries was a vaccination facilitator this was supported by other studies on motivators for COVID-19 vaccine uptake [132, 136]. Moore *et al* reported that people were vaccinated against COVID-19 for work-related reasons [132]. Most of the study participants were unemployed, and they stated that vaccination against COVID-19 was one of the requirements by their potential employers and employers for those who were employed. Therefore, vaccination against the virus to adhere to the new employment policies or be considered for potential employment was beneficial to pregnant women and motivated them to vaccinate. The study brought to light how unemployment impacts people's health decisions, particularly Soweto pregnant women.

To promote vaccine uptake the government gave out vouchers to individuals that vaccinated. This study found monetary benefits as a facilitator of vaccination. The uses of financial incentives in a study were found to have a positive effect on the COVID-19 vaccine uptake, this resulted in a considerable decrease in COVID-19, preventing a minimum of one infection for every six vaccinated individuals that were promoted by the financial incentive [117]. These reasons for vaccination by pregnant women were beyond health reasons, this answers the research objectives that some other reasons or motivators make pregnant women take the COVID-19 vaccine. This is supported by a study that reported an increased vaccine uptake in South African adults who received financial incentive [137].

6.3 Decision-making process.

One of the study objectives was to explore the decision-making process of vaccine acceptance, particularly looking at factors or significant others who influence the decision-making process for women in Soweto. To do that the participant's sources of information and their knowledge of the COVID-19 virus and the vaccine were explored. Traditional media outlets, government, social media, health care workers and word of mouth were among the sources of information where participants acquired knowledge. To note some pregnant

women had some knowledge of COVID-19 disease and the COVID-19 vaccine, which was important when the pregnant woman was deciding on vaccination. The study found that the decision to vaccinate while pregnant is mainly and solely made by the pregnant woman. According to the study, pregnant women talk to their family members about health-related matters, such as vaccinations, but ultimately decide whether or not to get vaccinated depending on their preferences or considerations [138]. Female family members such as the mother, aunt, sister, and mother of the partner were identified as the key advisors to the women during pregnancy. This could be because of their experience with pregnancy, or because they can relate with the pregnant women as females. An element of the HBM which is cues to action, discusses how a person's surroundings and people impact their health behaviour and outcomes [57].

A significant discovery in the study was the identified partners who are the fathers of the unborn child to be involved in the decision-making process and influencing maternal vaccination against COVID-19. This finding complements another South African study where women wanted their partners to attend antenatal care classes and be involved in the services provided [139]. Pregnant women involve their partners to have a voice in what medical interventions they plan to take. Significant others who influence the decision-making process for women in Soweto to take a vaccine during pregnancy were identified by the study. During antenatal care classes healthcare workers play a pivotal role in giving medical advice related to pregnancy, these healthcare workers educate and provide health recommendations [140, 141]. This is supported by other studies on COVID-19 vaccine uptake during pregnancy it was found that pregnant women in the studies trusted vaccine information and recommendations provided to them by individual healthcare providers, including medical practitioners, nurses, as well as pharmacists [69, 142]. This clearly demonstrates the significance of healthcare education in maintaining high vaccination uptake and the overall public health context. This is an important finding that could be useful to the Department of health on how to promote maternal vaccination through education provided by healthcare workers.

The lack of knowledge about the COVID-19 vaccine particularly on the effects of the vaccine on pregnant and the children of lactating women, was demonstrated to be the primary driver of COVID-19 vaccine hesitancy [69]. This clearly shows the importance of vaccine knowledge for participants to decide on taking the COVID-19 vaccine. Education and knowledge about the COVID-19 vaccine were identified to be important when pregnant women decide on vaccination [141]. Participants in a study that investigated patients' medical decision-making aspects concurred that being fully informed about a medical intervention was one of the most important factors in their ability to engage in decision-making [95]. To make an informed decision, this study found that pregnant women take the initiative to ask healthcare workers about any medical intervention. However, several pregnant women reported some challenges with the healthcare worker who gives them attitude when they seek health information so that they can make an informed decision. This is similar to a Cape Town finding where healthcare workers had negative attitudes and behaviours towards adolescents who were seeking reproductive health services [143].

Soweto pregnant women were found to discuss pregnancy-related issues amongst themselves as they do that, they influence one another to do what the majority perceive is the best thing to do. However, each pregnant woman will then make the choice on her own regarding taking the intervention. Traditional healers and faith healers are, in most cases, regarded as the leaders of the community [91]. Traditional and faith healers who were part of the study expressed their support for the maternal vaccination against COVID-19 and the other already available maternal vaccines. Their position allows them to perform vital educational roles in traditional culture, religion, and spirituality [91] and prescribe traditional medicine. The use of traditional medical remedies has been reportedly used by expectant mothers to promote labour, ease pregnancy, and increase the amount of milk produced during breastfeeding [144]. These healers were reported to support and advise the pregnant women to use the medical services provided at the clinic. Despite that, the decision to go to the clinic for consultation or to vaccinate lay with the pregnant woman. The trust of pregnant women in the local healers could be because they are people who live with them in the community and have faith in their expertise and insight. This study demonstrated the role played by faith and traditional healers in the health of pregnant women, particularly in Soweto.

6.4 Barriers to COVID-19 vaccination uptake

The study aimed to understand the barriers and motivators that affect pregnant women's uptake of the SARS-CoV-2 vaccine in Soweto. The study identified structural barriers to vaccination this included misinformation and rumours, the usage of alternative healing methods, vaccine-related fears, lack of information, healthcare system barriers, lack of perceived benefit, lack of motivation and lack of trust in government.

Misinformation and rumours about COVID-19 disease and the vaccine were identified as strong vaccination barriers in the study. Circulating stories on social media and word of mouth on how recipients of the COVID-19 vaccine are dying. Other studies which took place in several countries have reported on this finding, where they found that people were circulating a rumour that the COVID-19 vaccine is killing its recipients [145, 146]. According to research conducted in 52 countries, including South Africa, one of the most popular rumours was that the COVID-19 vaccination was deadly to humans [145]. More stories were on how COVID-19 vaccination is a population reduction strategy to reduce the world population, especially in Africa. This finding concurred with what has been documented by studies conducted in Zambia and the United Kingdom revealed that participants claimed the COVID-19 vaccination was going to reduce the population [136, 146]. The trend on how the vaccine is killing people and its impact is seen from the low intention to vaccinate following exposure to misinformation and rumours by pregnant women in Soweto. This is an important finding amid the importance of maternal vaccination and plans to ensure strong future public health.

