


UNIVERSITY OF CAPE COAST



EXPLORING RTS,S MALARIA VACCINE HESITANCY AMONG  
PARENTS/CAREGIVERS IN THE CAPE COAST METROPOLIS

VIOLET AHENKORAH

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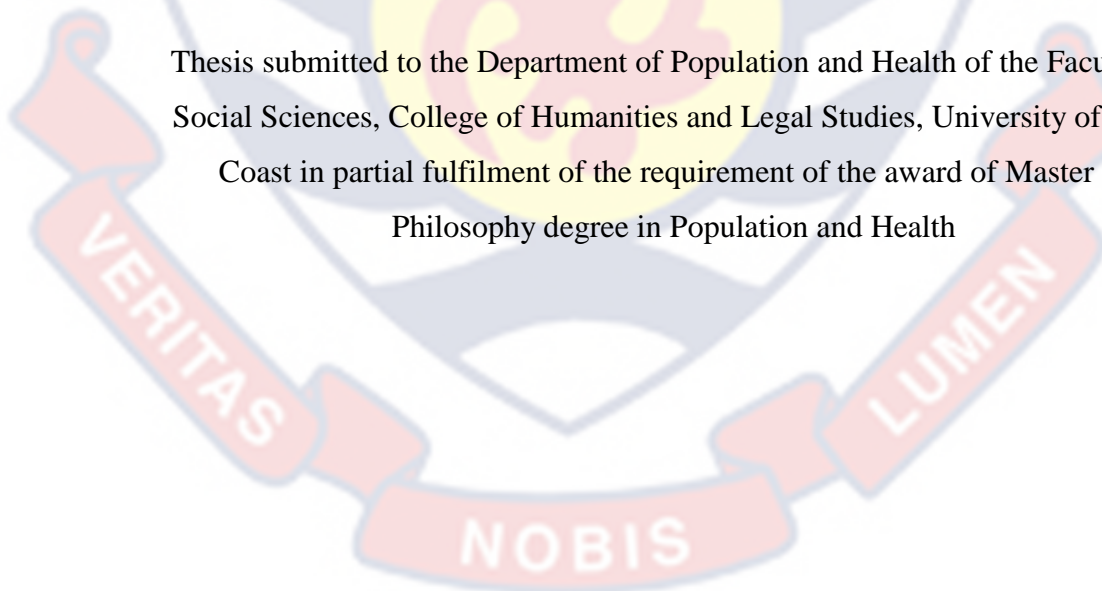
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BY

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Coast in partial fulfilment of the requirement of the award of Master of  
Philosophy degree in Population and Health



MARCH, 2024

## DECLARATION

### Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature..... Date.....

Name: Violet Ahenkorah

### Supervisor's Declaration

I hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Supervisor's Signature..... Date.....

Name: Prof Eugene Kofuor Maafo Darteh

## ABSTRACT

Vaccine hesitancy is a global health challenge mostly associated with newly introduced vaccines such as the RTS,S malaria vaccine. Vaccine hesitancy negatively affects vaccination programmes. This results in low vaccination coverage as seen with the RTS,S malaria vaccination in the Cape Coast Metropolis in the Central Region of Ghana. Given this, this study sought to explore the reasons for RTS,S malaria vaccine hesitancy among parents/caregivers in the Cape Coast Metropolis. The study was theoretically underpinned by the Health Belief Model and the Theory of Planned Behaviour. The study used a qualitative method of research and an in-depth interview was used to collect data from 11 participants. Data were analysed using a guide developed by Braun and Clarke. The study revealed that parents hesitated to the RTS,S malaria vaccine because there was a low perceived risk and severity of malaria, fear of adverse events following RTS,S immunisation, perception of vaccine being ineffective, dissatisfaction over RTS,S being piloted in some selected districts, unknown vaccine side effects and low vaccine education from the healthcare professionals. It is recommended that Cape Coast Health Directorate should use outreaches, door-to-door and social media as means to educate parents on the RTS,S vaccine. Cape Coast Health Directorate should encourage nurses to educate parents on the risks and benefits of RTS,S malaria vaccination. Cape Coast Health Directorate should use vaccine-accepting parents to educate vaccine-hesitant parents. Ghana Health Service should administer the RTS,S malaria vaccination nationwide. Ghana Health Service should add RTS,S vaccine to the list of vaccines in the child health record book.

## KEY WORDS

Vaccine Hesitancy

Immunisation

Malaria

RTS,S

Vaccination

Vaccine

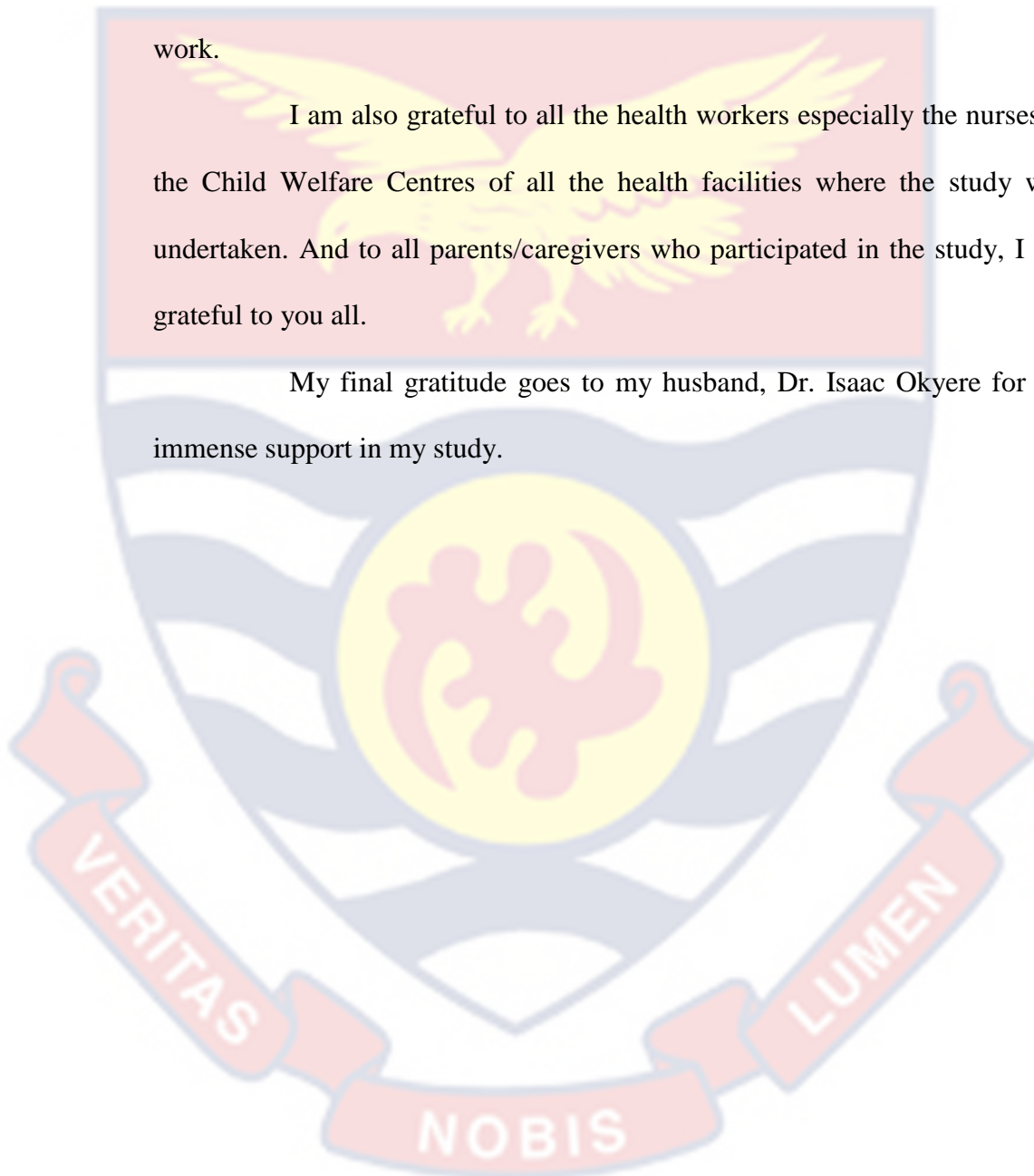


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**DEDICATION**

To my family



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**LIST OF ABBREVIATIONS**

CDC	Centre for Disease Control and Prevention
CWC	Child Welfare Clinic
GHS	Ghana Health Service
GVAP	Global Vaccine Action Plan
SAGE	Strategic Advisory Group of Experts
SDG	Sustainable Development Goals
WHO	World Health Organisation
HBM	Health Belief Model
VPD	Vaccine-Preventable Disease
TPB	Theory of Planned Behaviour
AEFI	Adverse Events Following Immunisation
EPI	Expanded Programme on Immunisation



## CHAPTER ONE

### INTRODUCTION

#### Background to the Study

Millions of children have died globally in the past due to infectious diseases which are currently preventable by vaccines (Etzioni-Friedman & Etzioni, 2021). The introduction of vaccines during the 1790s improved the well-being of humans (Stern & Markel, 2005). These vaccines are biological products that are administered through injection, orally or sprayed into the nose to create antibodies and work with the natural defences of the body to reduce the risk of getting infections and maladies (Centre for Disease Control and Prevention (CDC), 2021a). Vaccinating and immunising people with vaccines have been identified by the health and medical community as safe and effective ways of reducing the burden of infectious diseases (Andre et al., 2008).

Although the concept of vaccination and immunisation are mostly used interchangeably, vaccination involves the introduction or administration of a vaccine into the body to help the body generate immunity to a particular disease whereas immunisation occurs when a person is protected against a disease after taking a vaccine (CDC, 2021a). Currently, vaccines are available for over 20 life-threatening diseases including, Diphtheria, Tetanus, Pertussis, Hepatitis A, Chickenpox, Hepatitis B, Haemophilus Influenza Type B (Hib), Malaria, Human Papillomavirus (HPV), Yellow fever, Influenza, Measles, Mumps, Rubella, Polio, Covid-19, among others. These vaccines have been beneficial to human lives and are one of the most life-saving public health interventions in history (WHO, 2018a).

The benefits of vaccines notwithstanding, vaccination coverage has plateaued in recent years and dropped since 2020 (WHO, 2022b). Some people are sometimes reluctant to accept vaccines due to various reasons. Such people are mostly hesitant and have negative attitudes toward vaccines. Individual vaccination hesitation has been termed as vaccine hesitancy by the World Health Organisation (WHO). This hesitation has been identified as a challenge to various vaccination programmes due to the negative impact it has on vaccine uptake (WHO, 2015). Vaccine hesitancy which is the focus of this study arises when people have concerns about vaccines including doubt about safety. Over the past two decades, parental doubt concerning the essence and safety of vaccines has made people hesitant about vaccines. This has jeopardized the effort to eradicate many vaccine-preventable diseases (VPDs) (Gowda & Dempsey, 2013). The citing of vaccines as being involved in the causation of many conditions (MacIntyre & Leask, 2003) including developmental disorders, autism, diabetes, asthma, cancer, multiple sclerosis and AIDS (Farooqi & Hopkin, 1998; Hurwitz & Morgenstern, 2000; Marshall, 1998; Wakefield et al., 1998) has fuelled vaccine hesitancy among people.

Vaccine hesitancy refers to the delay in the acceptance or refusal of vaccination despite the availability of vaccination services (MacDonald et al., 2015). It is simply the unwillingness to have oneself or one's children vaccinated against diseases. In the context of this study, vaccine hesitancy is when parents delay accepting or refuse the RTS,S malaria vaccine for their children. Vaccine hesitancy is influenced by factors such as complacency, convenience, and confidence. It is complex and context-specific, varying across time, place, country's income level and specific vaccines (MacDonald

et al., 2015). The concept includes attitudes of people ranging from complete rejection to passive acceptance of vaccines. It is attributed to factors including demographic, geographic, sociocultural, political, personal, specific vaccine, inequities, poverty and gender discrimination (Allen & Butler, 2020). It happens in varying forms where unusually few individuals refuse all vaccines but the common instances are the delay and refusal of some vaccines (Gowda & Dempsey, 2013). Vaccine hesitancy formed part of the ten global health threats in 2019. This issue has existed for centuries but it has recently gained attention because it undermines vaccine uptake (Lane, 2018).

Globally, public health experts are alarmed over the increasing rate of vaccine hesitancy (Kumar et al., 2016). Vaccine hesitancy exists in all six WHO regions. It has been reported by more than 90% of countries with a relatively low number of countries reporting no hesitancy between 2015 and 2017 (Lane et al., 2018). All WHO categories of country income levels experience vaccine hesitancy (Lane et al., 2018). In high-income countries, hesitancy has been common among the wealthy group (Wagner et al., 2019) and according to Gallup, (2018), most hesitant countries are within Eastern Europe, Western Europe and Northern America. France is considered to be one of the vaccine-hesitant countries (one in three adults is hesitant) alongside Bosnia-Herzegovina, Japan and Mongolia (Schwarzinger et al., 2021; Vignaud, 2021). Vaccine hesitancy has increased the susceptibility of unimmunised children to measles in various places in the United States, Canada and Europe (CDC, 2019, 2015; Patel et al., 2019).



In Africa, there has been great progress in immunisation programmes over the last four decades but vaccine hesitancy is becoming a risk to this gain (Cooper et al., 2018). Vaccine hesitancy is rising in Africa (Cooper et al., 2018) as four countries reported the presence of vaccine-hesitant groups during their immunisation programmes review (Shibeshi et al., 2021). Within the region, people are delaying or refusing available vaccines due to contention over vaccines (Larson, 2018). In lower- and middle-income countries (LMIC), the common reason cited for hesitancy is the issue of low knowledge and awareness about vaccines (Marti et al., 2017). Although vaccine hesitancy is on the rise in Africa, the 2018 Wellcome Global Monitor report shows that, the rate of vaccine hesitancy and issues about vaccine safety is lower in LMIC as compared to high-income countries (HIC). Stakeholders in immunisation have expressed that vaccine hesitancy is becoming a threat to the health of Africa (Wiysonge, 2019) and needs urgent attention.

Ghana is one of the countries with good vaccination records over the years. The country has been in the lead in introducing new vaccines among African countries (Wallace et al., 2019). With the good vaccination record notwithstanding, there exist delayed infant vaccinations (Akmatov & Mikolajczyk, 2012). There are also isolated incidences of hesitancy expressed by individuals and not as a collective or sustained movement towards public health interventions including vaccination and medication (Grant et al., 2022). Hesitancy is mostly expressed among people in the country due to a lack of understanding of the interventions. An example was when a mass deworming programme was rejected by some community members due to rumours about the intervention (Dodoo et al., 2007). Issues of vaccine hesitancy at all levels

indicate that they are fuelled by vaccine rumours and misinformation (Wiyeh et al., 2018). This is mostly experienced by newly introduced vaccines (Strategic Advisory Group of Experts on Immunisation (SAGE), 2014) such as the RTS,S/AS01 malaria vaccine.

The RTS,S/AS01 or Mosquirix is a sporozoite vaccine introduced in some African countries to act against malaria caused by *Plasmodium falciparum* (Arora et al., 2021). This type of malaria is the deadliest and common malaria parasite in Africa. The RTS,S is a recombinant protein-based malaria vaccine. The “R” stands for the central repeat region of the circumsporozoite (CS) protein; the “T” stands for the T-cell epitope of the CS antigen; and the first “S” for “Surface” portion which when co-expressed on yeast cells, displays both CS protein and S at their surfaces, the next “S” stands for the hepatitis B surface antigen (a carrier matrix). The vaccine was developed in 1987 by GlaxoSmithKline (GSK) (Laurens, 2020) and it has gone through trials in Burkina Faso, Gabon, Ghana, Kenya, Malawi, Mozambique and the United Republic of Tanzania (Arora et al., 2021). In 2019, piloting implementation of the vaccine began in Ghana, Kenya and Malawi under the WHO-coordinated Malaria Vaccine Implementation Programme MVIP (Laurens, 2020).

The contribution of the RTS,S malaria vaccine towards malaria eradication effort notwithstanding (Alonso, 2012), the vaccine was welcomed with rumours and misinformation at the beginning of the piloting phase of the vaccine. In Ghana, videos on social media expressed that Ghanaians were being used as *guinea pigs* to test the vaccine and conspiracy theories to depopulate Africa through the vaccine (Asante et al., 2019; Edwards, 2020).

These misinformation and disinformation can increase vaccine hesitancy (Tuckerman et al., 2022). There was also growing concern among parents about children taking too many vaccines in Ghana and this was believed to have negatively affected the uptake of the RTS,S vaccine (Tabiri et al., 2021).

The protection from the RTS,S malaria vaccine combined with the various malaria control interventions has the potency to save many lives yearly (WHO, 2021) and reduce the global malaria burden. This highlights the need for acceptability and high uptake of the RTS,S malaria vaccine.

### **Statement of the Problem**

Malaria has received global attention since the early part of the 21st century. This recognition has over the years reduced the sudden rise in malaria cases and death during the 1960s and the late 1990s. According to the World Malaria Report 2015, there has been great progress in the fight against malaria over the past 15 years (2000-2015). However, the 2019 World Malaria Report showed that the progress has stalled especially in high malaria burden countries in Africa including Ghana (WHO, 2019b).

Globally between the years 2000 and 2015, malaria cases declined by 18%, malaria incidence decreased by 37% and deaths also declined by 48% (WHO, 2015). Despite the progress made, malaria still has devastating effects on humans. The Malaria report for 2019 indicated that there were 228 million malaria cases, a malaria incidence rate of 57% and an estimated 405000 malaria mortality in 2018 (WHO, 2019b).

In Africa, from the year 2000 to 2015, malaria cases fell by 12%, the malaria incidence rate fell by 42% and malaria deaths fell by 48% (WHO, 2015). However, the region still carries the weighty burden of malaria. In

2018, the region accounted for 213 million (93%) of the global malaria cases and 94% of global malaria deaths (WHO, 2019b).

In Ghana, malaria cases were reduced by over 50% between 2005 to 2015 (WHO, 2018b), estimates of malaria case incidence decreased although less than 50% and malaria deaths fell beyond 50% between 2000 to 2015 (WHO, 2015). However, in 2018, there was about an 8% increase in malaria cases making Ghana one of the countries that reported the highest absolute increase in malaria cases in the year. The nation also accounted for 3% of global malaria deaths in 2018 (WHO, 2019b).

The data from the 2019 World Malaria Report indicated that the progress experienced over the years has stopped (WHO, 2019b). The global fight against malaria has reached a state of little or no progress although effective prevention and treatment interventions are still being implemented. These interventions include the use of insecticide-treated mosquito nets (ITNs), indoor residual spraying (IRS), intermittent preventive treatment of malaria in infancy (IPTi), the use of intermittent preventive treatment of malaria in pregnant women (IPTp), malaria case management and others (CDC, 2018). With the disease still causing devastation in the world, there is a need for more malaria control measures including vaccines.

The RTS,S malaria vaccine has been introduced in Ghana, Kenya and Malawi for pilot implementation. In Ghana, the pilot implementation of the vaccine began in 2019 with 42 districts in seven regions namely; Volta, Central, Bono, Ahafo, Bono East, Oti and Upper East. These are regions where malaria transmission is highest. In the first and second quarter of 2020 of the pilot implementation, data from the Malaria Vaccine Implementation

Programme (MVIP) Quarterly Data Bulletin showed that, some of the piloting districts recorded lower RTS,S vaccination coverage compared to their comparative or benchmark antigens (Pentavalent 3 and Measles-Rubella 1 vaccines).

