ENSIGN GLOBAL UNIVERSITY

KPONG, EASTERN REGION, GHANA

DEPARTMENT OF COMMUNITY HEALTH

FACTORS INFLUENCING CHILDHOOD IMMUNIZATION AMONG INFANTS IN THE ASUOGYAMAN DISTRICT IN THE EASTERN REGION OF GHANA

BY:

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APRIL, 2025

DECLARATION

I hereby declare that this submission is my work for the master's degree in public health and that, to the best of my knowledge, it does not contain any material previously published by any person or material accepted for the granting of any other degree from this college, except where proper attribution has been indicated in the text.

Grace Selase Etsra

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DEDICATION

To God Almighty for His endless grace, to my family for their unwavering love and support, and to my director, Madam Rebecca Bantey, for her invaluable guidance and encouragement.

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I am deeply grateful to God Almighty for His abundant grace and strength throughout this journey. My heartfelt thanks go to my family for their endless support, encouragement, and prayers. I would also like to sincerely thank my supervisor, Dr. Sandra Boatemaa Kushitor, for her exceptional guidance, patience, and mentorship, which have been instrumental in the completion of this work.

ABBREVIATIONS / ACRONYMS

BCG	Bacillus Calmette-Guerin
OPV	Oral Polio Vaccine
DPT	Diphtheria Pertussis Tetanus
MCV	Measles Containing Vaccine
EPI	Expanded Program on Immunization
CHPS	Community-Based Health Planning and Services
GHS	Ghana Health Service
GAVI	Global Alliance for Vaccine and Immunization
WHO	World Health Organization
GDHS	Ghana Demographic Health Survey
HBM	Health Belief Model

ABSTRACT

Background: Immunization is a crucial public health intervention that significantly reduces morbidity and mortality from vaccine-preventable diseases among children less than one year of age. Despite progress in immunization coverage globally, disparities persist, particularly in low- and middle-income countries. In Ghana, the national immunization program has made notable strides; however, challenges remain in achieving universal coverage, especially in rural areas such as the Asuogyaman District.

Objective: This study sought to determine the factors influencing childhood immunization among infants in the Asuogyaman District, Eastern Region of Ghana.

Methods: A cross-sectional analytical study design was employed, targeting mothers and caregivers of children less than one year old residing in the Anum Boso Sub-District. The study used random sampling to select 307 participants. Data was collected through structured questionnaires which was administered using the Kobo Collect tool and analysed with the STATA 18.0.

Results: Mothers demonstrated high (95.2%) knowledge of immunization schedules correctly, identifying one dose required for BCG vaccination and associating immunization with protection against polio and child growth. Awareness of measles vaccination aligned well with WHO guidelines, and the majority (94.6%) affirmed that missing vaccines could lead to disease outbreaks. Knowledge was particularly strong for vaccines administered at birth, such as BCG and OPV, reflecting trends seen in previous studies. Most participants accurately identified that three doses of the Pentavalent vaccine are necessary, with clear framing of terminology improving understanding. Regarding post-vaccination effects, fever was the most commonly recognized side effect, followed by rash, vomiting, and cough. Moreover, 77.3% of mothers knew polio vaccination typically starts at birth, supporting findings from other international

studies. Overall, 32.5% of participants cited inconvenient immunization days while 28.3% reported long waiting times at clinics as some of the barriers to immunization uptake.

Conclusion: By understanding the barriers to immunization uptake, this study provides valuable insights that could help reduce the percentage of incomplete immunization in the Asuogyaman District, ultimately contributing to better health outcomes for children in the region.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

1.0 INTRODUCTION

1.0 Background

Immunization remains one of the most successful and cost-effective public health interventions globally, playing a vital role in reducing morbidity and mortality from vaccine-preventable diseases (WHO, 2022). According to the World Health Organization (WHO), immunization coverage has steadily improved over the past few decades, contributing significantly to the decline of several infectious diseases, including polio, measles, and tetanus. However, despite these advances, there remains significant issue in coverage, particularly in low- and middle-income countries (Kundu *et al.*, 2023). Basic immunizations are estimated to avert two million, five hundred thousand annual child deaths globally from diphtheria, tetanus, pertussis, and measles (Kuuyi and Kogi, 2024). Currently, more children are getting vaccinated at the appropriate time, but approximately 20 million children across the globe are still not receiving vaccinations, leaving them vulnerable to severe illnesses, fatalities, handicaps, and poor health (Kuuyi and Kogi, 2024)