Conspiracy theories and the impact of social media were also discovered to be reasons for low vaccine uptake by the Soweto pregnant women. Theories that came out from the study entailed some pregnant women saying

that the SARS-CoV-2 virus was a man-made agent which is used for biological warfare. Other studies have speculated on the possibilities of the SARS-CoV-2 virus being a biological agent [147, 148]. The idea that alcohol and smoking are preventive measures against the virus was another identified vaccination barrier because they believe that drinking and smoking would protect them. However on the contrary misinformation regarding alcohol intake being a protective factor against the virus was said to have resulted in numerous deaths in Iran owing to methanol poisoning, a common adverse event that occurs after consuming locally produced alcoholic beverages [149]. Of particular interest, the study discovered that social media was a main source of information about COVID-19 and the vaccine for pregnant women and the population at large. This could be associated with the social demographic status particularly the employment status of our participants, most of them were unemployed therefore becoming vulnerable to circulating social media inaccurate and false information, this is supported by a study by Loomba et al [150].

An interesting finding in this study was the usage of alternative healing methods to prevent and cure COVID-19 by the participants. *Umhlonyane* (African wormwood), ginger and Vicks were some of the commonly used alternative remedies for steaming and as a form of drink. This concurred with a Johannesburg-based study, where *umhlonyane* and ginger were reported to be used as an immune system-strengthening remedy and as protection against the SARS-CoV-2 virus [151]. The African wormwood has been used against sicknesses such as Flu and respiratory illnesses for hundreds of years [152]. However, the usage of *umhlonyane* as a herb against COVID-19 by pregnant women has not been studied nor reported particularly in Soweto pregnant women. This study uncovered the usage of *umhlonyane* by pregnant women in Soweto to protect themselves from COVID-19. This made them believe that they do not need the vaccine because they would not get infected and, in case, when they are infected, they are going to heal themselves using the alternative health approach. Of importance, it was discovered that the usage of *umhlonyane* against COVID-19 reduced vaccine uptake by pregnant Soweto women.

Soweto is a multicultural community, and this study discovered that Soweto has several healing systems, including indigenous and religious-based approaches, that pregnant women use to protect or cure themselves from COVID-19. Several unvaccinated individuals in South Africa and Zimbabwe were reported to have used herbal treatments and traditional remedies for preventing COVID-19 infection [153]. A USA-based study reported about pregnant women participants' usage of prayer as protection against influenza instead of taking the trivalent inactivated Influenza vaccine [154]. Importantly, the impact of the availability of COVID-19 alternative healing methods and their usage by pregnant women on COVID-19 vaccine uptake has not been defined in the South African population. Due to the availability of different health options, some participants turned to alternate healing measures of protection against COVID-19. This finding also shows how the Soweto population particularly the pregnant women value their beliefs and the trust they have in it, which is useful in future intervention implementation for this population.

Vaccine-related fears erupted as an important vaccination barrier. Soweto pregnant women were not vaccinated because they had trypanophobia (fear of needles). This phenomenon was reported by another study in the USA which discovered that Californian pregnant women were COVID-19 vaccine hesitant because they feared needles [69]. Another vaccine-related fear was the fear of side effects such as fever, fatigue, muscle pain around the injection site, and sore limbs. These were related to side effects that were also reported by Zewade *et al* which also included problems of blood clots, headache, redness and swelling around the injection site [143]. This study identified that side effects from vaccination in those who have taken the vaccine, made the unvaccinated pregnant individuals to be reluctant to take the vaccine, this trend was similar to what was noticed in a Turkish study where individuals were vaccine-hesitant because of vaccination side effects [155]. Participants in this study were skeptical about taking the vaccine due to COVID-19 vaccine side effects experienced and reported by those who have taken the vaccine especially individuals close to them. This changed their perception of the vaccine and how they might react to it to have a negative attitude towards the vaccine and decide not to take the vaccine.

The route of the COVID-19 vaccine administration was identified as a vaccination barrier. An interesting unique finding from this study was that pregnant women preferred a different administration route for COVID-19 vaccination. This study discovered that pregnant women were willing to take the vaccine orally or other vaccination routes such as nasal because they did not want to be injected. This was because of the reaction on the injection site caused by vaccination and injection in those who have taken the vaccine, this then made the unvaccinated individuals to be reluctant to take the vaccine. This concern is not new it has been reported as one of the reasons behind vaccine hesitancy, vaccine delivery method was found to be a reason for vaccine hesitancy [28].

The fear of having complications during pregnancy and delivery was identified by the study as a vaccination barrier. However, a Scottish study reported that there are more complications of COVID-19 infection in unvaccinated women during pregnancy and delivery [156]. The pregnant women's concern was a barrier that led to no vaccine uptake. Discovered concerns included the baby being born with malformations as previously reported by Mannocci *et al* [142]. These concerns were also linked to the pregnant women's worry about the life of the unborn child. Pregnant women in the United Kingdom were reported to be more inclined to oppose getting the COVID-19 vaccination because they were worried about possible harmful effects the vaccine might have on the baby in utero [62], this was also supported by an Ethiopian study [157]. Because pregnant women are not only concerned with their health but also the foetus's health therefore being worried about the vaccine-related pregnancy complications was a major issue to them. The vaccination information reassuring pregnant women about vaccine safety was identified to be associated with the raised concerns about maternal COVID-19 vaccination.

The lack of information on pregnant women was identified as a barrier to vaccination. Soweto pregnant women had a challenge understanding COVID-19 disease such as how the disease came about. These women lacked information and knowledge on how the vaccine may affect the unborn child. The lack of information or knowledge on the impact of the vaccine on the foetus was a reported concern that resulted in pregnant women not accepting the COVID-19 vaccine [62]. An important finding in the study was that insufficient information and knowledge were barriers to vaccination. This will be useful in ensuring that vaccination information gets to all people to enable them to make vaccination decisions knowing what the implications might be.

Healthcare system barriers were other vaccination barriers that were discovered by the study, the lack of accessibility to vaccination facilities. The closing of vaccination sites near them and being turned back at a vaccination site because the healthcare workers there did not want to vaccinate pregnant women, were the reasons they could not get vaccinated. Lack of accessibility to COVID-19 vaccine and vaccination sites was a reported barrier to vaccination in South Africa and Zimbabwe [153]. Interestingly, the study found that the refusal of healthcare workers to vaccinate pregnant women was due to conflicting influences regarding the vaccination of pregnant women from the government and the Department of health. To be on the safe side they refused to vaccinate then pregnant women. This finding is important because it can be used in the future by the government to ensure the correct information is conveyed to healthcare workers timely and constantly updated.