Some of the districts including Dormaa West, Cape Coast, Nkoranza North, Asunafo North and Abura Asebu Kwamankese recorded lower RTS,S vaccination coverage compared to their comparative antigens (MVIP 2020). The RTS,S vaccination coverage for these districts ranged from 42% to 64% compared to their comparative antigens which ranged between 72% to 120% in the first two quarters of 2020. Low RTS,S vaccination coverage against the comparative antigens implied that acceptance of the RTS,S was lower than the comparative antigens. This required a holistic approach to understand why there was low acceptance and uptake of the RTS,S vaccine despite the availability of the RTS,S vaccination service. Refusal of the RTS,S vaccine by a small subset of the population during the piloting stage can affect uptake during the national rollout of the vaccine.

This makes it imperative to study vaccine hesitancy concerning RTS,S vaccine in these low RTS,S coverage districts to understand district-specific drivers of hesitancy and required interventions. Not much is known about the nature of vaccine hesitancy in Africa (Cooper et al., 2018), and in Ghana, the reasons for infant vaccination delays have not been explored much (Laryea et al., 2018) in the literature. With the RTS,S malaria vaccine, many studies mostly involving parents in general have been undertaken during and before the vaccine was piloted. The studies covered knowledge, perception, attitude, uptake and acceptance of the vaccine (Bingham et al., 2012; Chukwuocha et

al., 2018; Febir et al., 2013; Meñaca et al., 2014; Mtenga et al., 2016; Ojaka et al. 2011; Ojaka et al., 2014; Romore et al., 2015; Tabiri et al., 2021). Although rumours and parental concerns about the RTS,S vaccine could promote hesitancy, most of the studies on the RTS,S vaccine did not research into hesitancy. This creates a dearth of information on RTS,S hesitancy among hesitant parents as well as their knowledge and perception during the piloting phase of the vaccine. Again vaccine hesitancy is complex and context-specific, which varies across places (MacDonald et al., 2015).

This makes it important to study the reasons for hesitancy in a piloting district with low RTS,S vaccination coverage where a similar study has not been done. This study tried to fill a gap by highlighting the knowledge, perception and reasons for RTS,S hesitancy from the perspective of hesitant parents during the piloting phase in a low RTS,S coverage district. This study was undertaken in the Cape Coast Metropolis which is one of the piloting districts with low vaccination coverage as shown in the 2020 Malaria Vaccine Implementation Programme quarterly data bulletin.

### **Objectives of the Study**

The general objective of the study was to explore RTS,S malaria vaccine hesitancy among parents/caregivers in the Cape Coast Metropolis, Ghana. The specific objectives were to:

1. Assess the knowledge of parents/caregivers about the RTS,S malaria vaccine in the Cape Coast Metropolis;
2. Investigate the perception of parents/caregivers about the RTS,S malaria vaccine in the Cape Coast Metropolis;

3. Explore parents/caregivers reasons for the delay in acceptance of the RTS,S malaria vaccine for their children in the metropolis;
4. Explore parents/caregivers reasons for the refusal of the RTS,S malaria vaccine for their children in the Cape Coast Metropolis.

### **Research Questions**

1. How knowledgeable are parents/caregivers about the RTS,S malaria vaccine in the Cape Coast Metropolis?
2. What is the perception of parents/caregivers about the RTS,S malaria vaccine in the Cape Coast Metropolis?
3. Why do some parents/caregivers delay accepting the RTS,S malaria vaccine for their children in the Cape Coast Metropolis?
4. Why do some parents/caregivers refuse the RTS,S malaria vaccine for their children in the Cape Coast Metropolis?

### **Significance of the Study**

The progress in the fight against malaria has stalled and it is envisaged that, the malaria vaccine together with the existing preventive measures will help save lives (WHO, 2021). High RTS,S malaria vaccine uptake especially in the piloting districts will help ascertain the impact of the vaccine on malaria control. The Cape Coast Metropolis as one of the piloting districts recorded low vaccination coverage according to the 2020 quarterly data bulletin of the Malaria Vaccine Implementation Programme (MVIP, 2020). To appreciate the reasons for low coverage despite the availability of the vaccine, the contributing factors would need to be understood. Given this, this study explored why parents hesitated concerning the RTS,S malaria vaccine as well as their knowledge and perception about the vaccine.

It is envisioned that the findings from this study would provide information on parents' knowledge and perceptions of the RTS,S malaria vaccine to the Cape Coast Metropolis Health Directorate. This information would guide the directorate to develop vaccine educational messages targeting parents' RTS,S knowledge and perception to help parents embrace facts and not myths about the RTS,S vaccine.

At the health facility level, this study would inform nurses at the child welfare clinics about parents reasons for being hesitant towards the RTS,S vaccine. This information would guide the nurses to engage vaccine-hesitant parents in health communication that acknowledges and addresses their concerns. This could help to change parents' negative vaccination behaviour to improve vaccine uptake.

The study could add to existing literature and serve as a source of information for other researchers in the field of vaccine hesitancy in the country. It would serve as a reference for researchers on issues of RTS,S vaccine hesitancy in the country.

Data from the study would also be available to other researchers in the area of vaccine hesitancy for further studies.

### **Limitations of the Study**

This study was successfully undertaken; however, there were some challenges that in a way affected the results of the study. Firstly, eight of the participants requested telephone interviews during data collection. As a result of that, participants' behaviours and body language that could give more meaning to what they said were not obtained.



Secondly, views of parents who hesitated from the onset of the RTS,S vaccine pilot implementation were not obtained. This is because the health facilities did not have adequate data on parents that refused or delayed the RTS,S vaccine for their children. This affected the richness of the data for the study since hesitancy was high when the piloting began. Finally, the use of a qualitative research approach in this study cannot make the findings to be generalised.

### **Organisation of Study**

This study was organised into five chapters. Chapter One which was the introductory part of the research consisted of the background of the study, statement of the problem, objectives of the study, research questions, significance of the study and limitations of the study. Chapter Two comprised a review of conceptual, theoretical and empirical literature about vaccine hesitancy. This covered the following sub-topics: the history and concept of vaccine hesitancy, the model of vaccine hesitancy, the determinant matrix of vaccine hesitancy, empirical issues on vaccine hesitancy, theoretical issues and conceptual framework. Chapter Three covered the methodology used in the research. It dealt with the research design, the study area, the target population, the source of data, the sampling procedure, the data collection instrument, data collection procedures and data analysis. Chapter Four consisted of a presentation of the data, analysis and discussion of the results. Chapter Five involved a summary of research findings, conclusions, lessons learnt and recommendations and suggestions for future research.

## CHAPTER TWO

### LITERATURE REVIEW

#### Introduction

This chapter dealt with the review of literature related to other vaccines and the RTS,S malaria vaccine as well as vaccine hesitancy. The chapter covered the empirical and theoretical literature on RTS,S malaria vaccine, vaccine hesitancy and the conceptual framework that guided the study. The empirical literature review looked into the history and concept of vaccine hesitancy, the model of vaccine hesitancy, the vaccine hesitancy matrix, parents' perception and knowledge about the RTS,S malaria vaccine, parents' reasons for delay accepting other vaccines and the RTS,S malaria vaccine and parents' reasons for refusing other vaccines and the RTS,S malaria vaccine for their children. The theoretical literature reviewed the Health Belief Model (HBM) developed by some psychologists in the US in the 1950s and the Theory of Planned Behaviour (TPB) by Ajzen (Ajzen, 1991). The conceptual framework that guided the study was also discussed in this chapter.

#### History and Concept of Vaccine Hesitancy

Many controversies surrounding vaccines have always affected vaccine acceptance to different degrees presently and in the past. According to Kumar and colleagues, the issue of vaccine hesitancy existed when the first vaccine was introduced (Kumar et al., 2016). The act of delaying accepting, refusing and opposing vaccines due to various reasons has existed since the emergence of the concept of inoculation and vaccination in the world as far back as the 1700s (Niederhuber, 2014). Even before the smallpox vaccine was introduced by Edward Jenner, Cotton Mather always defended and protected

the concept of inoculation which was opposed in 1721 during the Boston smallpox epidemic. Cotton Mather refuted the allegation that inoculation would cause more harm to humans than the smallpox disease itself (Schwartz, 2012). The concept of inoculation faced objection because people were of the view that, inoculating people against smallpox was a way of resisting God, others misunderstood and were uncertain about the concept and Dr. William Douglass (a Boston physician) who spearheaded the anti-inoculation exercise was of the view that, the inoculation method may rather fasten the spread of the disease if not well implemented (Buhr, 2000).

The smallpox vaccine developed by Edward Jenner still faced opposition from people who were against the inoculation concept (Niederhuber, 2014). Later when Edward Jenner's vaccine was seen to be effective in preventing the disease, vaccination of children against smallpox was required for school enrolment in most towns in Europe and Boston and that also faced serious objection (Schwartz, 2012). People saw mandatory vaccination as a way of the government interfering with their religious beliefs and violating the individual right to freedom (Jackson, 1969).

Reports of some vaccines being associated with autism and neurological problems compounded the objection even though those reports came out to be untrue (Dubé et al., 2015). The distrust and low confidence people have about vaccines make them express opposition to vaccines through groups or movements. Some of these groups included the Leicester anti-vaccination league which was formed in the UK in 1869, The New England anti-compulsory vaccination was formed in the US in 1882 and others ((Dubé et al., 2015).

After almost two centuries, the perspective of some people about the science of vaccines remains unchanged even though there has been great improvement (Schwartz, 2012). This has given public health experts the task of refuting incorrect information about vaccines all the time. The reasons for the disapproval of vaccines in the beginning stage of vaccines are the same as today; safety concerns, religious disapproval, doubt about vaccines, and lack of trust in government and pharmaceutical institutions (Clift & Rizzolo, 2014).

Hitherto, individuals' unwillingness and objection to vaccination have been termed "vaccine resistance" or "vaccine opposition" (Kumar et al., 2016). In recent times, the act of objecting to vaccines has been explored through research and has been termed as vaccine hesitancy (Opel et al., 2011). In 2012, the WHO Strategic Advisory Group of Experts (SAGE) on vaccine hesitancy was established to help deal with the issue. The SAGE defined vaccine hesitancy as the delay in acceptance or refusal of vaccines despite the availability of vaccination services (SAGE, 2014). Vaccine hesitancy is complex and context-specific, varying across time, place and vaccines. It is influenced by factors such as complacency, convenience and confidence (SAGE, 2014). People's reactions to vaccines are of different degrees, covering from full acceptance to absolute refusal.

Vaccine-hesitant people are diverse and such individuals may reject some vaccines but consent to others, delay other vaccines or accept others but are not sure in doing that (Benin et al., 2006). Vaccine hesitancy happens on the continuum between high vaccine demand and complete vaccine refusal and is often equated with vaccine safety concerns. Vaccine hesitancy is seen to occur when the level at which people accept the vaccine in a particular context

is lower than expected and it is mostly assessed based on the coverage goal of vaccination (SAGE, 2014).

### **The Model of Vaccine Hesitancy**

Human beings are rational actors and every exhibited health behaviour including vaccination is the result of intentions and decisions made. Most times, people undertake risk and benefit analysis of various courses of action and select the option with the highest benefits. The model of vaccine hesitancy comprises the factors that impact vaccination decisions and predict the vaccination behaviour of an individual (SAGE, 2014). The SAGE came out with the 3Cs model (confidence, convenience and complacency) to throw more light on the model of vaccine hesitancy.

Vaccine confidence may be influenced by the trust level the individual has in vaccine safety and efficacy, the health system and professionals and the policy-makers (SAGE, 2014). The level of confidence a person has in vaccines may cause him/her to vaccinate, delay accepting or refuse a vaccination service. Individuals who have low confidence in vaccines may not vaccinate (LaVail & Kennedy, 2013) but people with high confidence mostly accept vaccines. People who lack confidence in vaccines react more negatively to vaccines than those who are complacent and inconvenient with vaccines (Betsch et al., 2015). Low confidence in vaccines results from misinformation about the risks associated with vaccination (Zingg & Siegrist, 2012) or being associated with a group with anti-vaccination norms.

Complacency concerning vaccines occurs when the risks associated with vaccine-preventable diseases (VPDs) are perceived as low and vaccination is regarded as unnecessary (SAGE, 2014). A complacent person

sees other health activities to be more necessary and more important than vaccination because the risk of VPDs is regarded as being low. Under complacency, “vaccines do become victims of their success” (Janko, 2012). Individuals see vaccines to be rather risky and unnecessary because they do not feel the scourge of many VPDs as a result of good immunisation programmes (Larson et al., 2011). Complacent individuals do not acknowledge VPDs as a threat to their health and inactively ignore vaccination rather than actively deciding not to vaccinate (Betsch et al., 2015). As expressed by Schwarzer and Fuchs, (1996), if individuals do not feel the threat of these diseases to their health, they may not engage in any protective behaviour like vaccination.

Convenience in terms of vaccination deals with factors including the availability of the vaccine physically, affordability of the vaccine and individuals’ readiness to pay for the vaccine, how the vaccine is geographically accessible, the ability to understand health education on immunisation and how attractive vaccination service are to the people (SAGE, 2014). The time, place and cultural context in which immunisation service is delivered can also influence the level of convenience for the individual and the vaccination decision (SAGE, 2014). With people who hesitate as a result of inconveniences, they wish to vaccinate but structural and personal challenges about vaccines and the service prevent them from vaccinating. Even though 92% of people globally are of the view that vaccines are good for children (Gallup, 2018), people see other personal activities to be more important and may forgo vaccination appointments with the least challenges (Betsch et al., 2015).

As vaccination involves decision-making, a person may be hesitant when the individual is complacent about the VPD, lacks confidence in a vaccine, has inconveniences about the vaccination service and believes in individualism.

The model of vaccine hesitancy described by the SAGE highlighted the various factors that influence vaccination behaviour. From the review, confidence and complacency in vaccination mostly depend on the knowledge of the person about the vaccine and the VPDs that the vaccine is meant to prevent. Convenience mainly in vaccination describes the challenges associated with vaccination. Relating the review to this study, the knowledge of parents about RTS,S malaria vaccine will influence the vaccine confidence. Knowledge of parents about malaria will influence their complacency. Investigating parents' reasons for being hesitant help to identify whether the hesitancy is a result of confidence, complacency or convenience.

### **Determinant Matrix of Vaccine Hesitancy**

The SAGE, (2014) grouped the factors that influence vaccine hesitancy into three categories; contextual factors, individual or group factors and vaccine/vaccination-specific factors. The contextual factors cover issues that the individual will encounter with the environment, the health system, socio-cultural, economic, political factors and past events about vaccination. The individual or group factors involve the individual's perception of vaccines and the influences from society concerning vaccines on the individual. The vaccine or vaccination-specific issues include the issues the individual will have about vaccines and vaccination services.

Vaccine hesitancy is complex (MacDonald et al., 2015) due to the numerous issues that influence vaccination decisions. It is due to its complex nature that public health experts indicate that, there is no single approach for resolving vaccine hesitancy but rather different approaches including strong community engagement and communication campaigns (Tuckerman et al., 2022).

### **Knowledge of Parents/Caregivers about the RTS,S Malaria Vaccine**

The RTS,S malaria vaccine has newly been introduced in some countries and parents' knowledge about the vaccine will help them make informed decision. As indicated by Napolitano and colleagues, inadequate knowledge about vaccines can undermine an individual's access to vaccination which may lead to the re-emergence of VPDs (Napolitano et al., 2019). Given this, the following studies have been undertaken to assess the knowledge of parents about the RTS,S malaria vaccine (Angwenyi et al., 2014; Chukwuocha et al., 2018; Meñaca et al., 2014; Mtenga et al., 2016; Ojaka et al., 2014; Romore et al., 2015; Tabiri et al., 2021).

Romore et al. (2015) assessed the perception, awareness and willingness of parents toward the malaria vaccines during the testing phase in Tanzania. It was found that parents had low knowledge (awareness) 11% about the malaria vaccines although they had a high willingness of 94.5% to use the vaccine. Mtenga et al. (2016) also researched the opinion of stakeholders including parents about the malaria vaccine in Tanzania. It was highlighted that there were some misconceptions and incorrect information about the malaria vaccine among the participants. Ojaka et al. (2014) studied the acceptance of the malaria vaccine by caregivers of sick children in Kenya.



It was revealed that there was a lack of parental knowledge concerning the malaria vaccine. This was cited as a reason for the people of North Eastern province of Kenya to have low likelihood level of accepting the vaccine.

Angwenyi et al. (2014) found out in their research work about community engagement in malaria vaccine trials in Kenya that, the level of understanding of parents about the malaria vaccine and the trial exercise was low although they had their children participating in the activity. According to the data, only 31% of parents knew and understood the aim of the trial exercise. Chukwuocha et al. (2018) investigated the awareness, perceptions and intent to comply with the prospective malaria vaccine in Nigeria. It was found that around half of the participants (51.4%) knew nothing about any prospective malaria vaccine, it was realised that knowledge about the expected malaria vaccine was low among the caregivers. In Ghana, Meñaca et al. (2014) investigated the factors likely to affect community acceptance of the malaria vaccine in the Upper East and Ashanti Region. It was realised that there was a low level of knowledge about general childhood vaccines and the malaria vaccine among parents/caregivers.

Tabiri et al. (2021) similarly studied the factors associated with Malaria vaccine uptake in Sunyani Municipality in Ghana. It was shown that poor knowledge of parents over the vaccine schedule may have accounted for the reduced coverage for successive doses. Most of the studies on the malaria vaccine involved parents in general and were conducted during the trial phase of the vaccine. From the findings of most of the studies, parents had a low knowledge level about the vaccine during the trial phase.

### Perception of Parents/Caregivers about the RTS,S Malaria Vaccine

How people view, understand and interpret things is described as their perception. The perception people have about various health interventions including vaccination influences their reaction either to reject or accept them.

Acceptance of vaccines has been identified to be higher among those who perceive vaccination as a vital intervention to fight vaccine-preventable diseases (Kumar et al., 2016). Concerning the RTS,S malaria vaccine, various studies in different countries have explored how parents perceived the vaccine for malaria (Angwenyi et al., 2014; Bingham et al., 2012; Chukwuocha et al., 2018; Febir et al., 2013; Meñaca et al., 2014; Mtenga et al., 2016; Ojaka et al., 2011; Ojaka et al., 2014; Romore et al., 2015).

The work of Romore et al. (2015) assessed the parental perception of malaria vaccine in Tanzania. It was found that 88.5% of the respondents perceived childhood vaccines including malaria vaccines to be beneficial to children's health and that also influenced their acceptance. Findings from the work of Ojaka et al. (2011) in Kenya concerning the perception of the community about malaria and the vaccine indicated that, most of the participants were ready to accept the malaria vaccine if only it could easily be accessed. They perceived the vaccine would contribute to their good health and will add up to existing malaria preventive measures. The majority of the participants perceived the malaria vaccine to be helpful, others also had different opinions that the introduction of the malaria vaccine will render the current malaria drugs ineffective and there will be less need for mosquito nets.

The research by Ojaka and colleagues in 2014 found that the participants believed the malaria vaccine will reduce malaria cases and death and as a result, the majority of them were willing to get their children vaccinated (Ojaka et al., 2014). Mtenga et al. (2016) studied stakeholders' opinions and questions regarding the anticipated malaria vaccine in Tanzania. It was found that most of the participants had positive perspectives about the vaccine and were ready to welcome it once the vaccine could be accessed. Again, participants were of the view that, the vaccine would come with additional economic benefits by reducing the frequency and intensity of malaria cases, death. The cost of malaria treatment among their children although it offers partial protection. As indicated from the data of Mtenga et al. (2016), 84.2 % of the respondents showed a perfect acceptance, 11.9 % did not fully accept the vaccine and 3.9 % indicated no acceptance of the vaccine. The researchers attributed the positive perception and acceptance towards the vaccine to how seriously the people in the study area perceived malaria as a health threat to their children.