As indicated in WHO 2023 global immunization reports, global immunization coverage for infants, specifically for the first dose of the diphtheria-tetanus-pertussis (DTP1) vaccine, is approximately 90% coverage. This level of coverage indicates that the vast majority (90%) of infants worldwide receive at least the initial dose of the vaccine. However, the coverage for the third dose of the DTP vaccine (DTP3) drops to 81%, revealing that many children do not complete the full series of vaccinations (WHO, 2023).

In terms of other vaccines, the global coverage for the measles-containing vaccine first dose (MCV1) stands at 84%, while the coverage for the second dose (MCV2) is around 71%. This gap between the first and second doses highlights challenges in ensuring that children receive all

necessary vaccines on schedule (WHO, 2023). The WHO has set a target of achieving at least 95% coverage for two doses of the measles vaccine to prevent outbreaks and maintain herd immunity (WHO, 2023).

The World Health Organization (WHO) reports that while progress has been made in recent years, many countries in Africa still struggle to achieve the immunization coverage necessary to prevent outbreaks of vaccine-preventable diseases., particularly in rural and underserved areas (Galadima *et al.,* 2021). This is because many African countries struggle with limited healthcare infrastructure, including insufficient medical facilities, equipment, and trained health personnel. In rural areas especially, another rationale behind the low coverage is poor access to services, vaccination centers may also be far away, and transportation can be difficult or costly. In some cases, people may need to travel long distances to access immunization services(Kuuyi and Kogi, 2024). And the last but not the least plausible reason for the low immunization coverage is that in many countries in Africa, inadequate government funding for healthcare, coupled with economic challenges, limits the ability to procure, store, and distribute vaccines. External donors, such as GAVI (the Global Alliance for Vaccines and Immunization), often play a significant role in funding, but in some cases, there's a lack of sustainable financing (Kashinka, 2017).

As of the most recent data from the WHO, the national coverage for the third dose of the diphtheria-tetanus-pertussis (DTP3) vaccine in Ghana is approximately 90%. This level of coverage is relatively high compared to other countries in the African region and aligns with the WHO's target for maintaining herd immunity against these diseases (WHO, 2023). The consistently high coverage of DTP3 is indicative of the strength and reach of the immunization program in Ghana, particularly in urban and peri-urban areas where healthcare access is better (Walana *et al.*, 2024).

However, despite the overall success, disparities in coverage exist within the country. Rural areas, particularly those in the northern regions and other remote parts of Ghana, often report lower coverage rates. These disparities are due to several factors, including limited access to healthcare facilities, shortages of healthcare workers, and logistical challenges in vaccine delivery (Anokye *et al.,* 2018). The WHO emphasizes that while national coverage statistics are important, understanding and addressing regional disparities is crucial for improving overall immunization outcomes (WHO, 2023).

In Ghana, Expanded Program On immunization for children is carried out as Routine Immunization or National Immunization Days services. Routine immunization is when the children are vaccinated per a fixed schedule at the health facility or at the community level. National Immunization Days is where days are declared to conduct immunization campaigns to provide supplementary doses of vaccines to the children.