Another vaccination barrier associated with a lack of accessibility to vaccination facilities found by the study was the exclusion of illegal foreign nationals from COVID-19 vaccination. Studies have reported that the migrants have been excluded from COVID-19 vaccination [158]. In this study, people who wanted to get vaccinated had to register on the South African National Department of health website to take the COVID-19 using their national IDs or driver’s licenses for South Africans and passports for foreign nations. Pregnant women illegally in South Africa could not then get vaccinated against COVID-19. Accessibility to health care is a barrier not new to Soweto or COVID-19 vaccination, limited access to medical services was reported to be the primary obstacle to healthy behaviour [159].

Participants in this study were found to have concerns about the vaccine not being effective and not safe. Participants also suggested that they would only take the vaccine if they were convinced that it is safe and efficacious. This lack of perceived benefit due to safety and efficacy concerns trend was also identified in another South African-based study which reported that concerns about the mother's and baby's safety from the vaccines were the source of the vaccine hesitancy [160]. This was also reported in another study on pregnant women's COVID-19 vaccine hesitancy, where a factor such as participants perceiving the vaccine as ineffective was a barrier to vaccination [155]. Soweto pregnant women's hesitation to receive vaccinations was partly caused by their perception that vaccinations are not beneficial to them, which hindered them from

receiving the COVID-19 vaccine. This type of information is needed to strengthen and promote how pregnant women perceive maternal vaccination as a benefit to them.

An element of the HBM, the lack of perceived benefit speaks to the individuals' lack of belief that vaccinating will be beneficial to them[57] . Participants in this study were found to have concerns about the vaccine not being effective and not safe. Participants also suggested that they would only take the vaccine given that it is safe and efficacious. This lack of perceived benefit was identified in another South African study which reported that concerns about the mother's and baby's safety from the vaccines were the source of the vaccine hesitancy [160]. Vaccine effectiveness is an important factor in public acceptance, people must be convinced that an intervention works before they will use it. This was also reported in another study on pregnant women's COVID-19 vaccine hesitancy, where a factor such as participants perceiving the vaccine as ineffective was a barrier to vaccination [155]. The lack of perceived susceptibility which refers to people who do not believe they are susceptible to a certain illness, is another HBM component [57].

Lack of motivation to go vaccinate was identified as a barrier. The Soweto pregnant women were not driven or motivated to take the COVID-19 vaccine. The lack of willingness to receive the COVID-19 vaccine is not new to Soweto pregnant women, it has been reported by Price et al [161]. The lack of motivation could be because some individuals in this study did not believe in the idea of vaccination overall beyond the vaccine COVID-19 vaccine. Being pregnant also comes with its challenges of fatigue and tiredness therefore going to a vaccination site to receive that vaccine would be challenging this could be another reason why pregnant women did not that the vaccine.

The lack of trust in the vaccine was discovered to be a barrier to vaccination, participants did not trust the vaccine, the government’s healthcare system, and any communication regarding COVID-19 and the vaccine. Some pregnant women accused the government of altering COVID-19 numbers to scare them into believing in the disease's existence and pushing them to get vaccinated. This phenomenon was similar to an Ethiopian study, where the lack of trust in the vaccine and the healthcare facilities was a predictor of low vaccine uptake by pregnant women [162]. The lack of trust resulted in vaccine reluctance by the pregnant women. The lack of trust in the government by Soweto pregnant women could be justified by the socioeconomic environment that they live in. The government failed to keep the promises it made to develop good homes, create jobs, and ensure safety. And the government was now able to deliver vaccinations promptly, whereas promises that had been broken for decades eroded faith even more.

The research findings indicate that pregnant women in Soweto believed they would be infected by COVID-19, viewing it as a disease only affecting wealthy people. This was contrary to a Ghanaian study by Saba *et al* where it was reported that participants did not perceive COVID-19 to only affect the rich [163]. This view by pregnant women was also promoted by misinformation circulating on social media. Other studies have also

reported social media misinformation as a driver of vaccine reluctance [17, 164]. Soweto pregnant women refused to receive vaccinations because they thought they were unlikely to become infected by the virus due to their economic status.

6.5 HBM

The HBM was used as the theoretical framework of the study, the HBM allowed exploration of the study findings with regards to understanding COVID-19 vaccine hesitance, however, there were also some limitations. The HBM permitted the understating of pregnant women's motivators to take the COVID-19 vaccine perceived benefit, perceived susceptibility and perceived severity were the reasons pregnant women accepted the vaccine. Since they perceived themselves as being susceptible, the pregnant women wanted to protect themselves, the people around them and their unborn babies. Vaccination was then a beneficial option to protect themselves and prevent disease severity. Structural motivators came out as perceived benefits, the pregnant women had to be vaccinated to be able to travel, keep their employment and gain access to educational institutions. Another perceived benefit was monetary vouchers which was a motivator.

The HBM enable the discovery of self-efficiency and cues of action of pregnant women in deciding whether to take the vaccine or not. The pregnant women were at the correct capacity to decide to accept the vaccine and go to the vaccination site to vaccinate. The HBM permitted the demonstration of cues of action because the pregnant women were stimulated and had some influence from family, partner(s), and healthcare workers to take the vaccine.

Barriers to vaccination were understood with the HBM ensured the identification of perceived barriers, lack of perceived susceptibility, lack of perceived severity and lack of perceived benefit. Perceived barriers were identified as the primary reason for vaccine refusal, these included misinformation, rumours, lack of information on COVID-19 vaccines, vaccine-related fears, healthcare system barriers and lack of trust in the government. Lack of perceived susceptibility and lack of perceived severity were shown by pregnant women who lacked motivation to get vaccinated.

There were some limitations of the HBM in understanding the study findings. Findings such as pregnant women's usage of alternative healing methods such as prayer could not be understood using the HBM because the HBM does not take into consideration a person's views, beliefs, or other individual characteristics that influence someone's acceptance of a new health behaviour. The lack of trust in the government, the lack of belief in vaccination as a whole and the belief that COVID-19 is a disease for the wealthy which were views by the participants in the study were not covered by the HBM.