The work of Bingham et al. (2012) showed that although the malaria vaccine was yet to be made available, the respondents perceived that the vaccine would reduce malaria cases and death as well as make their children live healthy. Chukwuocha and colleagues studied awareness, perceptions and intent to comply with the prospective malaria vaccine in parts of South Eastern Nigeria. It was found that the participants had the perception that the vaccine could effectively prevent malaria cases. From the data of Chukwuocha and colleagues, 88.2% showed positive perception whilst 11.8% perceived the vaccine negatively. The participants were willing to vaccinate their children

against malaria whenever the vaccine was introduced (Chukwuocha et al., 2018). A literature review on the malaria vaccine by Angwenyi and colleagues showed that most of the parents perceived the malaria vaccine to be a positive intervention. The parents saw the vaccine to be effective and successful during the trial phase (Angwenyi et al., 2014). In the research of Menaca and colleagues, it was shown that the participants regarded vaccines as something of high value including the malaria vaccine. Participants were positive about the malaria vaccine and were ready to use it with other malaria preventive measures irrespective of its partial efficacy (Meñaca et al., 2014). Febir and colleagues studied community perceptions of the malaria vaccine in the Kintampo districts of Ghana and it was found that, the majority of the participants preferred vaccines to drugs as a way of combating malaria. The participants perceived the vaccine as an effective way of controlling malaria and were willing to vaccinate their children (Febir et al., 2013).

Participants in most studies had positive perceptions except the study by Mtenga and colleagues which had about 3.9% of the participants showing no acceptance and Chukwuocha where the perception of 11.8% of the participants was negative. In general, the participants had a positive perception towards the malaria vaccine and the vaccine acceptability was high among the participants. The positive perception and willingness to accept the vaccine by parents indicate that they saw the vaccine to be important and helpful and this confirms that about 92% of people globally see vaccines to be vital for their children as indicated in the 2018 Wellcome Global Monitor report.

## Parents Reasons for Delay in Acceptance of Vaccines for Their Children

Immunisation has been one of the successful interventions in fighting childhood maladies and improving the health of children. The continuous enjoyment of immunisation success demands adherence to vaccination schedule but delaying vaccines for children poses health risks to them (Laryea et al., 2018). The vaccination schedule does not remain fixed all the time, it changes depending on the health of the child, the type and availability of the vaccine and the geographical location of the individual. Although it is imperative to receive vaccines on time due to the timely protection vaccines offer recipients (Laryea et al., 2014), some individuals may decide either to delay or spread out vaccines which may be contrary to what is recommended. Parents delaying vaccines for their children are increasing as in the case in the United States of America where more than one-third of children have delayed vaccination due to their parent's decision (Hargreaves et al., 2020). It is common for parents to deliberately delay vaccines for their children and that puts such children at risk of not completing the full doses of recommended vaccine on time (Smith et al., 2010). Following these delays, studies have been done on the reasons that allow parents to delay accepting vaccines for their children (Banjari et al., 2018; Dempsey et al., 2011; Hughes et al., 2011; Odotola et al., 2015; Périnet et al., 2018; Saada et al., 2015; Smith et al., 2010)

Saada et al. (2015) in their work on parents' rationale for alternative vaccination in the United States of America found out that, parents delay vaccines for their children because they assume that too many vaccines at a time may result in *vaccine overload* in their children's immune system. They believed going by recommended schedules will end up putting a burden on the

child's body which may be inimical to their health. Other participants were also of the view that they liked to take one vaccine at a time to monitor the reactions the child experiences after each vaccine hence the reason for the delay. Hughes et al. (2011) studied Human Papillomavirus (HPV) vaccine decision-making in paediatric primary care in Philadelphia. It was found that, some parents delayed the vaccine for their children because they felt the vaccine was new in the system and they did not have much information in terms of duration of immunity, effectiveness and safety of the vaccine. Others also were of the view that their children were not at risk (too young and sexually inactive to contract disease caused by HPV) so they delayed.

Smith et al. (2010) studied the association between intentional delay of vaccine administration and timely childhood vaccination coverage. According to the data of Smith et al. (2010), 21.8% of parents deliberately delayed the vaccine doses for their children. Out of these parents, 44.8% delayed because they had reservations about the safety and effectiveness of the vaccine, 36.1% were because the child was sick, 7.7% could not meet the vaccination schedule, 5.6% delayed due to the amount of the vaccine, others also gave various reasons for the delay. Smith and colleagues indicated that parents who delayed were likely to have had negative information about vaccines from different sources. Dempsey et al. (2011) studied the use of alternative vaccination schedules by parents for their children in the United States. It was revealed that 13% of the parents indicated that they had gone contrary to the timetable recommended by the National Centre for Disease Control and Prevention (CDC). The parents delayed starting a vaccine because they wanted their children to take the vaccine at an older age than recommended.

The work of Périnet et al. (2018) on delayed measles vaccination of toddlers in Canada showed that, the measles vaccination delays by parents were linked to the knowledge, attitude and behaviour of the parents toward the vaccine. The reasons linked to the delay included; parents doubted the safety of the vaccine, parents not appreciating the importance of the vaccine in preventing measles and the belief that other health interventions like homoeopathy could take the place of vaccines. Banjari et al. (2018) in their studies on the reasons and how often children receive their vaccinations late in Saudi Arabia found that, 24.2% delayed vaccines for their children due to the following reasons; parents travelling on the vaccination appointment, shortage of vaccine at the health centre, parents had challenges with transportation to the health centre, children were sick as of the time of vaccination, parents were too busy to find time to go to the health facility, some forgot the time of vaccination.

Odutola et al. (2015) studied the risk factors for delay in age-appropriate vaccinations among Gambian children. It was revealed that 63.3% of the children have delayed in taking at least one of those vaccines under study. The reasons parents gave for the delay included ignorance of the date for vaccination, being forgetful of the vaccination date, too much time spent at the health centre, and either the child or parent being sick at the time of vaccination. Concerning RTS,S malaria vaccination, parents may have different reasons for delaying the vaccination of their children. Delaying malaria vaccination implies parents intentionally starting malaria vaccination later than the recommended age by the Expanded Programme on Immunisation.

### Parents Reasons for Refusing Vaccines for their Children

Individuals who have doubts or concerns about vaccines may decide to refuse some vaccines. Just like any other people, hesitant parents would always want to protect their children so reservations will make them reluctant to vaccinate their children. There are numerous and varying reasons that prevent parents from accepting vaccines for their children. The reasons are many vary across people. Mckee and Bohannon, (2016) groups the reasons into four: religious, personal beliefs, safety issues, and a desire to have in-depth information from health personnel (Mckee & Bohannon, 2016). The refusal of vaccines has been a great concern and an area of research due to its impacts on vaccine uptake and the outbreak of VPDs.

Albarakati et al. (2019) investigated the factors associated with vaccine refusal in Makkah and it was found that, out of the 31.3% of parents who were hesitant among the participants, 60 per cent complained of the unavailability of vaccines at the primary health centre, 25% feared of complications following immunisation, 13.7% had safety issues, 1.2% are of the view that vaccine producers just make a profit but do not consider the safety of their children, 0.2% of parents were inundated with arrangement for vaccinations. Some parents also did not acknowledge the essence of vaccines in disease prevention and others also lacked detailed information about vaccines since they were not given any sensitisation. Research undertaken by Dubé et al. (2014) by enquiring from immunisation managers of 13 countries on the reasons for vaccine refusal in their countries established that, religious beliefs, influences of notable leaders mostly of anti-vaccination opinions, misinformation by the various media platforms, geographical challenges,



perception about vaccine risk, fear of complication after vaccination, programming of the vaccination exercise and lack of trust for the vaccine as a result of the country of origin were the reasons for hesitancy. Saada et al. (2015) observed that people who declined vaccines for their children perceived that, some vaccines may not be safe and come with side effects as serious as cancer, some parents wanted to control the rate at which their children are open to the strange chemicals in vaccines, some participants also believed in natural immunity and not vaccines, some viewed some VPDs like influenza as not severe hence there is no need for its vaccine and others also refused some vaccines because they doubted the exposure of their children to some VPDs.

The study of Harmsen et al. (2013) in the Netherlands on why parents refuse childhood vaccination indicated that, participants who refused vaccine or partially vaccinated their children believed that, the proneness of their children to infectious disease is minimal, children's bodies are overloaded with vaccines, most VPDs are not life-threatening, vaccines are riskier than the disease they are made to prevent, doubtful about the efficacy of vaccines because vaccines do not offer 100 per cent protection, believe in natural immunity, negative experience with vaccines, lack of detailed information regarding the effects and benefits of the vaccines. Wombwell et al. (2015) researched religious barriers to measles vaccination in the United States of America. It was revealed that, the use of tissue of aborted fetuses and gelatin from animals in the manufacture of the Measles-Mumps -Rubella vaccine made people hesitant because it was against their religious beliefs.

Most of the participants in the study of Kennedy et al. (2011) in the United States of America had concerns although they accepted all recommended vaccines. The concerns they had about vaccines included pain associated with multiple vaccine shots for children, children given too many vaccines before their second birthday and vaccines causing disability including autism. Favin et al. (2012) reviewed the literature on why children are not vaccinated and it was gathered that parents worry about potential side effects, some mothers refused to send their babies for vaccination because they are supposed to be in isolation during the postpartum period, some parents were not convenient with the vaccination schedule and the distance to vaccination sites, some complained of maltreatment they receive from the health workers and too much waiting time at health centres, in some countries in South Asia, more boys are vaccinated than girls because the husbands feel uncomfortable when their female children are being cared by male health workers.

Sobo (2015) studied the social cultivation of vaccine refusal and delay among Waldorf (Steiner) school parents in the United States of America and the findings showed that parents who refused some vaccines opined that, vaccines are just means for some institutions to make profit, some childhood diseases help children to develop immunity so there is no need vaccinating them against such diseases, parents believed their geographical location gives the children a low level of exposure to the VPDs, children's body may be too young for such chemicals in vaccine and vaccines are poisonous with side effects and ineffective. Masters et al. (2018) investigated vaccine hesitancy among caregivers and its association with childhood vaccination timeliness in

Addis Ababa. It was shown that 7.18% of the participants were hesitant and their reasons were the fear they had for injection and worry over possible side effects of the vaccine. Meñaca et al. (2014) studied factors likely to affect community acceptance of a malaria vaccine in two districts of Ghana and it was found that, when parents associate serious health issues with vaccination, they will refuse subsequent vaccines. Like the Ashanti region of Ghana, some community members link paralysis to the inappropriate or unprofessional administration of vaccines by health workers.

Concerning the malaria vaccine, the study of Ojaka et al. (2014) explored the acceptance of the malaria vaccine by caregivers of sick children in Kenya. It was found that although the vaccine was not yet rolled out in the country, about 49% of parents/caregivers did not have a positive perception about the vaccine, citing the partial protection (40% protection) the vaccine renders and the concern over unknown side effects. The researchers were of the view that, these reasons may discourage such people from vaccinating their children when the vaccine becomes available. Ojaka and colleagues also highlighted some factors that may reduce the prospect of parents accepting the vaccine for their wards. These factors include low satisfaction by the parents/caregivers at the health facility, lack of enough knowledge about malaria as a disease coupled with a low-risk perception of malaria. Ojaka et al. (2011) studied community perceptions of malaria and vaccines in the South Coast and Busia regions of Kenya. It was revealed that some of the participants viewed the potential RTS,S vaccine as not being strong (partial efficacy) and may rather be inimical to their health. A participant said the

“weak vaccine (40% protection) could dissuade people and account for low acceptance once the vaccine was rolled out”.

Liheluka et al. (2013) looked at community perceptions on the secondary health benefits established by malaria vaccine trials (RTS,S phase 2 and phase 3) at the Korogwe site in North Eastern Tanzania. It was realised that, some people refused the vaccine due to speculation that the blood used for the research was being sold by the institution (Liheluka et al., 2013). Tabiri et al. (2021) studied factors associated with malaria vaccine uptake in Sunyani Municipality, Ghana. The findings from the study indicated that 5.9% of the children in the study had received none of the RTS,S doses and out of that, 60% were not vaccinated as a result of fathers’ decision, 28% were due to the mothers’ decision. And the rest said they didn’t know their children qualified for the vaccine. Although the reasons for the refusal were not indicated in the study, the authors were of the view that they might have been influenced by the vaccine rumours.

### **Theoretical Perspective**

The theories reviewed in this section are the Health Belief Model (HBM) propounded by some US psychologists in the 1950s and the Theory of Planned Behaviour (TPB) by Ajzen in 1991. The theories are obtained from the social and behavioural sciences and applied in the public health domain. These theories provided the theoretical basis for this study because they helped to explain, forecast and provide an understanding of individuals’ health and vaccination behaviour.

### **The Health Belief Model**

The Health Belief Model (HBM) was propounded by some psychologists; Hochobbaum, Rosenstock, and Kegels in a US public health institution in the 1950s (Janz & Becker, 1984). It was developed in the United States of America to help public health workers get in-depth knowledge about why some people may opt not to embrace health interventions that help to prevent diseases and promote health. This model was applied in this study because it provides a framework which helps to interpret why some people accept or reject various health interventions. The theory posits that, the belief of a person about the risk of disease together with the effectiveness of a health intervention in eliminating that risk will influence the decision towards health behaviour. The basic psychological concept of the Health Belief Model is the importance one attaches to a goal and the extent to which an individual sees an action or intervention to achieve the goal.

Relating the theory to health, the theory suggests two components: (1) one's eagerness to cure a disease, restore and improve health and (2) the belief that a specific health intervention could be effective in meeting the wish by curing disease, restoring and improving health. With vaccination as a health behaviour, it is the wish of every individual to prevent diseases but the belief one has about vaccines will impact the vaccination decision. The theory predicts and explains people's acceptance of health behaviour through six factors or dimensions. These dimensions are perceived susceptibility, perceived severity, perceived benefit, perceived barriers, cue to action and self-efficacy (Rosenstock, 1974).

Perceived susceptibility describes how individuals subjectively perceive their risk of contracting a disease. Individuals think differently when it comes to their level of proneness to a condition or disease (Janz & Becker, 1984). Under this dimension, some individuals may never believe to be susceptible to any disease, others may admit to being at risk to some extent but believe the disease may not occur and others agree that they are really at risk of a condition or disease. The level at which individuals perceive the risk level determines the acceptance of health behaviour. A person takes up protective behaviours (vaccination) when he/she feels endangered or at risk of a VPD (Conner & Norman, 2005).

Perceived severity describes the seriousness individuals attach to a disease or a condition. How serious or deadly individuals assume a condition or disease when contracted or left untreated informs their decision on the acceptance of health intervention. People consider the various implications of a condition or illness from medical effects (pains, disability and death) to societal implications (impact on work and family life) and if these implications will not have a serious impact on their life, they may not be motivated to accept a recommended health intervention (Carpenter, 2010). In vaccination, if a person does not acknowledge any negative impact of vaccine-preventable disease on his life, he may not see the need for vaccination and the opposite is true. At this stage, knowledge about the condition or disease helps to make informed decisions. As indicated by Bond and Nolan, (2011), people who accept vaccination dread the outcomes of the diseases, especially the strange ones and this fear encourages them to take vaccines and vice versa

Perceived benefits deal with the possible positive benefits of an action that a person looks out for before undertaking a health intervention. Under this concept, individuals who feel to be prone to a disease would like to take a protective health intervention. A particular action is taken based on the degree to which one trusts the action can be beneficial and effective. The individual chooses alternative recommended actions based on the belief that the action will be feasible and meet the needs. Relating this to vaccination, in as much as people want to be protected, they consider the extent to which the vaccine can protect them in terms of efficacy as well as gains. If per their belief, the vaccine may not be efficacious, they may not vaccinate.

Perceived barriers explain that, although an intervention may be effective, a prospective negative side of it will dissuade a person from taking that health intervention. The person undertakes cost and benefit analysis and if the cost or the barriers outweigh the benefits, it may prevent the person from going for it. Under this construct, the behaviour may be seen as being too difficult to undertake and challenging (Carpenter, 2010). In vaccination, the barriers may be in terms of the price of the vaccine, the distance to the vaccination centre, painful injection, long queues at health facilities, side effects and others. In this case, a person may support vaccination but may always delay vaccination because he/she becomes indecisive about it. If the willingness to vaccinate is high, the person will vaccinate irrespective of the barriers and vice versa.

Cues to action are the signals or prompts directed at individuals to help initiate an action. These cues to action could be internal (undergoing symptoms of a disease) or external (reminders, campaigns in the media,

newspaper articles, advice from a relative) which motivate the individual to take up an action (Rosenstock, 2005). It involves societal pressure which stimulates individuals to change their behaviour (Janz & Becker, 1984). Concerning vaccination, an individual being reminded by a health worker when vaccination time is due encourages the one to vaccinate. Having seen a family member experience symptoms of vaccine-preventable disease may trigger the person to vaccinate.

Self-efficacy was later added to traditional Health Belief Model variables in the mid-1980s. It explains the confidence or belief that one can victoriously complete an action irrespective of the barriers or challenges. The confidence a parent has to get the child vaccinated on time shows self-efficacy. The Health Belief Model also explains that beliefs about a health action are also influenced or altered by the modifying variable which include age, gender ethnicity, socioeconomic, knowledge about the action and personality. Factors like demographic, sociopsychological and structural factors are presumed to influence the perception of an individual which also shape health behaviour (Janz & Becker, 1984). These modifying variables may promote or hinder the performance of positive health actions (Cronin et al., 2018). Action as explained in the Health Belief Model is the individual behaviour exhibited after his/her beliefs have been altered by the modifying variables. This individual behaviour can be any activity like exercising, eating habits, vaccination and others.

The strength of the theory has been its simple way of defining and measuring these constructs in addition to major beliefs that are involved in health behaviour decisions (Conner, 2010). The model has also given



fundamentals for health behaviours upon which many interventions have been developed (Jones et al., 1987). As a limitation, the model is described as not being able to strongly predict a health behaviour (Taylor et al., 2006). It also does not consider individual habits that may influence their health intervention acceptance.

### **Theory of Planned Behaviour**

The Theory of Planned Behaviour (TPB) was propounded by Icek Ajzen in 1991 (Ajzen, 1991). The theory was applied in this study because it provides an efficient framework that helps to investigate a person's intention to act in a specific context. The theory was built on the concept of attitude theory and social cognitive tradition. The centre of attention of the theory is on the belief of individuals in the execution of behaviour in the future (Hagger, 2019). The theory postulates that the strongest predictor of voluntary behaviour is the individual's intention (Hale et al., 2002). The behavioural intentions are also influenced by the individual's attitude in performing the behaviour. An individual's belief about how important others feel that he/she should perform the voluntary behaviour (subjective norm) also influences the intention to execute a behaviour. The theory of planned behaviour has three constructs namely attitude, subjective norms and perceived behavioural control as factors that influence intention.

Attitudes are the positive or negative thinking or feeling of an individual about something. Attitudes are influenced by behavioural belief. Behavioural belief deals with the belief people have concerning activity or intervention. It also deals with what attributes, events and objects people associate a particular thing with. The assessment of the individual about

something will impact how the individual perceives it and that will influence the future intentions toward the event or activity to be performed. Attitude involves the degree to which a person has a favourable or unfavourable judgement about a behaviour (Ajzen, 1991).

Subjective norm as a predictor of intention shows the belief of the individual that other people would want him/her to execute the behaviour. It describes how an individual views the pressure from society to carry out or not to carry out an activity or behaviour (Ajzen, 1991). Subjective norm is influenced by normative belief. Normative belief deals with the chances that notable individuals or groups in society accept or reject the performance of a behaviour. For instance, a person would support a health intervention if it aligns with his/her societal norms. Some parents may vaccinate their children as a result of the advice/pressure from their family (Hagan & Phethlu, 2016).