Annual reports of the Asuogyaman District Health Directorate showed that the district has been facing consistent drop in their immunization coverages. Using OPV3 which is a proxy of measuring immunization coverage, Asuogyaman district recorded 82.9% in 2021, 76.2% in 2022, and 64.4 in 2023. Measles Rubella 1 which is given at nine months has also be reducing from 78% in 2021, 76% in 2022 to 68% in 2023. Almost all the antigens are showing the same trend (Asuogyaman District Health Directorate, 2023). This study focuses on identifying the factors influencing childhood immunization uptake in the district to inform policy and improve immunization coverage

1.2 Problem Statement

Childhood immunization is a critical component of public health strategies aimed at reducing the burden of vaccine-preventable diseases among children less than one year of age. Despite the proven efficacy of vaccines in preventing illnesses such as measles, polio, diphtheria, and pertussis, immunization coverage remains suboptimal in many regions, particularly in low- and middle-income countries. This situation poses significant risks to both individual and public health, as low immunization rates can lead to the resurgence of diseases that were previously under control or even eliminated. One global conquer that seems to hinder an optimal immunisation coverage is the presence of Anti-Vaxxers. An anti-vaxxer is someone who rejects vaccines due to misinformation, fear, or mistrust, potentially contributing to reduced vaccine uptake and increased public health risks. When individuals or communities refuse vaccination, it can lead to outbreaks of vaccine-preventable diseases and reduced herd immunity, which in turn can put vulnerable populations in danger (Tafuri et al.,2014). In Ghana, while the national immunization program has made considerable progress, challenges persist in achieving universal coverage, particularly among certain populations (Danso *et al.*, 2023). This situation exposes unimmunised children to the risk of getting vaccine preventable diseases that can even lead to death.

Annual reports of the Asuogyaman District Health Directorate showed that OPV3 which is a proxy of measuring immunization coverage was 82.9% in 2021, 76.2% in 2022, and 64.4 in 2023 remaining a consistent reduction over the years (Asuogyaman District Health Directorate, 2023). It is, therefore, necessary for efforts to be deployed towards addressing factors influencing childhood immunization uptake among mothers of children less than one (1) in the Asuogyaman District in the Eastern Region of Ghana

1.3 The rationale of the study

Childhood immunization represents one of modern public health's most successful interventions, having dramatically reduced global morbidity and mortality from vaccine-preventable diseases (WHO, 2022). Despite significant progress in immunization coverage worldwide, substantial disparities persist across low- and middle-income countries, with Ghana experiencing particular challenges in achieving equitable vaccine distribution (Kuuyi & Kogi, 2024). While Ghana's Expanded Programme on Immunization (EPI), initiated in 1978, has made considerable strides in combating vaccine-preventable illnesses through both routine immunization and national campaigns (Walana et al., 2024), concerning regional disparities continue to undermine these achievements, especially in rural districts such as Asuogyaman.

Recent epidemiological data from the Asuogyaman District Health Directorate (2023) paints a troubling picture of deteriorating immunization coverage. The district has witnessed a precipitous decline in OPV3 coverage - a crucial benchmark for immunization program effectiveness - from 82.9% in 2021 to just 64.4% in 2023. This downward trajectory mirrors similar reductions in Measles-Rubella 1 coverage, which fell from 78% to 68% during the same period. These statistics are especially alarming as they fall significantly short of Ghana's national coverage target of 95% (Kuuyi & Kogi, 2024), thereby elevating the risk of disease outbreaks among vulnerable pediatric populations and potentially reversing hard-won public health gains.

Vaccine-preventable diseases (VPDs) like measles and polio remain major threats to child health in Ghana, especially in underserved areas like Asuogyaman where immunization gaps persist. Declining vaccination rates risk outbreaks, preventable deaths, and long-term disabilities (Kuuyi

& Kogi, 2024). This study addresses these risks by identifying barriers to immunization to improve coverage and protect children.

1.4 Conceptual Framework

This study adopts the Health Belief Model (HBM) as its theoretical framework to examine the factors influencing childhood immunization uptake among mothers of children under one year in the Asuogyaman District of the Eastern Region of Ghana. The HBM provides a structured approach to understanding how individual perceptions of health risks, benefits, and barriers impact health behaviour decisions, particularly in the context of preventive healthcare practices like immunization.