Conclusion

The barriers, motivators, and decision-making processes regarding maternal COVID-19 vaccinations were covered in this chapter. Factors that influenced vaccine uptake included health concerns, structural motivators and receiving an incentive after vaccination. Decision-making regarding COVID-19 maternal vaccination mostly lies with the pregnant woman, even though family members, healthcare workers and alternative healers may advise and recommendations she is the one who will make the final decision. Factors found to influence vaccine reluctance included misinformation, alternative healing methods, vaccine-related fears, lack of perceived benefit, lack of information, health system barriers, lack of motivation and the lack of trust or belief in the vaccines.

Importantly, protection of self and the baby, and structural motivators such as travelling, employment, and gaining access to educational institutions were some reasons for vaccine uptake by pregnant women. The decision to vaccinate greatly lay with the women while there were other influencing factors such as family and healthcare workers. Barriers to vaccination among women included concerns about the route of COVID-19 vaccine administration, scepticism about vaccine safety, availability of alternative healing methods and insufficient information and knowledge. These factors contributed to women refusing to get vaccinated. It is important to address these barriers through education, clear communication, and providing accurate information to increase vaccine acceptance and uptake among this population.

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATIONS

Conclusion

The current study contributes to the growing set of research in medical sciences that uses ethnographic and quantitative techniques to get a full knowledge of the elements that influence human health. The COVID-19 vaccine remains the best and most effective method of protection against the COVID-19 virus. However, COVID-19 vaccine uptake remains lower than the projected one when the vaccine was introduced. Pregnant women as a part of the identified vulnerable group against COVID-19, need to be protected and the life they carry. There are complex elements involved in the vaccine hesitancy of pregnant women. Both tangible and perceived barriers prevented the vaccination of pregnant women.

, their fetus, and those around them, as well as to prevent mortality due to the SARS-CoV-2 virus. Structural The motivation for pregnant women to take the COVID-19 vaccine stemmed from a desire to protect themselves policies implemented by countries and institutions also played a role in inspiring pregnant women to accept the vaccine, particularly for reasons such as travel, employment, and education. Advice from healthcare workers, alternative healers, and family members influenced pregnant women's decisions regarding vaccination, with the ultimate choice resting with the pregnant woman herself. Information and knowledge provided by healthcare workers about the vaccine and its importance were crucial factors in pregnant women's decision-making process.

Despite these motivations, barriers to vaccination among Soweto pregnant women included misinformation and rumors about the vaccine, lack of motivation, and health system barriers such as limited accessibility to vaccination sites. Some pregnant women lacked knowledge about the virus and the COVID-19 vaccine, leading to hesitancy in getting vaccinated. Additionally, a lack of trust in the government and perceived lack of benefit from the vaccine were identified as barriers to vaccine uptake. Some pregnant women preferred alternative healing methods as a means of protection, further contributing to the challenges in achieving widespread vaccination coverage in this population.

Recommendations

The study's findings suggest that to increase pregnant women's vaccine uptake, specific interventions that target the motivators and barriers are necessary. To motivate pregnant women to take maternal vaccines policymakers and medical experts need to ensure that the available information emphasises the advantages of COVID-19 maternal vaccination rather than its negative aspects. Recommendations by health care providers for frequent maternal immunizations, such as seasonal influenza and pertussis immunization, has a significant impact on mother vaccine uptake [99]. Those who received a health care expert recommendation had 10 times the likelihood of getting vaccinated than those who did not [99].

Considering that people use alternative healing methods, it is apparent therefore that there is a need for cooperation and collaboration between the medical sector and the alternative healthcare systems (i.e. traditional and faith healers). This will assist in the tackling of all health issues and promote health. To address some of the barriers to vaccination, it can also be suggested that the relationship between a healthcare worker and patient be strengthened, by ensuring that healthcare workers conduct their work with pregnant women professionally.

Furthermore, access to medical services should be improved regardless of their nationality and how they got into the country to ensure no person is denied the opportunity to care. The aim should be to promote health and well-being in the communities. Lastly, the Department of Health officials are being urged to increase their use of social media as a practical tool for communicating with pregnant women and distributing correct information.

Further research is suggested especially in the area of health communications and interventions for pregnant women. It would also be useful to conduct further research into how partners influence maternal vaccinations. Involving the key advisors involved in a pregnant woman in a study to understand the influence they have would be beneficial in understanding their influence in maternal vaccination [99].

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Appendices

APPENDIX A: Ethics Approval

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

R49 Mr Z Zungu

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M221106

NAME: (Principal Investigator)	Mr Z Zungu
DEPARTMENT:	School of Pathology Department of Clinical Micro & Infectious Diseases Medical School University
PROJECT TITLE:	*Understanding SARS-CoV-2 vaccine hesitancy among pregnant women in Soweto, South Africa: a qualitative study*
DATE CONSIDERED:	2022/11/25
DECISION:	Approved unconditionally
CONDITIONS:	
NOTE:	If contact information regarding student study participants is required, please contact the Registrar's office - <Nicoleen.Potgieter@wits.ac.za>
SUPERVISOR:	Dr N Myburgh
APPROVED BY:	Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	2023/03/14

This Clearance Certificate is valid for 5 years from the date of approval. An extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office secretariat on the 3rd floor, Phillip Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated from the research protocol as approved, I/we undertake to submit details to the Committee. **I agree to submit a yearly progress report**. When a funder requires annual re-certification, the application date will be one year after the date when the study was initially reviewed. In this case, the study was initially reviewed in **November** and therefore reports and re-certification will be due in the month of **November** each year. Unreported changes to the study may invalidate the clearance given by the HREC (Medical).

Signature of Principal Investigator — Date: 15 March 2023

APPENDIX B: Permission letter

Wits VIDA Research Unit
Wits Learning Centre Building
11th Floor West Wing
Chris Hani Baragwanath Academic Hospital
Chris Hani Road, Diepkloof, Soweto, South Africa
e-mail: info@wits-vida.org Tel: +27(11) 983 4283

WITS VIDA
UNIVERSITY OF THE WITWATERSRAND
VACCINES & INFECTIOUS DISEASES ANALYTICS

30th Mar 2023

Mr. Zwile Zungu
MSc (Med)- vaccinology student

Dear Zwile Zungu,

Conditional approval to access and utilise data

Applicant:	Mr. Zwile Zungu
Student number	**1888851**- Wits
Title of project	Understanding SARS-COV-2 Vaccine hesitancy amongst pregnant women in Soweto: A qualitative study
Purpose:	MSc (Med) in the field of vaccinology student research project
Project supervisors:	Dr Nellie Myburgh and Dr Bent Steenberg (Wits-Vida)