Perceived behavioural control explains the view of an individual about the ease or difficulty in performing a behaviour and it is influenced by the person's previous experience as well as the expected hindrances in performing the behaviour (Ajzen, 1991). The behaviour of individuals is influenced by the trust the person has in his/her potential to perform a behaviour. Perceived behavioural control is influenced by the presence or absence of required resources and opportunities in performing a behaviour (control belief). Although the resources and opportunities (time, money, skill and others) available to a person influence the attainment of behaviour, the psychological perception of a person concerning how easy or difficult the achievement of the behaviour may greatly impact the performance of the behaviour. In relation to a health intervention, although the intervention may be available and

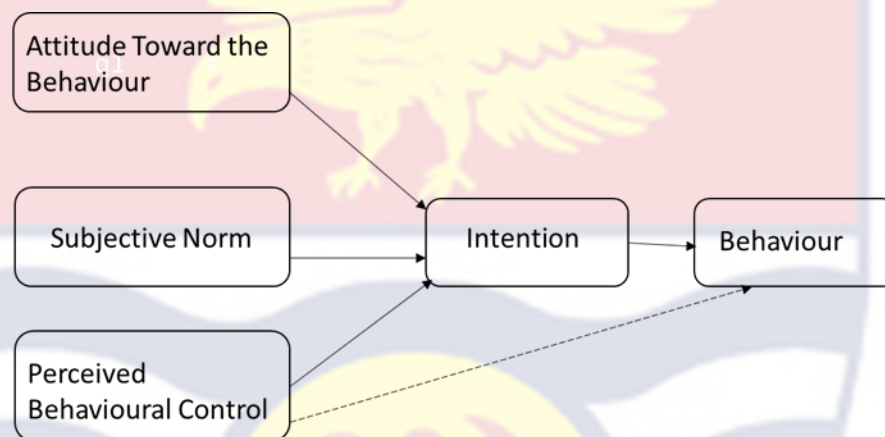
affordable at the health facilities, how easy or difficult it may be for a person to undergo the service has a long way to influence the intention towards it.

Intention under the Theory of planned Behaviour is a deliberate attempt made to perform a volitional behaviour and it is a good predictor of behaviour (Ajzen, 2005). It is formed after the person has developed an attitude toward the behaviour, considered societal norms to the behaviour and has also assessed his or her strength in performing the behaviour. Intention can however change over time as unforeseeable events could bring changes (Ajzen, 2005). For instance, a person deliberates on whether or not to accept a health intervention after developing an attitude toward it.

Behaviour is a goal whose accomplishment is subject to some level of uncertainty (Ajzen, 1985). A behaviour is the action a person intends to perform and it can be gambling or stopping gambling, fishing, exercising, vaccination and others. In all the Theory of Planned Behaviour posits that, an individual's plan to engage in a behaviour is based on the intention to perform the behaviour. A person may vaccinate or hesitate to vaccinate after the developed intention.

As a benefit, the theory is good at forecasting not only the intention to perform different behaviours but also showing whether or not the behaviours are performed (Armitage & Conner, 2001). The introduction of the perceived behavioural control to this theory has enhanced the performance of the theory and has made the theory applicable to a wide range of behaviours (Manstead & Parker, 1995). Although the theory has been useful in predicting peoples' behaviour, it has some limitations. The theory does not consider the influences of environmental and economic factors on a person's intention to perform a

behaviour. It does not also take into account conditions like fear, experience and threat as factors that can influence the intention to undertake a behaviour (LaMorte, 2019). The theory takes it that, behaviour is the outcome of a linear decision-making process and does not regard it as something that can change as time goes on. Figure 1 shows the conceptual framework of the Theory of Planned Behaviour.



*Figure 1: Conceptual framework of the Theory of Planned Behaviour*

Source: Ajzen, (1991)

### **Conceptual Framework for the Study**

To understand the context and the reasons behind RTS,S malaria vaccine hesitancy among parents, the conceptual framework of this study was developed based on the Theory of Planned Behaviour (TPB) developed by Icek Ajzen (Ajzen, 1991). After careful evaluation and assessment of the strengths and weaknesses of the Health Belief Model and the Theory of Planned Behaviour, the Theory of Planned Behaviour was adapted to develop the conceptual framework for this study. The Theory of Planned Behaviour was adapted to provide conceptual guidance to this study due to its strength of not only predicting the intentions to perform a behaviour but also showing the exhibited behaviour. The Theory of Planned Behaviour helped to highlight

parents' various RTS,S vaccination decisions/intentions and their exhibited vaccination behaviours. Although the original framework of the Theory of Planned Behaviour could explain the concept of the study, it was revised to include more variables and concepts about malaria and RTS,S vaccine to help give detailed meaning to the conceptual framework. The Theory of Planned Behaviour is a cognitive theory built on the assumption that people behave reasonably by taking into consideration available information and directly or indirectly reflecting on the implications of their actions (Ajzen, 2005). According to this theory, an individual's intention to perform or not to perform an action greatly determines the behaviour. Intention is influenced by three determinants; one is personal (attitude towards the behaviour), another one reflects on social pressure (subjective norm) and the third one involves the issue of control (perceived behavioural control) (Ajzen, 2005). How the three determinants influence intention and how intention also influences behaviour has briefly been described relating it to vaccination to provide the framework for this study.

Generally, individuals undertake a series of evaluations before making a decision. These evaluations will inform the person's wilfulness to undertake the action. Under the Theory of Planned Behaviour, a person undertakes an action after taking into account his/her beliefs about the action. These beliefs comprise attitude toward the behaviour, the subjective norm and the perceived behavioural control. People's beliefs are dependent on the information (be it correct or incorrect) they have about their behaviour (Ajzen, 1985). Attitude toward the behaviour is the person's own positive or negative evaluation of the behaviour of interest (Ajzen, 1991). This means that, if a person thinks that

performing a behaviour will lead to a positive result, a favourable attitude is developed and an unfavourable attitude is developed if the behaviour will lead to a negative outcome. Relating this concept to vaccination behaviour and RTS,S malaria vaccination to be specific, parents assess both malaria as a disease and the RTS,S malaria vaccine before developing an attitude toward the vaccination.

The parents evaluate malaria from various perspectives including how likely the child can get malaria, how susceptible is the child to malaria, how severe malaria can be, how regretful it will be in case the child gets malaria when unvaccinated, how concerned is the parent about malaria and the knowledge of the parent about malaria (Brewer et al., 2017; Sandberg & Conner, 2008). Assessment will also be done on the safety as well as the effectiveness of the RTS,S vaccine in malaria control. The knowledge of the parent about the RTS,S malaria vaccine also influences the parental subjective assessment of the vaccine. A favourable or unfavourable attitude will be developed after RTS,S vaccine and malaria risk appraisal by parents.

Subjective norm as another determinant of intention explains how people accept or reject an intervention because individuals with whom they are motivated to obey accept or reject that intervention. These respected people could be a person's parent, co-worker, spouse, experts like medical practitioners and others. Linking this to vaccination, most vaccination decisions place in take the context of relationships which revolve around social dyads, social networks and social norms (Brewer et al., 2017). For instance, malaria vaccination as a social activity can be influenced by the recommendation by a health professional to a parent as a result of the

relationship between them (social dyads). Social norms are the common rules shared among people that influence behaviour (Cialdini et al., 2006) and how these norms align with vaccination can predict vaccination behaviour. The social network also plays a vital role in vaccination as a person would like to consult family and friends and members in their social networks for information about the vaccination before developing an intention. Parents would like to consult family and friends about the newly introduced RTS,S malaria vaccine before accepting it for their children. The subjective norm is all the social processes that influence a behaviour like vaccination.

Perceived behavioural control as another determinant of intention is the sense of self-efficacy of a person (Ajzen, 2005). The successful performance of a behaviour partly depends on the control that a person has over both the personal and external hindrances that may prevent the performance. For instance, as an internal factor, a parent may consider the child's ability to get the RTS,S injection and bear its associated pain before making a decision. External barriers like distance to the health facility and vaccination schedule will also be considered before developing the intention about the vaccination. The ability to overcome both personal and external difficulties will determine the intention.

Intention is the attempt a person makes to perform a behaviour and not necessarily the actual performance of the behaviour. For example, an individual can have different vaccination intentions after developing the beliefs. These intentions include: deciding to vaccinate by thinking of the benefit of his/her vaccination to others (altruistic), becoming less willing to vaccinate because most people have been vaccinated and the spread of the

disease is minimised and such person enjoys the protection of other's vaccination (free rider), deciding to vaccinate only when many people have vaccinated, usually adopt wait and see strategy (bandwagoner) and may also remain indecisive about vaccination (fence sitters) (Hershey et al., 1994; Gust et al., 2005). Relating the various vaccination intentions to the newly introduced RTS,S malaria vaccination, some parents may vaccinate their children to protect other children as well as contribute to the piloting of the vaccine (altruistic). Some parents may also not vaccinate to take the potential risk and side effects of a newly introduced RTS,S vaccine (free riders), and other parents may also decide to wait to see more children get vaccinated to see if nothing happens to them before vaccinating their children (bandwagoner) and other parents become indecisive about the vaccine (fence sitter).

Behaviour is the action to be performed after an intention is developed. In the context of this study, the behaviour is the RTS,S malaria vaccination and it will be exhibited after vaccination intentions are developed. Although there could be an intention-behaviour gap, altruism drives vaccination behaviour, whereas free riding, fence sitting and bandwagoning can deter vaccination. Parents with bandwagoning, fence sitting and free-riding intentions mostly have unfavourable attitudes toward RTS,S vaccination. These parents are mostly complacent, lack confidence in the vaccine and have inconveniences either with the vaccine or the process. The conceptual framework is presented graphically in Figure 2.



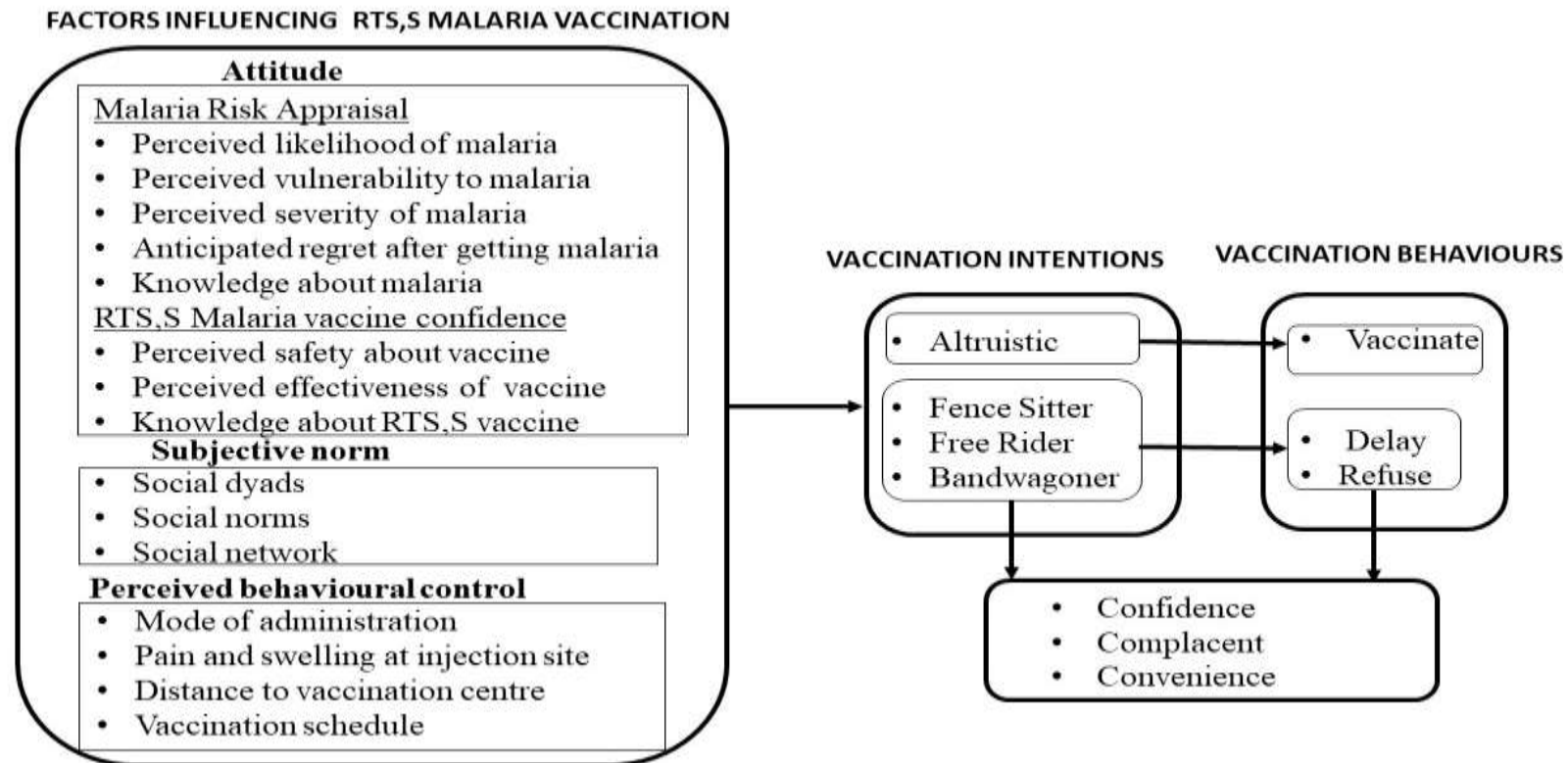


Figure 2: Conceptual framework for the study adapted from the Theory of Planned Behaviour (TPB)

Source: Ajzen, (1991)

## Chapter Summary

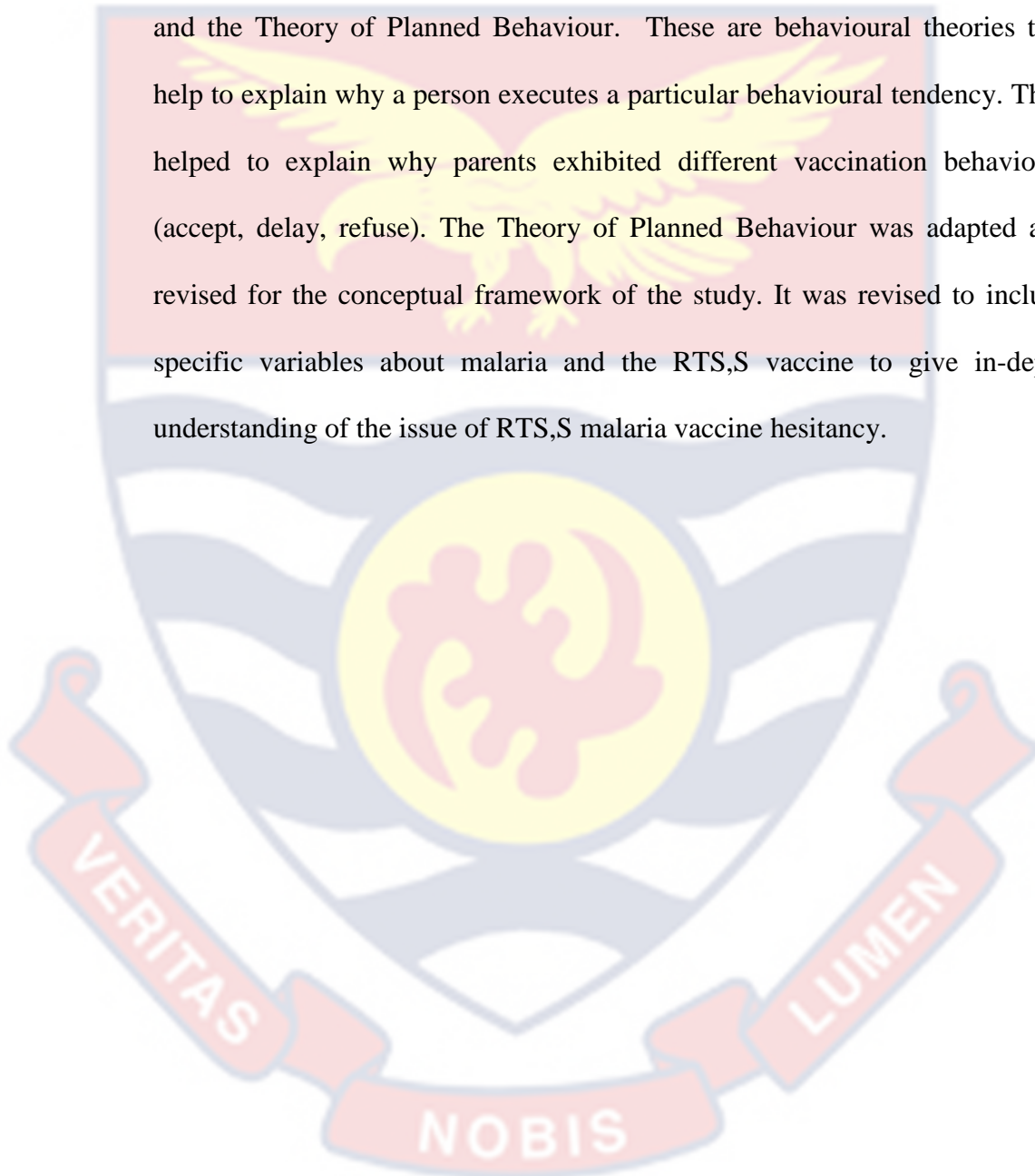
This chapter summarises the main issues that have come out of the literature review and their implications for the development of this study. The issues related to the history and concept of vaccine hesitancy, the knowledge of parents about RTS,S malaria vaccine, the perception of parents/caregivers about the RTS,S malaria vaccine and parents/caregivers' reasons for delaying accepting or refusal of RTS,S and other vaccines for their children.

Vaccine hesitancy refers to the delay in the acceptance or refusal of vaccination despite the availability of vaccination services. The act of opposing vaccines has existed since the beginning of the concept of inoculation and vaccination as far back as the 1700s even before Edward Jenner introduced the smallpox vaccine. Most of the studies on parental knowledge about the RTS,S malaria vaccine were conducted in Africa and during the trial phase of the vaccine. The literature showed that there was a knowledge deficit among parents about the RTS,S malaria vaccine. Previous studies on the perception of parents about the RTS,S vaccine showed that, parents had different perceptions about the vaccine; some perceived the vaccine positively and saw it as a good additional malaria control tool. Other parents perceived the vaccine negatively as being ineffective due to its partial efficacy.

Literature on why parents delay accepting vaccines for their children outlined these reasons; fear of vaccine side effects, fear of vaccine overload in their children's immune system, parents wanted children to take vaccine at older ages, parents do not appreciate the importance of vaccines in disease prevention. Literature reviewed on parents' reasons for refusing vaccines for

their children showed that; fear of complications after vaccination, safety issues, low perceived severity of VPDs, parents believed in natural immunity and not vaccines.

Theoretically, this study was underpinned by the Health Belief Model and the Theory of Planned Behaviour. These are behavioural theories that help to explain why a person executes a particular behavioural tendency. They helped to explain why parents exhibited different vaccination behaviours (accept, delay, refuse). The Theory of Planned Behaviour was adapted and revised for the conceptual framework of the study. It was revised to include specific variables about malaria and the RTS,S vaccine to give in-depth understanding of the issue of RTS,S malaria vaccine hesitancy.



## CHAPTER THREE

### RESEARCH METHODOLOGY

#### Introduction

This chapter presents the methodology used in conducting the research. The chapter describes the research philosophy, research design, study area, sources of data, the target population, procedure for sampling and sample size, data collection method and instrument for collecting data. In addition, research instrument pretesting, data management and analysis and ethical issues are covered in this chapter.