Perceived Susceptibility and Severity

The model posits that individuals are more likely to engage in health-promoting behaviours when they believe they are at risk of contracting a disease and perceive that the disease could have serious consequences. In the context of childhood immunization, mothers' awareness of the risks associated with vaccine-preventable diseases, such as measles or polio, and their understanding of the potential severity of these illnesses can significantly influence their decision to vaccinate their children. Research indicates that when caregivers have a heightened sense of vulnerability regarding their child's health, they are more likely to pursue immunization services (Budu, 2020; Danso *et al.*, 2023).

Perceived Benefits and Barriers

According to the HBM, individuals weigh the perceived benefits of a health action against the perceived barriers to that action. In this study, the perceived benefits of immunization include the prevention of serious diseases and long-term health security for children. Conversely, barriers may include logistical challenges, such as distance to healthcare facilities, costs associated with

accessing immunization services, and cultural beliefs that may discourage vaccination. Studies show that socio-economic factors, including a mother's income and education level, can significantly impact these perceptions and the likelihood of immunization uptake (Budu, 2020; Danso *et al.*, 2023).

Cues to Action

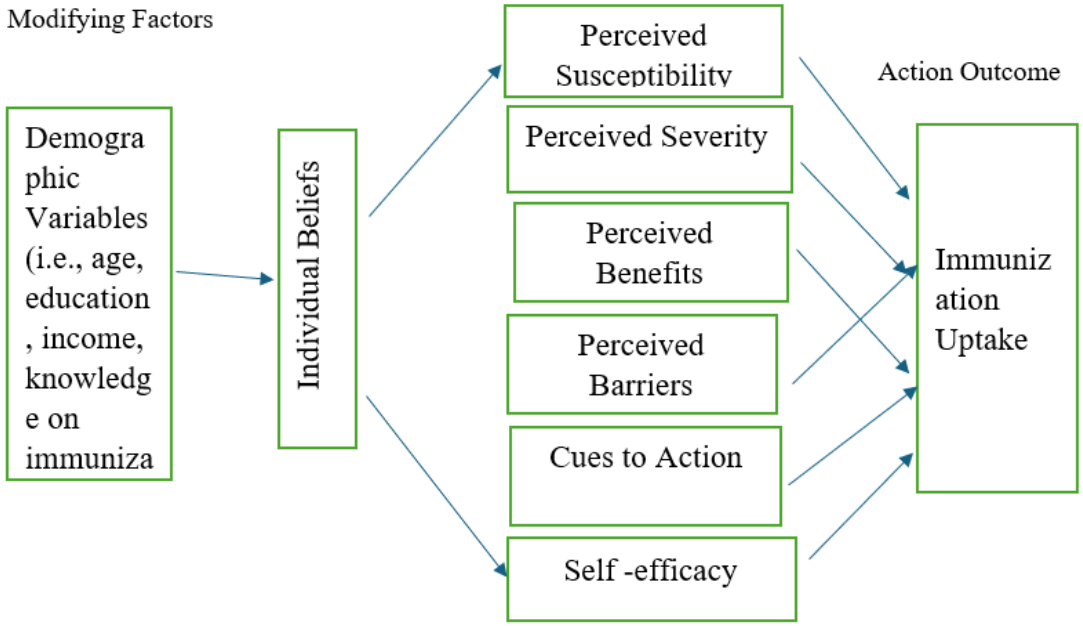
The HBM emphasizes the importance of cues to action—factors that trigger the decision-making process regarding health behaviours. In the context of immunization, these cues may include reminders from healthcare providers, public health campaigns, or community health worker outreach efforts. Positive interactions with healthcare personnel and trust in the healthcare system can serve as important motivators for mothers to seek vaccinations for their children. The availability and approachability of healthcare services also play a crucial role in prompting caregivers to act (Danso *et al.*, 2023).

Self-Efficacy

Finally, self-efficacy, or the confidence individuals have in their ability to perform a specific behaviour, is a critical component of the HBM. For mothers in the Asuogyaman District, factors such as education, knowledge about immunization schedules, and past experiences with healthcare services can influence their self-efficacy. Research indicates that when mothers feel empowered and knowledgeable about the immunization process, they are more likely to ensure their children receive timely vaccinations (Budu, 2020; Danso *et al.*, 2023; Walana *et al.*, 2024).