This letter refers to a research project entitled: **'Understanding SARS-COV-2 Vaccine hesitancy amongst pregnant women in Soweto: A qualitative study'** that you plan to undertake. Your application to utilise data collected as part of the Health and Demographic Surveillance System (HDSS) which has been established by the Wits-VIDA team under the Child Health and Mortality Prevention Surveillance (CHAMPS) program has been reviewed. This letter serves to advise that approval for this application has been granted, provided that the following conditions will be met:

- Ethics approval for your project is obtained from the University of the Witwatersrand Human Research Ethics Committee, and a copy of the HREC approval letter is provided to Dr Nellie Myburgh
- Confidentiality of the participants will be maintained
- None of the participants will be tracked using the data
- Acknowledgement of the Wits-VIDA CHAMPS team and any of its staff that will be involved in your study will be made, and Prof Madhi (project principal investigator), Prof Ziyaad Dangor (Co-PI), Dr Sana Mahtab (Senior Programme Manager), Dr Isaac Choge (Epidemiologist), Dr Nellie Myburgh (Supervisor) and Dr Brent Steenberg (co-supervisors) will be co-authors on publications.
- Acknowledgement of the CHAMPS program
- A final report of the research study and any related publication will be submitted to the Wits-VIDA for review and approval prior to finalization.

Please do not hesitate to contact me (Sana.Mahtab@wits-vida.org) if you have any additional queries.

Yours sincerely,

Dr Sana Mahtab
Senior Programme Manager

APPENDIX C: Information Sheet

Information Sheet

In-depth one-on-one interviews

Good day. My name is Zwile Zungu. I am a MSc Vaccinology student at the University of the Witwatersrand (Wits). I would like to invite you to consider participating in the study: "SARS-CoV-2 vaccine hesitancy among pregnant women in Soweto, South Africa." This study aims to understand the barriers and motivators for pregnant women to receive the SARS-CoV-2 vaccine in Soweto, South Africa. The study also seeks to understand the decision-making process of vaccine acceptance, particularly by looking at factors or significant others who influence the decision-making process. Also, the influence of local traditional healers, faith healers and healthcare workers they have on the decision-making process. Because of their profession this group of people play a pivotal role in advising the population regarding healthcare decision.

- Firstly, before deciding to participate, it is important that you read and understand the aim of the study, the study methods, the benefits, risks, discomforts, and safety measures, as well as your right to withdraw from the study at any time.

- This information sheet is intended to assist you in deciding whether or not to join.

  Before you agree to participate in this study, you must first fully understand what itmeans to be involved in the study.

- For clarity, please do not hesitate to ask me questions if you have any.

- You should not consent to participate unless you are comfortable and satisfied with allof the processes

involved.

- Should you decide to take part in this study, you will be asked to sign this document toconfirm that you understand the study and that you are willing to be part of it. You willalso be given a copy to keep.

This research will include audio-recorded individual that will take no more than an hour to an hour and a half. The researcher and interviewers will also take notes on the different aspects of the discussion. The tapes will be transcribed by the researcher and checked for accuracy (transcribing is the process of converting speech in an audio file into written text foranalysis purposes). Part or all of the transcripts of your discussions may be used in presentations or written products as part of the study outcome. Your participation in this studyis entirely voluntary, and you may decline or withdraw at any time without explanation. This will not affect your access to other medical care services.

If you have any questions, you may ask them now or later. If you wish to ask questions later, you may contact me, Zwile Zungu on 064 974 6833 or email address, 1888851@students.wits.ac.za

If you want any information regarding your rights as a research participant, or complaints regarding this research study, you may contact Prof Clement Penny, Chairperson of the University of the Witwatersrand, HREC, which is an independent committee established to help protect the rights of research participants at 011 717 2301.

Contact details:

Dr. Nellie Myburgh, Supervisor, by e-mail at nellie.myburgh@wits-vida.org

Prof Janan Dietrich, Co-supervisor, by e-mail at dietrichj@phru.co.za

Professor CB Penny, Chairperson of the Human Research Ethics Committee (Medical) at the University of Witwatersrand, on telephone no. 011 717 2301, or by e-mail at Clement.Penny@wits.ac.za.

Ms. Z Ndlovu or Mr. Rhulani Mkansi, Committee Secretariat, telephone nos.: 011 717 2700

/1234 or by e-mail at: Zanele.Ndlovu@wits.ac.za or Rhulani.Mkansi@wits.ac.za

APPENDIX D: Infornmed consent form

Informed Consent form

I hereby consent to be interviewed.

·I understand that:

- The recording will be stored in a secure location (a locked cupboard or password- protected computer) with restricted access to the researcher and the research supervisor.

- The recording will be transcribed, and any information that could identify me will be removed.

- The recordings will be erased within either (a) two (2) years of the publication of the research findings, or (b) six (6) years, if no publications arise from this research.

- Anyone wishing to access this information in the future will first have to obtain the approval of the Human Research Ethics Committee (Medical) of the University of theWitwatersrand, Johannesburg.

- Direct quotes from my interview, without any information that could identify me, maybe cited in the research report or other write-ups of research.

1. I have been given a Participant Information Sheet which explains the nature and processes involved in this study, which is attached hereto;

2. I was given enough time to read it or have it read to me in the language I understand best.

3. I was given time to ask any questions I wanted to and found any answers given to me to be reasonable

and satisfactory;

4. I believe I fully understand why the study is being conducted and what the intended outcomes will be;

5. I understand that there will be no immediate benefit to me, should I agree to participate,nor will I receive any payment; conversely, participation will not cost me anything butmy time;

6. I understand that, even if I initially agree to participate in the study, I may withdraw atany time and without explanation; if this occurs, any data collected about me for the study will be destroyed immediately, unless I give consent for it to be retained.

7. I have been given a range of contact details, listed above. If I require further informationor become concerned about any aspect of this study, I am free to speak to any of thesecontacts.

Consent to participate:

Name of Participant: _____

Date (dd/mm/yyyy)_____/_____/_____

Place: _____

Signature (or thumbprint) _____

Consent for audio recording:

☐ Yes ☐ No (mark ‘X’ in appropriate box)

Name of Participant: _____

Date (dd/mm/yyyy)_____/_____/_____

Place: _____

Signature (or thumbprint) _____

Witnessed by:

Name of Witness: _____

Signature (or thumbprint) _____

Date (dd/mm/yyyy)_/_____/_____

APPENDIX E: Interview question guide for vaccinated pregnant women

TITLE OF PROPOSED RESEARCH: Understanding SARS-CoV-2 vaccine hesitancy among pregnant women in Soweto, South Africa: A qualitative study

In-depth interview question guide for vaccinated pregnant women

Thank you for accepting and consenting to sit for an interview with me.