#### Research Philosophy

The study applied the interpretivism research philosophy. This philosophy contends that truth or reality is multiple and is subjective, culturally and historically positioned and influenced by people's experiences and understanding (Ryan, 2018). With this philosophy, knowledge is relative rather than absolute. The interpretivist understands and interprets the meaning attached to an action. It also concentrates on exploring the understanding and perception of people to understand why a situation exists or why they exhibit a particular behaviour. This philosophy was deemed appropriate for this study because, it helped to provide different perspectives about the feelings, opinions and experiences of parents regarding RTS,S malaria vaccine and their reasons for hesitancy. It helped to explain why parents exhibited a particular vaccination behaviour. The qualitative research approach such as interview in data collection informed by the interpretivism philosophy makes the philosophy appropriate for this study. Irrespective of the detailed information obtained through this philosophy, the use of a smaller sample size

mostly in its qualitative approach makes generalisation of the findings to the entire population impossible (Thomson, 2011).

### **Research Design**

This qualitative study was conducted cross-sectional using the phenomenological research design. Cross-sectional approach offers researchers the opportunity to study a problem or situation among a population at a single point in time (Wang & Cheng, 2020) and data are collected from participants once within a specific period (Sedgwick, 2014). This approach was appropriate because it helped to study RTS,S malaria vaccine hesitancy, particularly within the piloting stage of the vaccine. Data were collected once from participants without any plan of future data collection from participants after the piloting stage.

The phenomenological research design was used because it seeks to understand and explore phenomena from the perspective of those who experienced it (Qutoshi, 2018). This design was used to understand the meaning participants attached to the phenomenon (RTS,S vaccination). This design was appropriate because it helped to explore parents' experiences with the RTS,S malaria vaccination. It highlighted how the experiences have influenced parents' perception of the RTS,S vaccine as well as their reason for delaying accepting or refusing the vaccine for their children.

### **Study Area**

Cape Coast Metropolis is the study area for the research and is one of the oldest districts in Ghana which obtained its Metropolitan status in 2007. The Cape Coast Metropolis is situated on longitude 1° 15'W and latitude 5°06'N and shares boundaries with the Gulf of Guinea on the south, Komenda

Edina Eguafo Abrem Municipality on the west, Abura Asebu Kwamankese District on the East and Twifu Heman Lower Denkyira District on the North. It covers an area of around 122 square kilometres (GSS, 2014). According to the 2010 Population and Housing census, the population of the Cape Coast Metropolis is 169,894 which comprises 82,810 males (48.7%) and 87,084 females (51.3%). The Metropolis has a 97 per cent literacy rate among the 11-24 years age group with literacy almost common among the youth. The productive population forms 54.7 per cent and 45.3 per cent are economically inactive population. Within the productive population, 32.5 per cent of them are into service and sales, 23.6 per cent are into craft and trading and 13.2 per cent are into professional works. Other occupations of the people include agriculture, forestry and fisheries, plant and machine operation and assembling, technicians and administrative work. The biggest industry in the Metropolis is the wholesale and retail trade which employs 25.1 per cent of the people. The private informal sector absorbs 68.4 per cent and the public sector absorbs 21.4 per cent of the productive population.

Concerning health, the Metropolis is made up of both public and private health institutions. It has a regional hospital as well as district hospitals and many other clinics that serve as a source of health care delivery. The Assembly is demarcated into four health sub-districts namely: Cape Coast, Ewim, Adisadel and University sub-districts. It has been recognised that diseases that are common in the Metropolis are mostly related to the environment and are communicable. Malaria is one of the prevalent diseases in the Metropolis (CCMA, 2016). Immunisation services are mainly organised

at the Child Welfare Clinic (CWC) and through other outreach services for children in the Metropolis (Liverpool, 2000).

Within the Cape Coast Metropolis, the CWC from the University of Cape Coast Hospital, Adisadel Urban Health Centre, Cape Coast Metropolitan Hospital, Ewim Polyclinic and Cape Coast Central Reproductive and Child Health Centre were selected for the study. The Cape Coast Metropolis was chosen as a study area because, it is one of the districts that recorded low RTS,S vaccination coverage against the benchmark vaccines (Pentavalent-3 and Measles-Rubella 1). Data from the Malaria Vaccine Implementation Programme (MVIP) Quarterly Data Bulletin 2020 showed that, Cape Coast recorded low RTS,S vaccination coverage for both the first and second quarter of 2020.

Within the first quarter of 2020, vaccination coverage for RTS,S for the Cape Coast Metropolis ranged from 56% to 63% while coverage for the benchmark vaccines (Pentavalent-3 and Measles-Rubella 1) ranged from 74% to 85%. In the second quarter of 2020, RTS,S coverage ranged from 53% to 56%, while the coverage for the benchmark vaccines ranged from 72% to 76%. From the Malaria Vaccine Implementation Programme data, the vaccination coverage for RTS,S and its benchmark vaccines indicated that uptake for the RTS,S vaccine has been lower compared to the benchmark vaccines. With malaria being the leading prevalent disease in the Cape Coast Metropolis (CCMA, 2016), higher RTS,S vaccine uptake would have helped to control malaria but the uptake has rather been low. The first step in addressing vaccine is to have an understanding of who are the hesitant individuals and what are their specific concerns (Dubé et al., 2013). Given

this, the reasons for low RTS,S vaccine coverage in the Cape Coast Metropolis would need to be established and solved. An established and solved parental concerns with the RTS,S hesitancy would help to increase vaccine uptake and reduce malaria cases in the Cape Coast Metropolis. Figure 3 shows the map of Cape Coast Metropolis with the health facilities that were involved in the study.

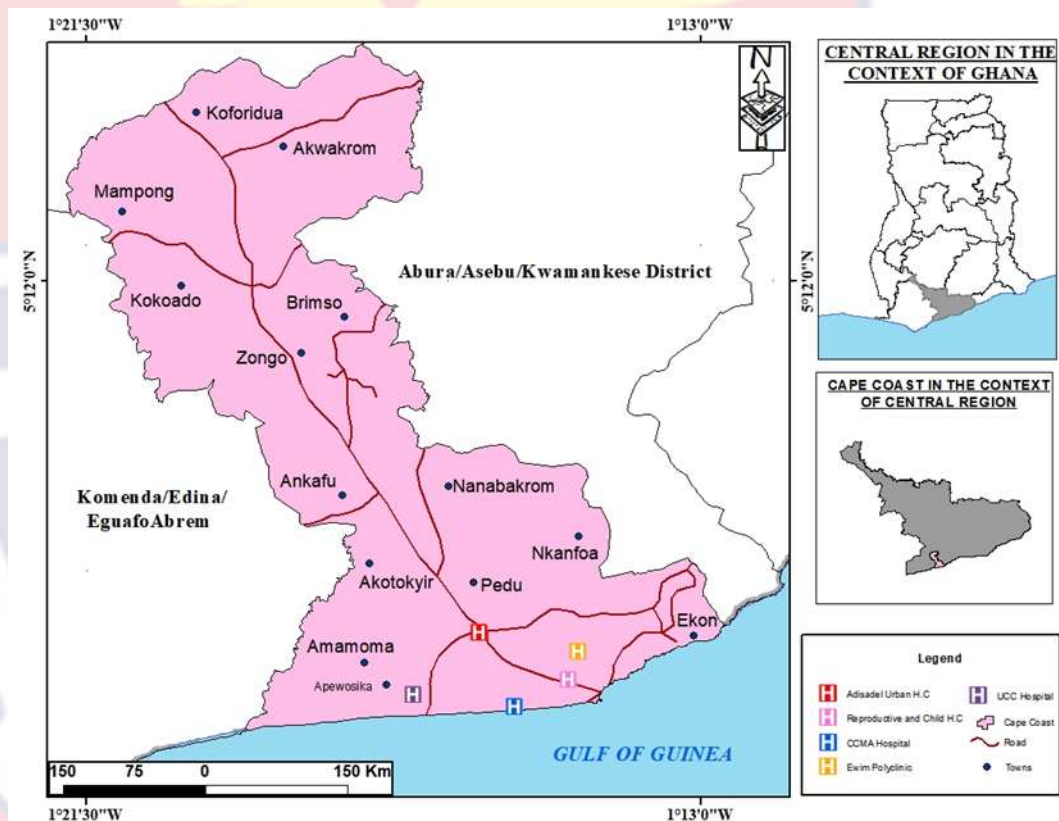


Figure 3: Map of the study area (Cape Coast Metropolis)

Source: GIS Lab of the Department of Geography and Regional Planning, University of Cape Coast (June 2021)

### Data and Sources

The study used both primary and secondary data for the study. The primary data were collected from parents/caregivers who refused or delayed accepting the RTS,S malaria vaccine for their children. Data obtained from



participants comprised their knowledge and perception about the RTS,S malaria vaccine, their reasons for delaying accepting the RTS,S malaria vaccine and their reasons for refusing the vaccine for their children. The 2020 Malaria Vaccine Implementation Programme Quarterly Data Bulletin on vaccination coverage was also used for the study.

### **Target Population**

The study targeted vaccine-hesitant parents/caregivers who received vaccination services for their children at the Child Welfare Clinics (CWCs) within the Cape Coast Metropolis. These parents/caregivers were those who accepted other childhood vaccines but refused or delayed accepting the RTS,S malaria vaccine for their children. Parents/caregivers of children who did not vaccinate or delayed vaccination as a result of RTS,S vaccine shortage were excluded.

### **Sampling Procedure and Sample Size**

The study used the judgemental sampling technique in selecting the various health facilities. The use of the judgemental sampling technique helped to carefully choose health facilities based on the characteristics that were of interest. This technique was used to choose child welfare clinics from facilities within the health sub-districts of the Cape Coast Metropolis. The child welfare clinic from the University of Cape Coast Hospital, Adisadel Urban Health Centre, Cape Coast Metropolitan Hospital, Ewim Polyclinic and Cape Coast Central Reproductive and Child Health Centre were selected for the study.

In sampling participants, both the judgemental and snowballing sampling techniques were employed. The judgemental technique was used to

sample some participants from the child health and nutrition register at the health facility. It was also used to sample some participants at the health facility on the day their children were supposed to have the RTS,S vaccination. The judgemental technique was appropriate for the study because it helped to deliberately select participants with rich information for the study in depth (Bhardwaj, 2019). The snowballing technique was used to sample some participants who were difficult to be identified (Dragan & Isaac-Maniu, 2013). These participants were those with no information on them and their children's RTS,S vaccination at the facilities where they refused the RTS,S malaria vaccine. Eleven participants were sampled from the five health facilities for the study.

At Adisadel Urban Health Centre, four participants were sampled; two were sampled from the contact addresses of parents in the child health and nutrition register of the facility, other two participants were sampled using the snowballing technique with the help of a nurse and a participant. At the University of Cape Coast Hospital, two participants were sampled; one was sampled through snowballing and the other participant was sampled at the health facility on the day her child was supposed to have the RTS,S vaccination. At Ewim Polyclinic, one participant was sampled using snowballing with the help of a nurse. At Cape Coast Metropolitan Hospital, two participants were sampled; one was sampled using snowballing and the other participant was sampled at the facility on the day her child was supposed to have the RTS,S vaccination. At Cape Coast Central Reproductive and Child Health Centre, two participants were sampled; one through snowballing with

the help of a participant and the other participant was sampled at the health facility on the day the child was supposed to have the RTS,S vaccination.

### **Research Instrument**

This study used an in-depth interview guide for data collection. The interview guide was developed under five sections (A, B, C, D, E). Section A sought information about the demographic data of parents/caregivers such as sex, age, level of education, marital status, occupation, number of children and place of residence. Section B elicited information on the knowledge of parents about the RTS,S malaria vaccine. Section C looked at the perception of parents/caregivers about the RTS,S malaria vaccine, section D dealt with parents' reasons for delaying accepting the RTS,S malaria vaccine while the left which is section E sought information about the parents' reasons for refusing the vaccine for their children. An in-depth interview was used because it is a suitable method when detailed information about a person's thoughts, feelings and behaviours is being explored (Islam & Aldaihani, 2022). This method was used to collect in-depth information from participants regarding their knowledge of the vaccine, their perception and reasons for delaying accepting and refusing the vaccine for their children.

### **Pre-Testing of Data Collection Instrument**

The pre-testing of the instrument was done at Moree Health Centre in the Abura-Asebu-Kwamankese district in the Central Region of Ghana. This facility was considered for the pre-testing because it is one of the RTS,S piloting facilities outside Cape Coast Metropolis. One person was used to pre-test the instrument and the interview was conducted at the convenience of the participant in terms of time and place. The pre-testing helped to reframe and

introduce some additional questions as well as correct ambiguous questions in the questionnaire. For example, the piloting helped to acknowledge the need to introduce a question such as *do you acknowledge that your child's RTS,S vaccination delayed or child did not get vaccinated with the RTS,S vaccine?* before asking participants the reasons for the delay or refusal of the vaccine.

### **Data Collection Procedure**

Data collection lasted for six months (November 2021 to April 2022). Before the data collection, the nurses at the child welfare clinics of the various health facilities were oriented on the nature and purpose of the study. After orienting the nurses, the data collection began by searching through the child health and nutrition registers of all the health facilities. The registers were searched to identify parents who refused or delayed the RTS,S vaccination for their children. After searching through all the facilities' registers, the contact addresses of two parents were retrieved specifically from Adisadel Urban Health Centre. This was because Adisadel Urban Health Centre was the only facility that had records of parents who refused the vaccine in the register.

These parents were contacted and sampled for the study after the nature and purpose of the study were explained to them. Within the third week of data collection, a 30-minute interview was conducted with each participant sampled from the register. For the rest of the data collection period, as and when a participant was sampled at either the health facilities on the day the child was supposed to have the RTS,S vaccination or through snowballing, a 30-minute interview was also conducted with each participant. The interviews were conducted on both telephone and in person (face to face). The telephone interview was used at the request of some of the participants. In all, three of

the interviews were done in person and eight were conducted through the telephone. Prior to the interview, participants were made to freely consent to participate in the study. Participants who opted for telephone interviews gave their consent verbally and other participants with in-person interviews consented by signing a written consent form.

Participants were informed that the study was for solely academic purposes and that they should feel free to talk. Additionally, participants were assured of confidentiality by orienting them that, their information was protected from unauthorized access or disclosure by saving the data in a password-protected computer. Regarding anonymity, participants were assured that, any identifying information such as the names of participants was removed from the data. Interviews were conducted with participants at their convenience in terms of place and time. During the interviews, data on the knowledge, perception and reasons for delaying accepting or refusing the vaccine were solicited from participants. The interviews were recorded with the knowledge of the participants and field notes were also taken. To ensure validity and trustworthiness of the data, the recorded audio was replayed to participants to let them confirm that the audio data reflected their views. Data collection was discontinued after interviewing 11 participants. It was realised that, there were no new ideas and opinions from participants. There was a repetition of responses from the participants with no new analytical information indicating the point of saturation.

As a challenge on the field, it took six months to sample 11 participants because four out of the five health facilities had no data in their register on parents who hesitate regarding the RTS,S malaria vaccine. It was

difficult to identify hesitant parents and sample them because most of the parents were accepting the vaccine for their children. Again, some of the hesitant parents were reluctant to be involved in the study because they did not want others to know about their vaccination decision.

### **Data Management**

The interviews were recorded using an audio tape. Data obtained from participants were treated with confidentiality and high security by preventing unauthorised access by saving the data in a password-protected computer. The data were also stored on an external hard drive to serve as backup.

### **Data Analysis**

The data was analysed using thematic analysis. Thematic analysis is a method for identifying, analysing, and reporting patterns (themes) within data (Braun & Clarke, 2006). The analysis was guided by the six-step process for thematic analysis developed by Braun and Clarke, (2006). Before applying the steps in thematic analysis, the verbal data were transcribed into English which gave verbatim account of all utterances from participants. The first phase of thematic analysis according to Braun and Clarke, (2006) involves familiarisation with the data. At this phase, there was repeated reading of the transcribed data. This was done to get immersed in the data to know the depth and breadth of the data content. The second phase of the analysis involved the generation of initial codes. These codes were interesting features in the data that were basic and gave meaning to the phenomenon. At this phase, interesting aspects in the data that gave repeated patterns were identified.

Codes were generated from utterances of participants that gave meaningful assessments of participants' knowledge about the RTS,S vaccine,

their perceptions and reasons for delaying accepting and refusing the vaccine. The third phase involved searching for themes. At this phase, different codes were grouped into potential themes and important codes were combined within identified themes. Different codes that were similar were put under the same theme that reflected the objectives of the study. The fourth phase involved reviewing the themes. At this phase, the developed candidate themes were refined. The codes under each theme were read to ensure that they were coherent and reflected the theme. After reviewing the themes, themes that did not have much data to support were put into others. To check the validity of individual themes in the data set, the entire data was re-read to ensure that the themes are accurate representations of the data. The fifth phase involved defining and naming themes. At this phase, the themes were defined and given more refinements. The relevance of each theme was identified by checking the various aspects of the data set that each theme represented. The themes were checked to see if they fit into the story being told in the study.

In all, four main themes and 16 sub-themes emerged out of the dataset that reflected the objectives of the study. The main themes were the knowledge of parents about the RTS,S malaria vaccine, the perception of parents about the RTS,S malaria vaccine, parents' reasons for delaying accepting the vaccine and parent's reasons for refusing the RTS,S vaccine. The sixth phase involved producing the report. During this phase, the final analysis and the writing of the report were done. The report was written to highlight the themes being supported by verbatim quotations from participants.

### **Ethical Consideration**

The following ethical guidelines were followed to ensure that the study met the ethical standards required to conduct research. A copy of the research proposal was submitted to the University of Cape Coast Institutional Review Board (IRB) for assessment of the protocol and approval of the ethical clearance. After obtaining ethical clearance (UCCIRB/CHLS/2021/58), permission was obtained from the administration of the various health facilities involved in the study as well as the child welfare clinics of the facilities. Before the commencement of the fieldwork, the decision of those who opted not to be part of the study was respected and consent was sought from the parents who participated in the study.

Before the interviews, the purpose and nature of the study were made known to the participants. Participants were informed that the interview was recorded. The information from participants was kept confidential by storing the data in a password-protected computer to prevent unauthorised access. Pseudo-names were used to avoid participants being traced to their interviews. Participants were also made aware of their right to refuse to provide answers to some questions if they felt uncomfortable giving that information out.

### **Chapter Summary**

This chapter described the research methodology used to conduct the study. The chapter described the study area, research philosophy, research design, source of data for the study, target population, sampling and sample size as well as the research instrument. The procedure for data collection, pre-testing of data collection instrument, data management, data analysis and issues about ethics were all discussed in this chapter. The study area which



was the Cape Coast Metropolis was described as well as the reason for choosing that area. The study was cross-sectional using the interpretivism philosophy and phenomenology as the design for the study. The target population for the study were parents who delayed accepting or refused the RTS,S malaria vaccine for their children. An in-depth interview was used to collect primary data from these participants who were sampled using both judgemental and snowballing techniques. Data collection started after obtaining ethical clearance from the University of Cape Coast Institutional Review Board.

The data collection lasted for six months and within the six months, as and when a participant was sampled, a 30-minute interview was conducted with the participant. The data solicited from participants were their knowledge about RTS,S malaria vaccine, perception about the RTS,S malaria vaccine and reasons for delaying accepting and refusing the RTS,S malaria vaccine for their children. Data were treated with confidentiality and analysed using a thematic analysis guide developed by Braun and Clarke (2006). With the guide, the data were categorised and put into themes for writing the report.

## CHAPTER FOUR

### RESULTS AND DISCUSSION

#### Introduction

This chapter presents the results and discussion based on the objectives of the study. It describes the socio-demographic background information of the participants, the knowledge and perception of parents/caregivers about the RTS,S malaria vaccine as well as parents' reasons for delaying accepting or refusing the RTS,S malaria vaccine for their children.