The Health Belief Model provides a comprehensive framework for understanding the complex interplay of factors that influence childhood immunization uptake among mothers in the Asuogyaman District. By exploring how perceived risks, benefits, barriers, cues to action, and self-

efficacy shape maternal health behaviours, this study aims to identify actionable insights that can enhance immunization coverage and promote better health outcomes for children in this region.



Hobani etal., 2022. Factors related to parents' adherence to childhood immunization.

Figure 1: A conceptual framework of the factors influencing childhood immunization uptake among children less than one year in the Asuogyaman District.

1.5 Research Questions

1. What is the level of knowledge and awareness among mothers regarding childhood immunization in the Asuogyaman District?
2. What is the level of immunization uptake among children less than one (1) in the Asuogyaman District?

3. What factors affect the uptake of childhood immunization among children less than one (1) in the district?

1.6 General Objective

To determine the factors influencing childhood immunization uptake among children less than (1) year in the Asuogyaman District.

1.7 Specific Objectives

1. To evaluate mothers' knowledge and awareness levels about the importance and schedule of childhood immunization in the Asuogyaman District.
2. To determine the level of immunization uptake of children less than one (1) in the Asuogyaman District
3. To analyse the factors that influence childhood immunization uptake among children less than one (1) in the Asuogyaman district.

1.8 Profile of study area

The Asuogyaman District, located in the Eastern Region of Ghana, is one of the 33 administrative districts in the region. Covering an area of 1,507 square kilometres, it represents 5.7% of the region's total land area and ranks as the 10th largest district. The district has a population of 105,532 which is demarcated into six (6) sub-districts and forty-two (42) Community-based Health Planning and Services (CHPS) zones with about 145 communities.

(Asuogyaman District Health Directorate, 2023).

Atimpoku is the capital town of Asuogyaman district. The district is bordered to the north by Kwahu North, to the south by North Tongu, to the west by Lower Manya Krobo, and to the east by South Dayi Districts.

The Asuogyaman District is divided into six sub-districts for healthcare management and service provision. The district's health system is supported by 32 health facilities that serve both urban and rural communities. These include district hospitals, health centres, CHPS compounds, and private clinics. Among these, the health centres and several CHPS compounds focus extensively on providing maternal and child health services, including childhood immunization. These facilities cater to the vaccination needs of children under five years as well as pregnant women, contributing to the district's immunization coverage.

Vaccines are received from the Eastern Regional Health Directorate and are subsequently distributed to the sub-districts for further dissemination. Health facilities within each sub-district collect vaccines and administer them according to scheduled dates. Childhood immunization in the district follows the national immunization schedule, with vaccines such as Bacillus Calmette-Guerin (BCG), Oral Polio Vaccine (OPV), Pentavalent, and Measles-Rubella offered to children at different stages of their early life.

Outreach programs are a critical component of the immunization process, especially for communities located far from healthcare facilities. Community health workers frequently visit these areas to ensure that no child is left behind in receiving essential vaccines. Immunization days, often called Child Welfare Clinics, are held at regular intervals in various parts of the district, where mothers and caregivers bring their children for vaccination, growth monitoring, and other essential health services.

The Asuogyaman district's health indicators reveal challenges that affect maternal and child health. Immunization uptake in some rural areas can be lower due to transportation difficulties, limited healthcare personnel, and cultural beliefs. The district has a relatively high fertility rate, and childhood

diseases such as malaria, diarrhoea, and respiratory infections remain prevalent. As such, improving access to immunization services is a priority for reducing child mortality rates.

Efforts are ongoing to enhance the capacity of health facilities and increase immunization coverage through targeted education, community mobilization, and improved logistical support for vaccine distribution. The district also faces socioeconomic challenges, such as poverty and low literacy rates, which influence healthcare-seeking behaviours.