(**NB**: I would like to ask you very personal questions. If you do not want to answer them, please let me know and we will stop the interview immediately. Are you alright if we continue? Yes, No (If No, the interview will be stopped immediately and apologise for any distress caused. At this point an option to reach out to the Grief Counsellor who will provide grief counselling will be suggested). If yes, we continue with the interviews.

DEMOGRAPHIC INFORMATION

Before we begin, I would like to gather some basic demographic information to help me better understand your background and perspective. Please note that all information provided will be kept confidential.

1. Age: How old are you?

2. Marital status: What is your current marital status?

3. Who are the people you live with at home?

    a. Probe

        i. How many people in total do you live with?

4. Education level: I would like to know what your highest education level is.
5. Economic activity: I would like to ask what you do for a living.

    a. Probe:

        i. What is your profession?

PREGNANCY QUESTIONS

I would like to ask you some questions related to your pregnancy. I understand that pregnancy is a personal and sensitive topic, so please only answer what you are comfortable sharing. Your insight will be very valuable in helping me better understand the experiences of pregnant women.

6. As I said in my introduction, I am conducting research to understand the attitudes of pregnant women towards COVID-19 pregnancy. And I can see you are expecting, may I know how far you are with your pregnancy?

7. And is this your first pregnancy?

    a. Probe:
        i. Have you been pregnant before?

        ii. How many children do you have?

COVID-19 KNOWLEDGE AND PERCEPTION QUESTIONS

I am interested in understanding your knowledge regarding the COVID-19 vaccine as well as how other pregnant women you interact with view the COVID-19 vaccine. It is important to know that there is no correct or incorrect answer, please feel free to answer according to your knowledge and understanding.

8. What do you know about COVID-19 vaccines?

    a. Probe:

        i. Transmission

        ii. Prevention

        iii. Fears

9. What are your sources of information on COVID-19 vaccines, is it the internet, social media, government website, or others?

    a. Probe:

        i. How reliable are your sources?

10. Please enlighten me on what other pregnant women in Soweto saying regarding COVID-19 vaccination during pregnancy?

    a. Probe:

        i. Side effects

        ii. Rumours

iii. Worries or concerns etc

11. From everything they have said about the COVID-19, what do you think about the things the other pregnant women are saying regarding the COVID-19 vaccine and pregnancy?

12. What are some of the concerns you have about vaccinating for COVID-19 while pregnant?

ATTITUDE QUESTIONS

The COVID-19 vaccine has been a topic of much discussion lately. I am interested in hearing your thoughts and feelings on the vaccine and the views of people in your community.

13. As someone living in a densely populated community like Soweto, what are the rumors around the COVID-19 vaccine in the Soweto community or anywhere?

    a. Probe

        i. Do they trust the vaccine?

        ii. Are they taking the COVID-19 vaccine?

14. I would like to know why you vaccinated against COVID-19?

15. With regards to maternal vaccination, have you been vaccinated against the flu, or other pregnancy recommended vaccines this year or in previous years in connection with your pregnancy?

MOTIVATORS QUESTIONS

There has been a lot of information surrounding the COVID-19 vaccine. This information motivated people to get vaccinated, however some information made people to express some concerns about getting vaccinated against COVID-19. And I totally respect their opinions. I am interested to know what you think about the vaccine and the reasons for getting vaccinated. Please feel free to speak your mind without worrying that it may be used against you or leaked to others.

16. What is the main reason or motivator for vaccinating against COVID-19?

17. From what you have mentioned, how are each of these motivators influence you to get vaccinated against COVID-19?

    a. Probe

        i. Please elaborate.

ALTERNATIVE HEALING METHODS

During the COVID-19 pandemic many people turned to alternative healing methods to supplement conventional medical interventions. I am curious to hear your thoughts and experiences in this area. Please feel free and note that I will not

judge you or your actions, this is a safe space.

18. Indigenous and spiritual healing is part of being African healing methods, speaking of these do you consult *bathandazi/phorofiti* (faith healer or prophet) or *Inyanga/sangoma* (traditional healer) regarding your health?
    a. Probe
        i. If yes, what did they say regarding vaccination against COVID-19 while pregnant?

19. *Umhlonyane* (alternative remedies/herbs) was used across the board during the pandemic as a prevention method. Do you believe that *umhlonyane* can prevent COVID-19 illness?
    a. Probe
        i. Do you have first-hand experience?
        ii. Do you believe that *umhlonyane* (alternative remedies/herbs) can also cure COVID-19 illness?

20. What are other alternative remedies/herbs you use to prevent COVID-19 infection/ illness or cure?
    a. Probe
        i. How do you use them?

DECISION MAKING

Can you walk me through your decision-making process when it comes to health-related decisions. I'm interested in understanding how you typically go about making decisions related to your health specifically the acceptance of the COVID-19 vaccine.

21. The COVID-19 vaccine is a hot topic everywhere, have you ever discussed vaccination against COVID-19 while pregnant with anyone?

22. Who was that person(s)?
    a. Probe
        i. What is your relationship with them?

23. From the discussion you had what was their advice to you about vaccinating while pregnant?
    a. Probe
        i. Did the discussions you had influence you to take the COVID-19 vaccine?

24. Are you attending antenatal care?

a. Probe

    i. What were the discussion with the nurse regarding vaccination against COVID-19?

    ii. Did the discussions you had influence you to take the COVID-19 vaccine?

25. How did all these discussions influence your final decision regarding vaccinating against COVID-19?

26. In closing what given the chance to vaccinate against COVID-19 again would you take the vaccine while pregnant?

    a. Probe

        i. Please elaborate why.

APPENDIX F: Interview question guide for unvaccinated pregnant women

TITLE OF PROPOSED RESEARCH: Understanding SARS-CoV-2 vaccine hesitancy among pregnant women in Soweto, South Africa: A qualitative study

In-depth interview question guide for unvaccinated pregnant women

Thank you for accepting and consenting to sit for an interview with me.

(**NB**: I would like to ask you very personal questions. If you do not want to answer them, please let me know and we will stop the interview immediately. Are you alright if we continue? Yes, No (If No, the interview will be stopped immediately and apologise for any distress caused. At this point an option to reach out to the Grief Counsellor who will provide grief counselling will be suggested). If yes, we continue with the interviews.

DEMOGRAPHIC INFORMATION

Before we begin, I would like to gather some basic demographic information to help me better understand your background and perspective. Please note that all information provided will be kept confidential.