#### Socio-Demographic Characteristics of Participants

This section covers the socio-demographic and background information of the participants. The information comprises the sex, age, level of education, marital status, number of children, occupation and place of residence. In all, eleven hesitant parents/caregivers comprising ten females and one male were involved in the study. Most of the participants were female because the mothers were mostly in charge of the vaccination and health screening of the children. One out of the eleven participants delayed before accepting the vaccine whereas ten participants refused the vaccine for their children.

All the participants were within the age range of 25 and 40 years. Regarding education, all the participants had at least secondary education. The majority of the participants were married and had between one and three children. The majority of the participants stayed within the Cape Coast Metropolis with few staying outside Cape Coast although they all accessed health care services in the Metropolis. Table 1 shows the demographic data of participants.

Table 1: Socio-Demographic Background of Participants

<b>Demographic Characteristics</b>	<b>Frequency</b>
<b>Sex</b>	
Female	10
Male	1
<b>Age</b>	
25-29	3
30-34	2
35-39	5
40-44	1
<b>Education</b>	
Secondary	3
Tertiary	8
<b>Marital Status</b>	
Single	1
Married	10
<b>Number of Children</b>	
1-3	8
4-6	3
<b>Occupation</b>	
Trader	2
Teacher	3
Preacher	1
Court worker	1
Dietician	1
Student	1
Unemployed	1
Lecturer	1
<b>Place of Residence</b>	
Adisadel Estate	1
Elmina	2
Aggrey	1
Amamoma	2
Ankaful	1
Ola	1
Akotokyir	1
Bakaano	1
Abura	1
<b>Total</b>	<b>11</b>

Source: Field Work (2022).

### **Knowledge of Parents/Caregivers about the RTS,S Malaria Vaccine**

Vaccine knowledge is defined as detailed and factual information regarding vaccines and immunisation (Awadh et al., 2014). The decision either to accept or refuse a vaccine involves a multiplex process that is influenced by many factors including knowledge about vaccines (Charron et al., 2020). Studies have shown that the vaccination status of children highly depends on the knowledge of parents about vaccines (Awadh et al., 2014; Smith et al., 2017). Considering the RTS,S malaria vaccine which has newly been introduced, there are huge amount of information that can be accessed by parents. This information whether correct or incorrect can influence parents' knowledge as well as the RTS,S vaccination status of their children. As part of the objectives of this study, the knowledge of parents about the RTS,S malaria vaccine was assessed.

Contextualising knowledge in this study, the assessment of knowledge was done based on three criteria; awareness of parents about the availability of the RTS,S malaria vaccine, the knowledge of parents about the vaccination schedule of the RTS,S malaria vaccine and the knowledge of parents about the usefulness of the RTS,S malaria vaccine. In this study, a participant was said to have knowledge about the RTS,S malaria vaccine if the participants knew about; the availability of the RTS,S malaria vaccine, the vaccination schedule of the RTS,S vaccine and the usefulness of the RTS,S malaria vaccine.

#### ***Awareness of parents/caregivers about the availability of RTS,S malaria vaccine.***

Vaccine awareness involves knowing that a particular vaccine exists or is available. Awareness about vaccines forms part of vaccine knowledge. As part of assessing the participants' knowledge of RTS,S vaccine, it was

enquired from the participants if they knew and have heard of the existence of RTS,S malaria vaccine. Parents may be familiar with the already existing childhood vaccines that are indicated in the child health record book in Ghana. Considering the RTS,S malaria vaccine which has newly been introduced, awareness of parents about the vaccine was explored during the interviews. The data revealed that all the participants were aware of the RTS,S malaria vaccine. Some of the participants got to know about the vaccine either before or on the day their children were supposed to have the RTS,S vaccination. Some of the participants indicated their awareness of the RTS,S malaria vaccine in the following comments:

A father had this to say:

*...yes, I have heard about the malaria vaccine before... (38 years old; preacher)*

A caregiver confirmed her awareness as follows:

*... I have heard about the RTS,S malaria vaccine before... (27 years old; a dietician caregiver).*

#### ***Knowledge of parents/caregivers about the vaccination schedule of the RTS,S malaria vaccine***

A vaccination schedule is a tool that is used to ensure that the recommended immunisations are provided to shield both children and adults from disease when they are the most vulnerable (Institute of Medicine, 2013). The immunisation schedule is carefully designed to offer protection at just the right time (Centre for Disease Control and Prevention, 2020b). Deviation from the approved vaccination schedule could either reduce vaccine effectiveness or increase the risk of adverse events (Edwards & Decker, 2000).

Every vaccine just like the RTS,S malaria vaccine has its unique schedule for administration. Awareness and adherence to such vaccination schedules will greatly help reduce vaccine preventable diseases among children (Abahussin & Albarrak, 2016). In Ghana, the RTS,S malaria vaccine is a four-dose regimen with a recommended vaccination schedule at six, seven, nine, and 24 months of age (MVIP, 2019). The data from the participants revealed that one participant knew the correct vaccination schedule. Most of the participants had knowledge about the multiple-dosing nature of the vaccine but the exact schedule was not known. Other participants also had no idea about the vaccination schedule. A father with the idea of the correct schedule had this to say about the RTS,S vaccination schedule:

*... the nurse said the children take the malaria vaccine at 6, 7, 9 and 24 months... (38 years old; preacher)*

Some participants knew that the vaccine was a multiple-dosing vaccine but the exact schedule was not known.

A female teacher noted this:

*... The malaria injection is given three times, I have forgotten the specific months at which it is given but the last injection is given at two years... (34 years old; teacher).*

Other participants knew nothing about the schedule.

A mother indicated this:

*... I don't know about the vaccination schedule and the number of doses the malaria vaccine will be taken, in fact, I did not even ask... (37 years old; teacher)*

*Knowledge of parents/caregivers about the usefulness of the RTS,S malaria vaccine*

The usefulness of vaccines in safeguarding individuals and communities from vaccine-preventable diseases cannot be overstated. The usefulness of vaccines and their pivotal role in eradicating diseases highlight their impact on disease prevention efforts. The knowledge of parents about the usefulness of vaccines including the RTS,S malaria vaccine may help in making vaccination decisions. From the interviews, it was observed that most of the participants knew that the RTS,S malaria vaccine was a malaria preventive tool. Few participants also thought the RTS,S malaria vaccine was used in malaria treatment. This was evidenced in the contributions made by the participants.

Some of the participants who knew that the vaccine prevents malaria expressed it in their comments.

A female teacher had this to say:

*...the malaria vaccine will help eradicate malaria... (34 years old; teacher)*

A mother said this:

*... they (nurses) said, the vaccine is used to prevent malaria ... (40 years old; lecturer)*

On the contrary, to some participants, the vaccine was used to treat malaria.

The mother noted this:

*...Hmm, the malaria vaccine injection is used to treat malaria in children, when the child is sick, then the malaria injection will be given to him/her... (34 years old; trader).*

From the data, only one participant responded correctly to all three criteria for assessing RTS,S vaccine knowledge in this study. The participant knew of the existence of RTS,S vaccine, the vaccination schedule and the usefulness of the vaccine. For the remaining participants, some of them were aware of the RTS,S vaccine and its usefulness but the correct vaccination schedule was unknown. Others were also aware of the RTS,S vaccine but the usefulness and the schedule were not known. This showed that there was inadequate knowledge about RTS,S malaria vaccine among the participants.

### **Perception of Parents/Caregivers about the RTS,S Malaria Vaccine**

Vaccine hesitancy is influenced by how people think and feel about vaccines (Tuckerman et al., 2022). Together with vaccine safety and effectiveness, the perceptions of parents about childhood vaccines influence the vaccination status of children (Khan et al., 2022). In this study, the perception of parents about the RTS,S malaria vaccine was explored. It was observed from the interviews that, participants had various perceptions based on what they had heard, read and experienced about the RTS,S malaria vaccine. Participants expressed their perception under five issues: the malaria vaccine is the same as medicine for treating malaria, testing of RTS,S malaria vaccine on children, a link between vaccines and autism, RTS,S malaria vaccine as a painful childhood vaccine, RTS,S malaria vaccine as a complementary malaria control tool.

#### ***Malaria vaccine same as medicine for treating malaria***

Children are given health screening as well as vaccines at the child welfare clinics for their well-being. Some of the vaccines are administered



orally and others are through injections. Some of these vaccines administered through injections are sometimes perceived as medicines administered through injections by some parents. Some participants saw the RTS,S vaccine as a medicine for treating malaria and would cause their children to fall sick if the children took the vaccine without suffering from malaria. These participants hesitated because, they saw it as no need for their children to go for malaria treatment when they were not suffering from malaria. This was realised from the comments made by the participants.

A mother said:

*... for me, I know that a person is being given a malaria injection when one is suffering from malaria. If you are not sick of malaria, there is no need for a malaria injection. I believe that once my child is not sick of malaria when given the malaria injection, it will rather cause him to be sick...(34 years old, trader).*

A caregiver spoke about the view of her sister concerning the malaria vaccine as follows:

*... my sister believes that the child is not sick of malaria so giving her malaria vaccine will rather trigger a sickness in the child's body...(27 years old; a dietician caregiver).*

#### ***Testing of RTS,S malaria vaccine on children***

Parental approval of children's participation in vaccine research helps in the development of paediatric vaccines as well as public health policies (Chantler et al., 2007). Parents consider the risk or the importance of the vaccine research before either agreeing or declining the participation of their

children in research. It takes altruistic parents to consider the contribution of the research to health and involve their children in vaccine research (Langley et al., 1998). The pilot implementation of the paediatric RTS,S malaria vaccine is being done in Ghana, Kenya and Malawi. The piloting exercise is meant to compile evidence on the impact of the vaccine in preventing severe malaria and deaths in children (MVIP, 2019). The interviews from this study revealed that, although the RTS,S vaccine has passed through various developmental phases and is now being piloted, some parents perceived the RTS,S malaria vaccine to be a study vaccine being tested on their children. The parents perceived the RTS,S vaccine to be in a developmental phase and risky to the health of their children. This was observed in the remarks made by some of the participants.

A mother who perceived the piloted RTS,S vaccine to be unsafe indicated this:

*...they (nurses) said they are piloting the vaccine and I will not allow my child to be used for piloting and be tested on. The vaccine is for trial and error and might not be safe. I will not let my child be involved while the error could come to my child. For now, at the piloting stage, it is risky and not good... (37 years old; teacher)*

A participant shared a similar perception:

*... being a piloted vaccine, there is no doubt that my child was going to be used for testing the vaccine. That is my thinking and my husband also feels the same. The malaria vaccine tested on my son can have a serious effect on the child that we*

*may not know how to go about it to help our son... (29 years old; court worker)*

### ***Vaccines have a link with Autism***

One way that a participant has perceived all vaccines including the malaria vaccine is their link with autism. During the interviews, it was revealed that the participant read and knew the suspicion of the association of vaccines with autism. This influenced her negative thoughts about the RTS,S vaccines. For this participant, the whole concept of vaccination unsettles her. The mother shared her opinion with the following words:

*...well let me tell you where I am coming from, you know, my first daughter is autistic, and you know it is speculated that autism is vaccine-related so that angle is `making me sceptical about vaccines in general. I am not afraid of vaccines but I just dislike them. If I have my way, I would limit the vaccines so I avoid unnecessary vaccines. The whole idea of vaccines unsettles me ... (40 years old; lecturer).*

### ***RTS,S malaria vaccine as a painful childhood vaccine***

With the plethora of vaccines that infants are supposed to take, the associated pain, distress, and other usual reactions may raise concern among parents and aggravate antivaccine sentiment. For one of the participants, the RTS,S malaria vaccine is the most painful one among the childhood vaccines and unbearable for children. She expressed her view as follows:

*... my third child suffered after taking the malaria injection. I went to ask the nurse and she said the malaria vaccine is more*

*painful than all the vaccines. I know the vaccine protects children against malaria but the associated pain is unbearable and may cause further problems. For me, I see the malaria vaccine to be the most painful vaccine and that is why I refused it for my fourth child...(37 years old, unemployed).*

### ***RTS,S malaria vaccine as a complementary malaria control tool***

The RTS,S malaria vaccine has been introduced to be used together with already recommended malaria preventive measures. All these measures are being put in place to ensure that individuals especially children are protected from malaria. There were varied views concerning malaria prevention with vaccines. While some participants supported that malaria could be prevented through vaccination, others were of the view that malaria can be prevented with the already recommended measures and that vaccine is unnecessary. Some of the participants who perceived the vaccine to be unnecessary gave these comments:

A student and a mother gave this remark:

*...to me, malaria can be prevented with the already existing preventive measures so the introduction of the vaccine is not necessary... (27 years old; student).*

Another parent made this remark:

*... I think of rather protecting my child from malaria with other recommended measures instead of the malaria injection... (36 years old; teacher).*

Some of the parents supported the use of vaccines in malaria prevention although they were hesitant.

A participant said this:

*... for me, although there are other malaria preventive measures, it is still good to add the vaccine because I believe that if the child takes the malaria vaccine and he gets malaria, it will not be as severe as in the case of not being vaccinated...*

(29 years old; court worker).

Another mother expressed her perception as follows:

*... malaria vaccine is very important and good. It is one touch and once and for all if we want to eradicate malaria....* (34 years old; teacher).

### **Parents/Caregivers Reasons for the Delay in Acceptance of the RTS,S Malaria Vaccine for their Children**

Vaccine hesitancy entails unwillingness to take a vaccine and it happens in various forms including delays in accepting a vaccine. Some hesitant people mostly have delayed vaccination and do not go exactly according to the vaccination schedule. As part of this study, parents' reasons for the delay in accepting the RTS,S malaria vaccine were explored. The comments from the interview showed that the parent was hesitant mainly for fear of adverse events following immunisation.

#### ***Adverse events following immunisation***

As most vaccine-preventable diseases continue to reduce, people are becoming more concerned about health problems that may happen after vaccination. A participant who delayed before accepting the RTS,S malaria vaccine for the child posited that, fear of the child experiencing paralysis after

the vaccination as speculated made her hesitant although she eventually accepted the vaccine for the children. She expressed her views as follows:

*...my husband heard that the malaria injection paralyses children so we waited for some time because we didn't want to vaccinate them. I later vaccinated my children (twins) after being encouraged by a nurse. By God's grace nothing happened to them after the injection... (35 years old; trader)*

### **Parents Reasons for the Refusal of the RTS,S Malaria Vaccine for their Children**

Routine vaccination programmes have helped to reduce many vaccine-preventable diseases. Despite this success, many parents have issues and a small proportion even refuse vaccination for their children (Harmsen et al., 2013). Parents who refuse vaccines make a well-considered decision by assessing the benefits and the risks of vaccination (Sporton & Sally-anne, 2001). This study was aimed at exploring why parents/caregivers refused the RTS,S malaria vaccine for their children. The interview revealed that the majority of the participants had more than one reason for refusing the RTS,S vaccine. The participants gave the following reasons: perceived ineffectiveness of the RTS,S malaria vaccine, district-specific pilot implementation of RTS,S malaria vaccine, RTS,S malaria vaccine not among the list of childhood vaccines in the child health record book, unknown vaccine side effects, adverse events following immunisation, low education about RTS,S vaccine and low perceived likelihood and severity of malaria.

### ***Perceived ineffectiveness of the RTS,S malaria vaccine***

The decision to vaccinate or refuse a vaccine can be influenced by how the individual sees a vaccine in terms of effectiveness. A participant was concerned about how well the RTS,S malaria vaccine performs in the real world. From the interviews, it was realised that a participant doubted the ability of the RTS,S malaria vaccine in malaria prevention so she refused it.

The participant expressed her views as follows:

*...I am not keen on all the vaccines not only the malaria vaccine, by then I wanted to avoid unnecessary vaccines. So I enquired from some mothers of vaccinated children to see if the vaccine prevented malaria in their children but they said their children still had malaria after vaccination so I refused the vaccine ... (40 years old; lecturer)*

### ***District-specific pilot implementation of RTS,S malaria vaccine***

In Ghana, RTS,S malaria vaccine is being piloted in some selected high malaria transmission districts. This makes the vaccine to be administered in some selected districts and not nationwide. The interview revealed that the district-specific piloting of the malaria vaccine was a concern and a reason for refusal by some participants. The participants lamented that their children may drop out when they move to non-piloting districts so it was needless to start the vaccination.

A participant gave this comment:

*...I told the nurse that in two years, I will be in Takoradi and I will continue from there but the nurse told me the vaccine is being given at selected places and not everywhere because it is being piloted. I refused the vaccine because my child will not complete all the doses of the vaccine when we travel to different places ... (34 years old; teacher)*

Another mother added:

*...again the nurse said the malaria injection is in some selected area but I think it should be in every part of the country so that wherever I go, my child can continue since the nurses said the injections are three. This is also another reason for not taking the vaccine for my child ... (34 years old; trader)*

***RTS,S malaria vaccine not among the list of childhood vaccines in the child health record book***

In Ghana, the Expanded Programme on Immunisation has recommended and listed some childhood vaccines in the child health record book. As of the time of this research, the RTS,S malaria vaccine was not listed in the book and that was an issue raised by some participants. According to these participants, they refused the vaccine because they believed the vaccine has not been approved by Ghana Health Service and that is why it is not listed in the child health record book. These are remarks made by some mothers:



*...I didn't allow my child to get the injection because the malaria vaccine is not written in the child health record book...(34 years old; trader)*

Another mother added that:

*...my husband sees the list of vaccines that will be given to the baby from the weighing book so he knew that the child will take those vaccines. The malaria vaccine is not written in the book so that is also why we refused...(29 years old; court worker)*

#### ***Unknown side effects of the RTS,S malaria vaccine***

Parents are most of the time anxious about the well-being and health of their children. For parents, knowing or being told about the possible adverse reactions that are associated with a vaccine may help them in making a vaccination decision for their children. From the interviews, it was realised that some parents refused the vaccine because they had no idea about the side effects of the vaccine on their children. Some participants had these to say:

*...whenever you buy a drug, you are told of the side effects, even with this COVID-19 vaccine, they tell us that you may get headaches but the nurses didn't tell me anything about the side effects of the malaria vaccine. I don't know the side effects of the vaccine so I did not take it for my child...(37 years old; teacher)*

Another parent noted that:

*...my child sometimes reacts to other vaccines. I think he got diarrhoea and temperature when he was given a vaccine at six*

*weeks but the father was not worried because we were told at the hospital before the injection. For the malaria vaccine, we refused because my husband has not heard anything about it so he just does not know the side effects of the malaria vaccine on the child... (29 years old; court worker)*

#### ***Adverse events following immunisation***

Vaccines are considered as strong preventers of infection but most of them are not without adverse reactions. These reactions are mostly minor, yet of global health concern (Yamoah et al., 2019). During the interviews with participants, most of them complained and cited adverse events following RTS,S vaccination as part of their reasons for refusing the malaria vaccine. Some of the participants had their previous children experiencing health problems after taking the RTS,S malaria vaccine and that made them refuse the vaccine for their subsequent children. The participants made these remarks during the interview:

A participant gave this comment:

*...my third child was so weak and one leg also got swollen and became hard after the malaria injection so I refused it for my fourth child. A friend of mine also gave testimony in our religious group that her baby had convulsion after receiving the malaria vaccine injection and it was God that saved the baby...(37 years old; unemployed).*

A father had this to say:

*...we didn't allow our daughter to get the vaccine because our first child had the vaccine and she reacted badly with*

*temperature and fever so we refused the vaccine for this child due to the bad experience we had previously...(38 years old; preacher)*

#### ***Inadequate education about the RTS,S malaria vaccine***

Information about vaccines can be obtained from various sources but health facilities are one of the sources that parents do expect to hear more about health. A recommendation from a healthcare professional is the main reason parents decide to vaccinate (Centre for Disease Control and Prevention, 2020a). This implies that adequate information from a nurse will promote vaccine acceptance among parents. It was revealed from the interview that, at some health facilities, some parents were not given education about the malaria vaccine and those who were given some information also saw it as inadequate. They refused the vaccine because they didn't know much about it. These mothers explained their issues as follows:

*...I refused the vaccine because education on the vaccine didn't go well with me. It looks like the nurses themselves do not know the side effects of the vaccine. No one educated me on the malaria vaccine on the day I took my child to the clinic and the nurse only told me my child will take the malaria vaccine so I refused... (37 years old; teacher).*

It was confirmed by another parent:

*... We didn't know much about the malaria vaccine and during the weighing of the child, the nurses didn't tell us anything about the malaria vaccine... (29 years old; court worker).*

### *Low perceived likelihood and severity of malaria*

Malaria is one of the most common diseases in Ghana. Although it can be fatal sometimes, most people who get malaria recover within some days after treatment. Interviews with some of the parents showed that they saw malaria as a disease that their children are less likely to be infected and it can be treated in case the children get malaria. The following comments show the views of the parents:

*...something like the Hepatitis B vaccine, I am serious about it because I am hepatitis B positive and I don't want my children to get infected so I vaccinate them against hepatitis B. For malaria, you know I can prevent it and I will treat her in case she gets malaria...(37 years old; teacher)*

A parent also said a similar thing:

*...fortunately for me, my children don't get malaria, I think our immune system is good against malaria so my children hardly get malaria... (40 years old; lecturer).*

### **Discussion**

Trepidation about vaccines is as old as the whole concept of vaccination. There has been improvement in vaccines over the years but hesitancy still exists in various guises. Issues about vaccine hesitancy are complex and manifold and these make deliberations on parental concerns about vaccines very critical to increase vaccine uptake. The discussions were presented in line with the objectives of the study as well as the theoretical and conceptual issues supporting this study. The discussion covered the following themes: knowledge of parents/caregivers about the RTS,S malaria vaccine, the

perception of parents/caregivers about the RTS,S malaria vaccine, parents' reasons for delaying accepting and refuse the RTS,S malaria vaccine for their children.