1. Age: How old are you?

2. Marital status: What is your current marital status?

3. Who are the people you live with at home?

    a. Probe

        i. How many people in total do you live with?

4. Education level: I would like to know what your highest education level is.

5. Economic activity: I would like to ask what you do for a living.

    a. Probe:

        i. What is your profession?

PREGNANCY QUESTIONS

I would like to ask you some questions related to your pregnancy. I understand that pregnancy is a personal and sensitive topic, so please only answer what you are comfortable sharing. Your insight will be very valuable in helping me better understand the experiences of pregnant women.

6. As I said in my introduction, I am conducting research to understand the attitudes of pregnant women towards COVID-19 pregnancy. And I can see you are expecting, may I know how far you are with your pregnancy?

7. And is this your first pregnancy?

    a. Probe:
        i. Have you been pregnant before?

        ii. How many children do you have?

COVID-19 KNOWLEDGE AND PERCEPTION QUESTIONS

I am interested in understanding your knowledge regarding the COVID-19 vaccine as well as how other pregnant women you interact with view the COVID-19 vaccine. It is important to know that there is no correct or incorrect answer, please feel free to answer according to your knowledge and understanding.

8. What do you know about COVID-19 vaccines?

    a. Probe:

        i. Transmission

        ii. Prevention

        iii. Fears

9. What are your sources of information on COVID-19 vaccines, is it the internet, social media, government website, or others?

    a. Probe:

        i. How reliable are your sources?

10. Please enlighten me on what other pregnant women in Soweto saying regarding COVID-19 vaccination during pregnancy?

    a. Probe:

i. Side effects

ii. Rumours

iii. Worries or concerns etc

11. From everything they have said about the COVID-19, what do you think about the things the other pregnant women are saying regarding the COVID-19 vaccine and pregnancy?

12. What are some of the concerns you have about vaccinating for COVID-19 while pregnant?

ATTITUDE QUESTIONS

The COVID-19 vaccine has been a topic of much discussion lately. I am interested in hearing your thoughts and feelings on the vaccine and the views of people in your community.

13. As someone living in a densely populated community like Soweto, what are the rumors around the COVID-19 vaccine in the Soweto community or anywhere?

    b. Probe

        i. Do they trust the vaccine?

        ii. Are they taking the COVID-19 vaccine?

14. I would like to know why you haven't vaccinated against COVID-19?

15. With regards to maternal vaccination, have you been vaccinated against the flu, or other pregnancy recommended vaccines this year or in previous years in connection with your pregnancy?

BARRIERS QUESTIONS

Some people have expressed hesitation or concerns about getting vaccinated against COVID-19. And I totally respect their opinions. I am interested to know what you think about the vaccine and the reasons for not getting vaccinated. Please feel free to speak your mind without worrying that it may be used against you or leaked to others.

16. What is the main reason or barrier for not vaccinating against COVID-19?

17. From what you have mentioned, how are each of these barriers stopping you from getting vaccinated against COVID-19?

    a. Probe

        i. Please elaborate.

ALTERNATIVE HEALING METHODS

During the COVID-19 pandemic many people turned to alternative healing methods to supplement conventional medical interventions. I am curious to hear your thoughts and experiences in this area. Please feel free and note that I will not judge you or your actions, this is a safe space.

18. Indigenous and spiritual healing is part of being African healing methods, speaking of these do you consult *bathandazi/phorofiti* (faith healer or prophet) or *Inyanga/sangoma* (traditional healer) regarding your health?
    a. Probe
        i. If yes, what did they say regarding vaccination against COVID-19 while pregnant?

19. *Umhlonyane* (alternative remedies/herbs) was used across the board during the pandemic as a prevention method. Do you believe that *umhlonyane* can prevent COVID-19 illness?
    a. Probe
        i. Do you have first-hand experience?
        ii. Do you believe that *umhlonyane* (alternative remedies/herbs) can also cure COVID-19 illness?

20. What are other alternative remedies/herbs you use to prevent COVID-19 infection/ illness or cure?
    a. Probe
        i. How do you use them?

DECISION MAKING

Can you walk me through your decision-making process when it comes to health-related decisions. I'm interested in understanding how you typically go about making decisions related to your health specifically the acceptance of the COVID-19 vaccine.

21. The COVID-19 vaccine is a hot topic everywhere, have you ever discussed vaccination against COVID-19 while pregnant with anyone?

22. Who was that person(s)?
    a. Probe
        i. What is your relationship with them?

23. From the discussion you had what was their advice to you about vaccinating while pregnant?
    a. Probe
        i. Did the discussions you had influence you not to take the COVID-19 vaccine?

24. Are you attending antenatal care?
    a. Probe
        i. What were the discussion with the nurse regarding vaccination against COVID-19?
        ii. Did the discussions you had influence you not to take the COVID-19 vaccine?

25. How did all these discussions influence your final decision regarding vaccinating against COVID-19?

26. In closing what will it take for you to get vaccinate against COVID-19?
    a. Probe
        i. What will motivate you to get vaccinated?

APPENDIX G: Interview question framework for traditional healers and faith healers

TITLE OF PROPOSED RESEARCH: Understanding SARS-CoV-2 vaccine hesitancy among pregnant women in Soweto, South Africa: A qualitative study

In-depth interview question framework for traditional healers and faith healers

Thank you for accepting and consenting to sit for an interview with me.

(**NB**: I would like to ask you very personal questions related to your profession. If you do not want to answer them, please let me know and we will stop the interview immediately. Are you alright if we continue? Yes, No (If No, the interview will be stopped immediately and apologise for any distress caused. At this point an option to reach out to the Grief Counsellor who will provide grief counselling will be suggested). If yes, we continue with the interviews.

DEMOGRAPHIC INFORMATION

Before we begin, I would like to gather some basic demographic information to help me better understand your background and perspective. Please note that all information provided will be kept confidential.

1. Education level: I would like to know what your highest education level is.
2. Economic activity: I would like to ask what you do for a living.
    a. Probe:
        i. What is your profession?
        ii. How long have you been working in this profession?

COVID-19 KNOWLEDGE AND PERCEPTION QUESTIONS

I am interested in understanding your knowledge regarding the COVID-19 vaccine and the vaccination of pregnant women you interact with. It is important to know that there is no correct or incorrect answer, please feel free to answer according to your knowledge and understanding.

3. What do you know about COVID-19 vaccines?
    a. Probe:
        i. Transmission

ii. Prevention

iii. Fears

4. What are your sources of information on COVID-19 vaccines, is it the internet, social media, government website, or others?

    a. Probe:

        i. How reliable are your sources?

5. Please enlighten me on what do you know about the vaccination of pregnant women in against COVID-19 during pregnancy?

    a. Probe:

        i. Side effects

        ii. Rumours

        iii. Worries or concerns etc

6. As someone in your profession what are some of the concerns you have about the vaccination of women for COVID-19 while pregnant?

ATTITUDE QUESTIONS

The COVID-19 vaccine has been a topic of much discussion lately. I am interested in hearing your thoughts and feelings on the vaccine and the views of people in your community especially pregnant women.

7. As someone living in a densely populated community like Soweto, what are the rumors around the COVID-19 vaccine in the Soweto community or anywhere?

    c. Probe

        i. Do they trust the vaccine?

        ii. Are they taking the COVID-19 vaccine?

8. With regards to maternal vaccination such as flu, or other pregnancy recommended vaccines, what do you think about them?

    a. Probe

i. Are they necessary?

ii. Are they safe?

ALTERNATIVE HEALING METHODS

During the COVID-19 pandemic many people turned to alternative healing methods to supplement conventional medical interventions. I am curious to hear your thoughts and experiences in this area. Please feel free and note that I will not judge you or your actions, this is a safe space.

9. Indigenous and spiritual healing is part of being African healing methods, when consulted what are other forms of preventing COVID-19 do you prescribe or give your clients?
    a. Probe
        i. How do the things you give them work?
10. Most people did not know about COVID-19 until 2019 because it is a new disease, how did you know that the substances/herbs or intervention would work?
    a. Probe
        ii. What are the concerns regarding the substances/herbs or intervention being used by pregnant women?

DECISION MAKING

Can you walk me through your decision-making process when it comes to health-related decisions. I'm interested in understanding how you typically go about advising your clients in making decisions related to your health specifically the acceptance of the COVID-19 vaccine.

11. The COVID-19 vaccine is a hot topic everywhere, have, when consulted by pregnant women regarding the administration of the COVID-19 vaccine what do you advise?
    a. Probe
        i. Why do you give them that advice?
12. Do you suggest the clinic or hospital to pregnant women when you cannot assist them?
    a. Probe
        i. Why?
13. In closing are you vaccinated against COVID-19?
    a. Probe
        i. Why?

APPENDIX H: Interview question framework for Healthcare workers

TITLE OF PROPOSED RESEARCH: Understanding SARS-CoV-2 vaccine hesitancy among pregnant women in Soweto, South Africa: A qualitative study

In-depth interview question framework for Healthcare workers

Thank you for accepting and consenting to sit for an interview with me.

(**NB**: I would like to ask you very personal questions related to your profession. If you do not want to answer them, please let me know and we will stop the interview immediately. Are you alright if we continue? Yes, No (If No, the interview will be stopped immediately and apologise for any distress caused. At this point an option to reach out to the Grief Counsellor who will provide grief counselling will be suggested). If yes, we continue with the interviews.

DEMOGRAPHIC INFORMATION

Before we begin, I would like to gather some basic demographic information to help me better understand your background and perspective. Please note that all information provided will be kept confidential.

1. Education level: I would like to know what your highest education level is.
2. Economic activity: I would like to ask what you do for a living.
    a. Probe:
        iii. What is your profession?
        iv. How long have you been working in this profession?

COVID-19 KNOWLEDGE AND PERCEPTION QUESTIONS

I am interested in understanding your knowledge regarding the COVID-19 vaccine and the vaccination of pregnant women. It is important to know that there is no correct or incorrect answer, please feel free to answer according to your knowledge and understanding.

3. What do you know about COVID-19 vaccines?
    a. Probe:
        i. Transmission

ii. Prevention

iii. Fears

4. What are your sources of information on COVID-19 vaccines, is it the internet, social media, government website, or others?

    a. Probe:

        i. How reliable are your sources?

5. Please enlighten me on what do you know about the vaccination of pregnant women in against COVID-19 during pregnancy?

    a. Probe:

        i. Side effects

        ii. Rumours

        iii. Worries or concerns etc

6. As someone in your profession what are some of the concerns you have about the vaccination of women for COVID-19 while pregnant?

ATTITUDE QUESTIONS

The COVID-19 vaccine has been a topic of much discussion lately. I am interested in hearing your thoughts and feelings on the vaccine and the views of people in your community especially pregnant women.

7. As someone living in a densely populated community like Soweto, what are the rumors around the COVID-19 vaccine in the Soweto community or anywhere?

    a. Probe

        i. Do they trust the vaccine?

        ii. Are they taking the COVID-19 vaccine?

8. With regards to maternal vaccination such as flu, or other pregnancy recommended vaccines, what do you think about them?

    a. Probe

        i. Are they necessary?

ii. Are they safe?

ALTERNATIVE HEALING METHODS

During the COVID-19 pandemic many people turned to alternative healing methods to supplement conventional medical interventions. I am curious to hear your thoughts and experiences in this area. Please feel free and note that I will not judge you or your actions, this is a safe space.

9. Indigenous and spiritual healing is part of being African healing methods, do you recommend the usage of alternative healing methods for pregnant women especially against COVID-19?
    a. Probe
        i. Why?

10. *Umhlonyane* (alternative remedies/herbs) was used across the board during the pandemic as a prevention method. Do you believe that *umhlonyane* can prevent COVID-19 illness?
    a. Probe
        i. Do you have first-hand experience?
        ii. Do you believe that *umhlonyane* (alternative remedies/herbs) can also cure COVID-19 illness?

11. What are other alternative remedies/herbs used to prevent COVID-19 infection/ illness or cure?
    a. Probe
        i. How do you use them?
        ii. Would you recommend them to pregnant women to use against COVID-19?

DECISION MAKING

Can you walk me through your decision-making process when it comes to health-related decisions. I'm interested in understanding how you typically go about advising your clients in making decisions related to your health specifically the acceptance of the COVID-19 vaccine.

12. The COVID-19 vaccine is a hot topic everywhere, when consulted by pregnant women regarding the administration of the COVID-19 vaccine what do you advise?
    a. Probe
        ii. Why do you give them that advice?

13. As a healthcare worker do you motivate pregnant women to attend antenatal care?
    a. Probe

i. What were the discussions you have with the pregnant woman regarding the vaccination against COVID-19?

ii. Did think discussions you have with them influence them to take the COVID-19 vaccine?

14. In closing have you been vaccinated against COVID-19?

a. Probe

i. Why?