### **Knowledge of parents/caregivers about the RTS,S malaria vaccine**

Parents are mostly the health decision-makers when it comes to the vaccination of their children. This makes it very imperative to give attention to the knowledge of parents about the vaccination of their children to enhance vaccine uptake and completeness (Awadh et al., 2014). Knowledge of parents about the RTS,S malaria vaccine was assessed based on their awareness of the vaccine, their knowledge about the vaccination schedule and their knowledge of the usefulness of the vaccine. The findings indicated that, all the participants had some information about the malaria vaccine either through their search or from the health facilities.

Results of the study regarding the awareness of parents about the RTS,S malaria vaccine revealed that, all the participants were aware of the malaria vaccine. They all expressed that, they knew about a malaria vaccine that has been introduced and available in the health facilities. High RTS,S vaccine awareness among the participants could be a result of their higher educational level. This finding is in line with the work of Aremu et al. (2022) conducted in Ghana, Nigeria and Uganda. Aremu and colleagues found that, there was high RTS,S awareness among participants with higher education. This could be that people with higher education can read more about the health and vaccination of their children.

On knowledge of parents about the vaccination schedule of the RTS,S malaria vaccine, most of the participants had inadequate knowledge about the

vaccination schedule. Only one participant knew the correct schedule whereas the rest did not know. Responses from most of the participants indicated that, they knew the malaria vaccine as a multiple-dosing vaccine but the exact schedule for the vaccine was not known. Although the vaccine is given four times to children at the age of six, seven, nine and 24 months, some of the participants indicated that the vaccine was taken three times. Other participants knew nothing about the schedule. In all, there was inadequate knowledge about RTS,S vaccination schedule among the participants. The inadequate knowledge of RTS,S vaccination schedule among parents in this study confirms a study in Ghana on factors associated with malaria vaccine uptake (Tabiri et al., 2021). According to Tabiri and colleagues, there was inadequate parental knowledge about the schedule of the RTS,S vaccine which might have contributed to the reduction in the uptake of subsequent doses of the malaria vaccine.

The knowledge of participants about the usefulness of the malaria vaccine was good. Most of the participants indicated that the RTS,S malaria vaccine was used to reduce the severity of malaria as well as prevent malaria among children. In all, it was realised that all the participants were aware of the malaria vaccine, the majority of them knew that the vaccine is used to prevent malaria but most of the participants had inadequate knowledge about the vaccination schedule of the vaccine. Among the participants, only one participant correctly answered all the criteria set to define knowledge of RTS,S vaccine in this study. This showed that, although the majority of the participants had some information about the RTS,S vaccine, their knowledge about the vaccine was not adequate.

Knowledge is an important aspect of vaccine hesitancy (Rola & Russell, 2023). Parents who are well informed about vaccines are more likely to appreciate the benefits of vaccines and accept vaccines (Seeber et al., 2017). This implies that, when parental knowledge about a vaccine is adequate, it promotes vaccine uptake but hesitancy increases when knowledge is inadequate. This is explained under knowledge of RTS,S malaria vaccine in the conceptual framework (Figure 2). In this study, although the participants were literate, it could be that they might have been misinformed by sources other than health facilities. This finding of inadequate knowledge about vaccines among vaccine-hesitant parents is in line with the study of Lau et al., (2013) in Hong Kong about the influenza vaccine. The work of Lau et al., (2013) established that there was inadequate knowledge of the influenza vaccine among parents that refused the influenza vaccine.

#### **Perception of parents/caregivers about the RTS,S malaria**

In the concept of vaccination, the way people think about vaccines and vaccine-preventable diseases constitutes a greater part of the decision to vaccinate. The vaccination behaviour will be influenced by how parents think or perceive a vaccine irrespective of the vaccination education provided to them. In this study, participants gave varying views on how they perceived the RTS,S malaria vaccine based on what they heard or experienced. To some of the participants, the concept of malaria vaccination is synonymous with malaria treatment, other participants perceived that the RTS,S malaria vaccine was being tested on their children. A participant also perceived vaccines to have a causative link with autism, some participants viewed the RTS,S malaria

vaccine as the most painful childhood vaccine and others regarded the RTS,S malaria vaccine as a complementary malaria control tool.

The malaria vaccine being perceived as medicine for treating malaria was deduced from the comments of some participants. Vaccines and medicines are both medical products that are administered through injection. Vaccines are known to be one of the effective measures in preventing infection whereas medicines are used to cure or treat various maladies (He et al., 2012). The use of injections to administer some vaccines as well as medicines could make some parents who are not attuned to the science of medicine see both medicine and vaccine as being same. Some participants saw the RTS,S malaria vaccine as a medicine used to treat malaria. This perception might have been developed because, at the child welfare clinics, all vaccines are locally called '*Panie*' or '*Droba*' which means *injection* in the English language. In this way, a parent could misinterpret the injection for vaccines and medicines and may perceive both to be the same. This finding is congruent with the work of Meñaca et al. (2014) where participants perceived and referred to vaccines as injections (*panie*). Contextualising and linking this perception to hesitancy, some parents do not see any benefit or use in taking a perceived malaria medicine for their children who were not suffering from malaria. This could be explained by the *perceived benefit* under the Health Belief Model. Perceiving the RTS,S malaria vaccine as a medicine for treating malaria is also an indication of inadequate knowledge about the RTS,S malaria vaccine. This is demonstrated as *knowledge about RTS,S malaria vaccine* in the conceptual framework (Figure 2.)



Testing of RTS,S malaria vaccine on children was also a perception deduced from the interviews with the participants. The administration of a vaccine is seen as a simple phenomenon but the concept of vaccination is complicated. To invent, test, and produce a vaccine is a daunting task that requires high levels of organisation and individual participation (Allen & Butler, 2020). Before a vaccine is approved and added to the immunisation programme of a country, it goes through phases of extensive and rigorous testing to ensure safety before being used on a few volunteers to a larger population across countries (WHO, 2020a).

According to some of the participants, the RTS,S malaria vaccine is an unsafe study vaccine being tested on their children. Although vaccines are only tested on children when the vaccines have proven to be scientifically safe and effective, some of the participants perceived the RTS,S vaccine to be unsafe. Lack of enough information on the principles behind vaccine development through the various trial phases by the average citizen accounts for such perception and hesitancy (Alhassan et al., 2021). This finding is in line with the findings of the research of Chantler et al., (2007) and Craciun and Baban, (2012) where parents were reluctant to enrol their children in vaccine research. This perception that promoted hesitancy among some parents is explained under *perceived vaccine safety* in the conceptual framework (Figure 2). Some of the participants developed negative attitudes toward the RTS,S vaccine due to their perception of the vaccine being unsafe. This negative attitude can be explained by *attitude toward the behaviour* under the Theory of Planned Behaviour.

A link between vaccines and autism was expressed by a participant. A British gastroenterologist Andrew Wakefield proposed a link between the measles vaccine and autism (Wakefield et al., 1998). Although the claim was refuted and the paper retracted, the meme remains on social media and in the minds of people. This thought has brought hesitant attitudes toward childhood vaccines among parents of children affected by autism. As a parent, she was anti-vaccine and has refused most vaccines including RTS,S malaria vaccine because her first daughter is autistic and she sides with Wakefield. This finding is consistent with the study of Pivetti et al. (2020) on vaccines and autism. In their study, most parents perceived and cited vaccines as the cause of autism in their children. Explaining this perception with the Theory of Planned Behaviour, an unfavourable attitude has been developed by the participant towards RTS,S vaccine because the vaccine has been perceived to be unsafe. This is explained by the conceptual framework (Figure 2) under *perceived vaccine safety*.

Some parents also perceived the RTS,S malaria vaccine as a painful childhood vaccine. Vaccination is mostly a stressful health process for healthy children and the associated pain in some vaccines is more than in others (Ipp et al., 2004). The RTS,S malaria vaccine has been perceived by some of the participants to be the most painful childhood vaccine. This perception could be developed either through what they had heard or from the experience of their RTS,S vaccinated children.

For some of these participants, the experience of their previous children with the vaccine was unbearable, others were informed at the child welfare clinics about the associated pains with the vaccine and others also

heard through rumour. For some participants, the inconvenience and pain associated with RTS,S vaccination was a concern and a barrier to vaccination. The finding in this study is in tandem with the works of Luthy et al. (2010) and Alawneh et al. (2020) where parents perceive some vaccines to be painful and that was a reason for their concern and hesitancy. This can be explained by the Health Belief Model under *perceived barrier* as a predictor of acceptance of health behaviour. This finding is also explained by the conceptual framework (Figure 2) under *pains and swelling at the injection site* under *perceived behavioural control*.

RTS,S malaria vaccine as an additional malaria preventive measure has been seen or perceived by parents in different ways. The malaria vaccine is being piloted by WHO as a complementary malaria control tool to be used in addition to the already recommended measures. Although all the participants were hesitant, some perceived the addition of the vaccine in controlling malaria as being necessary whereas others thought the already recommended control measures were enough and the introduction of the vaccine was not necessary. Concerning those who perceived the vaccine to be a good and necessary additional malaria control tool, such finding was established in the work of Ojaka et al. (2011) and Meñaca et al. (2014).

Some of the participants in the work of Ojaka et al. (2011) and Meñaca et al. (2014) perceived the RTS,S vaccine to be a good and necessary additional preventive tool. The findings that some participants did not support the use of the vaccine in malaria control is in line with the work of Mtenga et al. (2016) and Chukwuocha et al. (2018) where some participants were not willing to receive the vaccine as an additional malaria control tool.

## Parents/caregivers reasons for the delay in acceptance of the RTS,S malaria vaccine for their children

Vaccination is very imperative in protecting a child against infectious diseases however, some parents intentionally delay vaccination for their children as a result of concerns about vaccines. Delaying vaccination leaves young children prone to diseases (Smith et al., 2010). Such parents although had concerns but they vaccinate their children at a later date. During the interview, a participant revealed that she intentionally delayed the RTS,S malaria vaccine for her children as a result of fear of adverse events following immunisation.

An adverse event following immunisation is any health problem that happens after vaccination. This problem could be a true adverse reaction or a coincidental event following the vaccination. For a participant, the fear of the child being paralysed after taking the RTS,S malaria vaccine as rumoured made her unwilling and intentionally delayed accepting the vaccine for the children. This finding is in line with the finding of Meñaca et al. (2014) where some community members in the Ashanti Region of Ghana associated vaccines with paralysis. They cited the vaccine or improper administration of the vaccine injection by the health officials as the cause of the paralysis and that made them hesitant. Parents will have confidence in vaccines and accept them when they perceive them to be safe as indicated under *perceived safety about RTS,S vaccine* and *confidence* in the conceptual framework (Figure 2).

### **Parents/caregivers reasons for the refusal of the RTS,S malaria vaccine for their children.**

Different reasons cited by the participants for refusing the vaccine for their children seemed to hold similar weight. During the interview, all the participants expressed concerns about the RTS,S malaria vaccine that made them refuse. Some of them had concerns because they had perceived the RTS,S malaria vaccine to be ineffective, others refused because the RTS,S vaccine is administered in specific districts. RTS,S malaria vaccine not among the list of childhood vaccines in the child health record book was a concern for some of the participants. Some also had issues because they were not made aware of the RTS,S vaccine side effects. Fear of adverse events following RTS,S immunisation, low education about RTS,S vaccine and complacency made them refuse the vaccine for their children.

A participant perceived the RTS,S malaria vaccine as ineffective. The participant expressed that, after enquiring from some parents of malaria-vaccinated children, they confirmed that their children still got malaria even after vaccination. This feedback made her lose trust and confidence in the effectiveness of the RTS,S vaccine. Vaccine effectiveness is one of the main reasons that could motivate a person to get vaccinated. Individuals who have low confidence in vaccines may not vaccinate (LaVail & Kennedy, 2013) but people with high confidence mostly accept vaccines. So if a person perceives a vaccine to be ineffective, the one does not see any need for the vaccine. Similar finding was documented by Ojaka et al. (2011) and Ojaka et al. (2014) in their research where some participants referred to the malaria vaccine as a weak vaccine with partial protection (partial efficacy) and cited

that as a reason that could make them hesitant when the vaccine was made available.

The RTS,S malaria vaccine prevents malaria caused by *Plasmodium falciparum*. This means that a child can still get other types of malaria even after being vaccinated with RTS,S vaccine. Contextualising vaccine ineffectiveness as a reason for hesitancy, such a participant had no confidence in the RTS,S vaccine due to her perception. This is explained under the *effectiveness of the RTS,S vaccine* in the conceptual framework (Figure 2). This can also be explained by the *perceived benefit* under the Health Belief Model. The participant saw no benefit or use in the vaccination since she thought the RTS,S cannot prevent malaria. According to the participant, she confirmed the effectiveness of the vaccine from other parents of vaccinated children. This shows the contribution of social networks to vaccine uptake and that can be explained by *social networks* in the conceptual framework (Figure 2).

The district-specific pilot implementation of RTS,S malaria vaccine was a concern for some parents. The RTS,S vaccine not being administered nationwide was a problem and a barrier for some of the participants to get their children vaccinated with all the doses over two years. A parent expressed that although she supported vaccination, she refused the malaria vaccine because within the two years of vaccination, she may move to a non-piloting district which will let her child drop out. She believed if the child cannot complete all the doses, then there is no need to start. Another parent also indicated that she cannot accept a vaccine that she cannot continue vaccinating when she goes to a different place. Refusing a vaccine over the non-

availability of the vaccine in some places can be grouped under *convenience* in the vaccine hesitancy model. It is also explained under *perceived behavioural control (distance to vaccination centre)* in the conceptual framework (Figure 2). Under convenience, although the parent would want to vaccinate the child, the cost of travelling to a piloting district could be a barrier to vaccination. This supports the findings of Albarakati et al. (2019) where some people were hesitant due to the non-availability of some vaccines in some primary health centres. The work of Tabiri and friends also attributed some children not being vaccinated with subsequent doses of the malaria vaccine to the district-specific pilot implementation of the vaccine.

RTS,S malaria vaccine not listed among childhood vaccines in the child health record book was also a reason for refusal by some of the parents. In the child health record book, vaccines that are to be taken by children are listed in the book which include: pneumococcal, polio, measles-rubella, hepatitis B, meningitis and others but excludes the malaria vaccine. When the malaria vaccine is administered to children, it is recorded in a section of the book earmarked for other vaccines (page 52). Interviews with the parents indicated that they refused the vaccines due to the fear that the vaccine not listed in the book has not been approved by the Ghana Health Service.

Fear of unknown side effects of the newly introduced malaria vaccine raised scepticism among some participants. Side effects also known as adverse reactions are known to be caused by a vaccine and the seriousness of these reactions may differ from mild to severe (CDC, 2021b). WHO also indicates that there is no perfect vaccine that entirely protects and is safe for everyone. Some of the parents admitted that every vaccine has side effects which they

are mostly told before their children are vaccinated. In the case of the malaria vaccine, they were not informed about the adverse reaction. This finding is in line with Favin et al. (2012) and Masters et al. (2018) where parents were hesitant due to worry about the potential side effects of vaccines. The parents are sceptical about the safety of the vaccine and this can be explained by the *perceived vaccine safety* from the conceptual framework (Figure 2).

Adverse event following immunisation of the malaria vaccine was a concern for the parents. An adverse event following immunisation is any untoward medical occurrence which follows immunisation and does not necessarily have a causal relationship with the usage of the vaccine (WHO, 2022a). According to some of the parents, the health problems that their previous children experienced after taking the RTS,S malaria vaccine ranging from fever, extreme temperature, weakness, swollen thighs and others made them refuse the vaccine for their subsequent children. This finding is in line with Albarakati et al. (2019) and Harmsen et al. (2013) where people were hesitant due to their negative experiences with vaccines and fear of complications after vaccination. These parents have developed *unfavourable attitudes* towards the RTS,S malaria vaccine due to the experience of their previous children as explained in the Theory of Planned Behaviour.

Low RTS,S education and sensitisation at the health facility were raised by some of the participants as their reason for refusal. There are numerous sources of vaccine information but health providers' advice is very important during vaccination decisions (Marzo et al., 2022). For these parents, the information or education they were given at the child welfare clinics about the malaria vaccine was not enough to help them in their vaccination decision.



The parents were of the view that the nurses could have given them in-depth education about the vaccine to help in their decision-making. A participant felt the nurses themselves did not know much about the vaccine and lost trust in them and the vaccine. These are the hesitant people that the work of Mckee and Bohannon, (2016) groups their reason as *a wish to have more information from healthcare personnel*. This finding is in line with Albarakati et al. (2019) where some participants were hesitant due to a lack of detailed information about vaccines from health workers.

Low perceived likelihood and severity of malaria also accounted for the refusal of the RTS,S malaria vaccine. Although the burden of malaria is still high in Africa, some participants saw their children as being less likely to get malaria and some also believed malaria can be prevented with already WHO-recommended measures. According to these participants, malaria can be prevented, their children may not get malaria and it can also be treated, so they refused it. A person takes up protective behaviours (vaccination) when he/she feels endangered or at risk of a vaccine-preventable disease (Conner & Norman, 2005). These participants did not feel prone to malaria so they refused the vaccination.

This finding is in line with the work of Saada et al. (2015) where people refused the vaccine because they saw the particular vaccine-preventable disease as not severe so there was no need for its vaccine. Contextualising this reason for hesitancy, these parents were complacent about malaria as shown in the conceptual framework (Figure 2). They perceived that their children were insusceptible and unlikely to be affected by malaria. This can also be explained by *perceived susceptibility, severity and likelihood of*

*malaria* as indicated in the conceptual framework (Figure 2). The outcome of the interviews with the participants showed that each participant had more than a reason for being hesitant. The participants were aware of the malaria vaccine as well as its uses yet they were hesitant. This hesitation could partly be a result of misinformation, negative experiences and personal sentiments they have about the RTS,S malaria vaccine.



## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### Introduction

This chapter presents the summary of the study, conclusions built on the findings and recommendations. Suggested area for further studies is also provided in this section.

#### Summary

The main objective of the study was to explore RTS,S malaria vaccine hesitancy among parents/caregivers in the Cape Coast Metropolis. The study was undertaken specifically to: assess the knowledge of parents/caregivers about the RTS,S malaria vaccine, investigate the perception of parent/caregivers about the RTS,S malaria vaccine, explore parent/caregivers' reasons for the delay in acceptance of the RTS,S malaria vaccine for their children and explore parents/caregivers' reasons for the refusal of the RTS,S malaria vaccine for their children. The study employed the qualitative approach and phenomenological research design. Theoretically, the study was guided by the Health Belief Model and the Theory of Planned Behaviour. These theories were reviewed to provide the theoretical basis for discussing and interpreting parents' reasons for RTS,S malaria vaccine hesitancy in the Cape Coast Metropolis. In-depth interview (IDI) was used to collect data from eleven participants from five health facilities in the Metropolis.

## Summary of Main Findings

This section provides a summary of the major findings that were derived from the study.

Each parent had more than a reason for being hesitant about the RTS,S vaccine and most of them had their partners involved in making the hesitancy decisions.

Findings on the knowledge of parents about the RTS,S malaria vaccine revealed that, all the participants were aware of the RTS,S malaria vaccine as a newly introduced childhood vaccine against malaria. Most of the participants knew the usefulness of the RTS,S malaria vaccine as an additional malaria preventive tool. Knowledge of participants about the RTS,S vaccination schedule was inadequate. Although all the participants had some information about the RTS,S malaria vaccine, their knowledge of the RTS,S malaria vaccine was inadequate.

Findings from the study concerning the perception of parents about the RTS,S malaria vaccine emerged that, almost all the participants had unfavourable perceptions about the RTS,S malaria vaccine. These unfavourable perceptions might have been developed from their previous experience with the vaccine. Other perceptions were misconceptions that might have been developed through rumour. Some participants wrongly perceived the concept of malaria vaccination as synonymous with malaria medication, others also perceived the vaccine as a study vaccine being tested on their children, to another participant, vaccines have a link with autism. Some participants also perceived the RTS,S malaria vaccine as a painful childhood vaccine, other participants were of the view that RTS,S vaccine as

an additional malaria preventive tool is necessary whereas others perceived it as needless.

Findings on parents' reasons for the delay accepting the RTS,S malaria vaccine was mainly due to fear of adverse events following immunisation.

Parents' reasons for refusing the RTS,S malaria vaccine for their children were driven largely by the fear of adverse events following immunisation of the RTS,S malaria vaccine. Apart from adverse events following immunisation, the participants doubted the safety and effectiveness of the RTS,S vaccine. Inadequate education about the side effects of the RTS,S vaccine by health professionals and unavailability of the vaccine in some districts were also cited by the participants. Others were also driven by complacency about malaria as a disease.

### **Conclusion**

The study highlighted some of the reasons for RTS,S malaria vaccine hesitancy from the perspective of parents/caregivers. It also sought to gain the knowledge as well as the perception of parents about the RTS,S malaria vaccine in the Cape Coast Metropolis. Information solicited from participants showed that there was inadequate knowledge about the RTS,S malaria vaccine among the participants. Inadequate knowledge about the RTS,S malaria vaccine could promote negative perceptions and hesitancy.

The participants had different unfavourable perceptions about the RTS,S malaria vaccine. These perceptions could be true or untrue reflections of the vaccine. The unfavourable beliefs or attitudes about the RTS,S malaria vaccine led to the rejection of the vaccination as a health intervention. These unfavourable perceptions when left unrefuted could affect RTS,S vaccine

uptake during national roll-out. The participants gave different reasons for being hesitant and that confirms the complex nature of vaccine hesitancy as indicated by World Health Organisation (WHO). Participants were hesitant mainly because some lacked confidence in the vaccine, others had inconveniences regarding the vaccination process and others were complacent about malaria. All the reasons cited for hesitancy fitted into the model of vaccine hesitancy (3C) as described by WHO. Theoretically, the findings in this study confirm the concept of the Theory of Planned Behaviour. People with favourable beliefs toward health interventions accept the interventions but unfavourable beliefs could lead to the rejection of the interventions.

To achieve the WHO's global ambition of reducing malaria case incidence and mortality rate by at least 90% and eliminating malaria in at least 35 countries by 2030, measures that will help to resolve the knowledge deficit of parents about the RTS,S malaria vaccination must be put in place. A well-informed parent about RTS,S malaria vaccination will have a positive perception of the vaccine and that will improve acceptance and uptake. Reasons cited by parents for being hesitant about the malaria vaccine should be considered during the development of vaccine educational messages. Reducing vaccine hesitancy is paramount in attaining a world free of malaria and that requires a concerted effort and shared responsibilities of individuals, Cape Coast Health Directorate, Ghana Health Service (GHS) and WHO at large.

## Recommendations

Based on the findings made from the study, the following recommendations are made:

1. Cape Coast Health Directorate should encourage nurses at the various child welfare clinics to not only sensitise parents on the malaria vaccine but also the severity and the impact of malaria on children. This will help parents to appreciate the urgent need for the malaria vaccine in malaria prevention.
2. Cape Coast Health Directorate should encourage nurses to use outreaches, door to door and especially social media to educate the public during the introduction of new vaccines.
3. Cape Coast Health Directorate should train and orient nurses on the benefits and risks associated with the RTSS malaria vaccination. This will help the nurses give detailed information on the RTS,S vaccine to parents so that parents embrace facts not myths about the vaccine.
4. Owing to the fact that parents visit the child welfare clinics at different times during the day, it is recommended that the Cape Coast Health Directorate provides the various child welfare clinics with a television set that will show vaccine educational videos throughout the visiting time. This will help parents who miss morning health education offered by the nurses at the facility to also get the right information.
5. Cape Coast Health Directorate should use vaccine-accepting parents to educate other vaccine-hesitant parents during outreaches.
6. As WHO recommends the widespread use of the RTS,S malaria vaccine among children in sub-Saharan Africa and other regions, Ghana

Health Service should roll out the vaccine nationwide so that children can get vaccinated as they travel around as well as parents not perceive the vaccine as being tested on their children in their district.

7. Ghana Health Service should add the RTS,S malaria vaccine to the list of childhood vaccines in the child health record book. This will make parents acknowledge and appreciate the approval of the vaccine by the Ghana Health Service.

#### **Suggestions for Further Studies**

1. This study was cross-sectional and as such future studies can consider a longitudinal study to follow up on vaccine-hesitant parents to explore if they would later accept the vaccine and their reasons for changing their vaccination decision.
2. Most child welfare clinics in the Cape Coast Metropolis do not keep data on hesitant parents and their reasons for hesitancy. Given this, a study can be undertaken to explore how vaccine hesitancy is being managed and addressed at the facility level.



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**APPENDICES****Appendix A: Interview-guide for Participants****UNIVERSITY OF CAPE COAST****DEPARTMENT OF POPULATION AND HEALTH****INTERVIEW GUIDE FOR PARENTS/CAREGIVERS WHO  
DELAYED IN ACCEPTING OR REFUSED THE RTS,S MALARIA  
VACCINE FOR THEIR CHILDREN.****General Introduction – Purpose of the Research**

You are highly appreciated for making time to speak to me about your reasons for delaying accepting or refusing the RTS,S Malaria vaccine for your child. I expect that this interview will last for about 30 minutes and it will be recorded for analysis. You are assured that your response in this interview will be treated with a high level of confidentiality during data management and analysis. Written approval will be sought from you before you will be quoted if there is the need in the research.

I would also like to reassure you that, this research is solely for academic purposes and you will not be held responsible for any of your responses so please you are encouraged to speak freely as you contribute to the research.

**Section A**

**To begin with, I would like you to tell me more about yourself:**

**Please tick the appropriate option.**

I. Sex

1. Female [ ] 2. Male [ ]

## II. Age

1. 15-19 [ ] 2. 20-24 [ ] 3. 25-29 [ ] 4. 30-34 [ ] 5. 35-39 [ ] 6. 40-44 [ ] 7. 45-49 [ ] 8. 50 and above [ ]

## III. Level of education

1. No education [ ] 2. Primary [ ] 3. Secondary [ ] 4. Tertiary [ ]  
5. Others (specify).....

## IV. Marital status

1. Single [ ] 2. Married [ ] 3. Divorced [ ] 4. Widowed [ ]

## V. Number of children

1. 1-3 [ ] 2. 4-6 [ ] 3. 7 and above [ ]

## VI. Occupation.....

## VII. Place of residence.....

**Section B****Objective 1: Knowledge of Parents/Caregivers about the RTS,S Malaria Vaccine.**

We are going to talk about the knowledge you have about the RTS,S malaria vaccine.

**Potential questions:**

- a. Have you heard of the RTS,S Malaria vaccine?
- b. Tell me what you know about the vaccination schedule for the RTS,S Malaria vaccine.
- c. What do you think are the uses of the RTS,S Malaria vaccine based on what you have heard?
- d. From your view, what do you think the RTS,S Malaria vaccine will do to the health of your child?



### Section C

#### **Objective 2: Perception of Parents/Caregivers about the RTS,S Malaria Vaccine.**

We are going to talk about the perception you have about the RTS,S malaria vaccine.

##### **Potential questions:**

- a. Tell me what you think about the addition of RTS,S malaria vaccine to the already existing malaria preventive measures.
- b. What is your view about your child taking RTS,S Malaria vaccine as a childhood vaccine?
- c. Tell me how you see or perceive the RTS,S malaria vaccine.

### Section D

#### **Objective 3: Parent/Caregivers' reasons for the delay in acceptance of the RTS,S Malaria vaccine for their children.**

Now we are going to talk about why you delayed accepting the RTS,S malaria vaccine for your child

##### **Potential questions**

- a. Do you acknowledge that your child's RTS,S malaria vaccination delayed?
- b. Did you intentionally delay your child's RTS,S malaria vaccination?
- c. What are your reasons for delaying accepting the RTS,S malaria vaccine for your child?

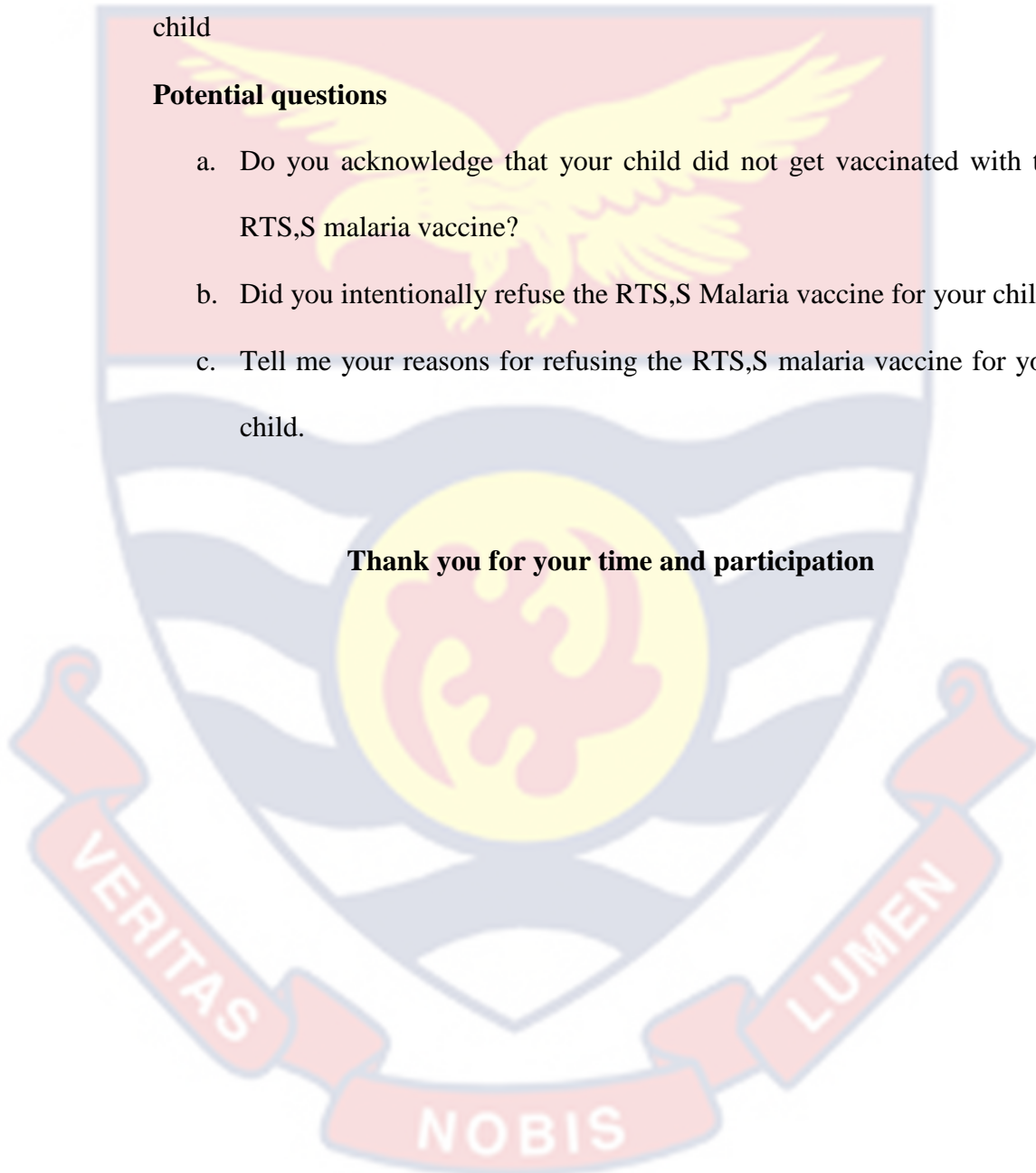
**Section E****Objective 4: Parent/Caregivers' reasons for refusing the RTS,S Malaria vaccine for their children**

We are going to discuss why you refused the RTS,S malaria vaccine for your child

**Potential questions**

- a. Do you acknowledge that your child did not get vaccinated with the RTS,S malaria vaccine?
- b. Did you intentionally refuse the RTS,S Malaria vaccine for your child?
- c. Tell me your reasons for refusing the RTS,S malaria vaccine for your child.

**Thank you for your time and participation**



**Appendix B: Ethical Clearance Approval Letter**

## UNIVERSITY OF CAPE COAST

## INSTITUTIONAL REVIEW BOARD SECRETARIAT

TEL: 0558093143 / 0508878309  
E-MAIL: [irb@ucc.edu.gh](mailto:irb@ucc.edu.gh)  
OUR REF: UCC/IRB/A/2016/1147  
YOUR REF:  
OMB NO: 0990-0279  
IORG #: IORG0009096

9<sup>TH</sup> NOVEMBER 2021

Ms. Violet Ahenkorah  
Department of Population and Health  
University of Cape Coast

Dear Ms. Ahenkorah,

**ETHICAL CLEARANCE – ID (UCCIRB/CHLS/2021/58)**

The University of Cape Coast Institutional Review Board (UCCIRB) has granted Provisional Approval for the implementation of your research titled **Exploring RTS,S Malaria Vaccine Hesitancy among Parents/Caregivers in the Cape Coast Metropolis**. This approval is valid from 9<sup>th</sup> November 2021 to 8<sup>th</sup> November, 2022. You may apply for a renewal subject to submission of all the required documents that will be prescribed by the UCCIRB.

Please note that any modification to the project must be submitted to the UCCIRB for review and approval before its implementation. You are required to submit periodic review of the protocol to the Board and a final full review to the UCCIRB on completion of the research. The UCCIRB may observe or cause to be observed procedures and records of the research during and after implementation.

You are also required to report all serious adverse events related to this study to the UCCIRB within seven days verbally and fourteen days in writing.

Always quote the protocol identification number in all future correspondence with us in relation to this protocol.

Yours faithfully,

A handwritten signature in blue ink, appearing to read 'Samuel Asiedu Owusu'.

Samuel Asiedu Owusu, PhD  
**UCCIRB Administrator**

ADMINISTRATOR  
INSTITUTIONAL REVIEW BOARD  
UNIVERSITY OF CAPE COAST

## Appendix C: Introductory Letters

## UNIVERSITY OF CAPE COAST

COLLEGE OF HUMANITIES AND LEGAL STUDIES

FACULTY OF SOCIAL SCIENCES

## DEPARTMENT OF POPULATION AND HEALTH

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Fax: 233-34072, UCC, GH  
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Email: pop.health@ucc.edu.gh



UNIVERSITY POST OFFICE  
CAPE COAST, GHANA

Our Ref: DPH /I.8/ V.2/85

15<sup>th</sup> September 2021

The Officer-In-Charge,  
Adisadel Urban Health Centre  
Cape Coast

Dear Sir/Madam,

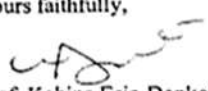
**LETTER OF INTRODUCTION**

Violet Ahenkorah is an MPhil student of the Department of Population and Health, Faculty of Social Sciences, College of Humanities and Legal Studies, University of Cape Coast. Her research topic is titled: **Exploring RTS,S Malaria Vaccine Hesitancy among Parents/ Caregivers in the Cape Coast Metropolis**

She needs information/data from your outfit to enable her conduct the research. We would be very grateful if you could give her your maximum co-operation and do not hesitate to contact me if necessary.

Thank you.

Yours faithfully,

  
Prof. Kobina Esia-Donkoh  
**HEAD**

# UNIVERSITY OF CAPE COAST

COLLEGE OF HUMANITIES AND LEGAL STUDIES

FACULTY OF SOCIAL SCIENCES

## DEPARTMENT OF POPULATION AND HEALTH

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UNIVERSITY POST OFFICE  
CAPE COAST, GHANA

Our Ref: DPH /I.8/ V.2/85

15<sup>th</sup> September 2021

The Officer-In-Charge,  
Cape Coast Metropolitan Hospital  
Cape Coast

Dear Sir/Madam,

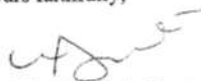
### LETTER OF INTRODUCTION

Violet Ahenkorah is an MPhil student of the Department of Population and Health, Faculty of Social Sciences, College of Humanities and Legal Studies, University of Cape Coast. Her research topic is titled: **Exploring RTS,S Malaria Vaccine Hesitancy among Parents/ Caregivers in the Cape Coast Metropolis**

She needs information/data from your outfit to enable her conduct the research. We would be very grateful if you could give her your maximum co-operation and do not hesitate to contact me if necessary.

Thank you.

Yours faithfully,

  
Prof. Kobina Esia-Donkoh  
HEAD

# UNIVERSITY OF CAPE COAST

COLLEGE OF HUMANITIES AND LEGAL STUDIES

FACULTY OF SOCIAL SCIENCES

## DEPARTMENT OF POPULATION AND HEALTH

Telephone: 03321-32440/4 & 32480/3  
Direct: 03321 - 30416  
054 738 0265  
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Email: [pop.health@ucc.edu.gh](mailto:pop.health@ucc.edu.gh)



UNIVERSITY POST OFFICE  
CAPE COAST, GHANA

Our Ref: DPH /I.8/ V.2/85

15<sup>th</sup> September 2021

The Officer-In-Charge,  
Ewim Polyclinic  
Cape Coast

Dear Sir/Madam,


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A handwritten signature in black ink, appearing to read 'K. Esia-Donkoh'.

Prof. Kobina Esia-Donkoh  
HEAD

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Cape Coast Metropolitan Health Directorate  
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