Figure. 2. Map of Asuogyaman District showing Anum Boso sub-district with some of its communities

CHAPTER 2

2.0 LITERATURE REVIEW

2.1 Introduction

Childhood immunization is a cornerstone of public health, significantly reducing morbidity and mortality associated with vaccine-preventable diseases. Globally, immunization programs have led to substantial declines in diseases such as polio, measles, and diphtheria (World Health Organization, 2022). However, despite significant progress, challenges remain in achieving universal immunization coverage, particularly in rural and underserved areas. This section reviews relevant literature based on the specific objectives of the study: assessing mothers' knowledge and awareness of immunization, determining the level of immunization uptake, and identifying the factors influencing childhood immunization in the Asuogyaman District. Childhood immunization has transformed global health, preventing 2-3 million deaths annually from vaccine-preventable diseases (WHO, 2022). EPI, launched in 1978, follows WHO-recommended schedules providing BCG, polio, pentavalent, and measles vaccines. Despite progress, 20 million children worldwide remain unvaccinated (Kuuyi & Kogi, 2024), with rural areas like Asuogyaman experiencing coverage gaps due to access barriers and health system challenges.

2.1.2 Vaccine schedule and intake

The Ghana Expanded Programme on Immunization (EPI) follows a structured schedule to ensure children under five receive timely protection against vaccine-preventable diseases. Immunization begins at birth with the administration of the Bacillus Calmette-Guérin (BCG) vaccine, which protects against tuberculosis, and the first dose of the Oral Polio Vaccine (OPV0), which safeguards against poliomyelitis. These initial vaccinations are critical for establishing early immunity. At six weeks of age, infants receive the first dose of the pentavalent vaccine, which

combines protection against diphtheria, tetanus, pertussis, hepatitis B, and Haemophilus influenzae type b (Hib). Alongside the pentavalent vaccine, the first doses of the Rotavirus vaccine (Rota1) and the Pneumococcal Conjugate Vaccine (PCV1) are administered to prevent rotavirus gastroenteritis and pneumococcal diseases, respectively. Additionally, the second dose of the Oral Polio Vaccine (OPV1) is given at this stage.

The immunization schedule continues at ten weeks with the second dose of the pentavalent vaccine (Penta2), the Rotavirus vaccine (Rota2), and the Pneumococcal Conjugate Vaccine (PCV2). The third dose of the Oral Polio Vaccine (OPV2) is also administered at this time. By fourteen weeks, infants receive the third dose of the pentavalent vaccine (Penta3), the Pneumococcal Conjugate Vaccine (PCV3), and the Inactivated Polio Vaccine (IPV), which provides further protection against poliomyelitis. The measles-rubella vaccine (MR1) is introduced at nine months to protect against measles and rubella, followed by the yellow fever vaccine at the same age to prevent yellow fever.

This carefully sequenced schedule ensures that children develop robust immunity against these diseases during their most vulnerable early years. The timing of each vaccine is designed to maximize effectiveness while minimizing the risk of adverse effects. For instance, the measles-rubella vaccine is administered at nine months because maternal antibodies may interfere with earlier vaccination, reducing its efficacy. Similarly, the yellow fever vaccine is given at nine months to align with the maturation of the infant's immune system.

The Ghana Health Service emphasizes the importance of adhering to this schedule to maintain high immunization coverage and prevent outbreaks of vaccine-preventable diseases. Community health workers and outreach programs play a vital role in educating caregivers about the timing and necessity of each vaccine, addressing misconceptions, and ensuring compliance. By following

this schedule, Ghana aims to achieve the World Health Organization's target of 95% immunization coverage, thereby reducing child mortality and improving public health outcomes.

2.2 Mothers' Knowledge and Awareness of Childhood Immunization

Globally, maternal knowledge and awareness are key determinants of childhood immunization. Studies indicate that in high-income countries, structured educational programs have significantly improved immunization rates (World Health Organization, 2023). However, in low- and middle-income countries, limited health literacy and misinformation contribute to vaccine hesitancy. A study in Brazil found that 30% of mothers lacked knowledge about their child's immunization schedule, leading to incomplete vaccinations(Santos *et al.*, 2023)

In sub-Saharan Africa, maternal educational levels contribute to varying immunization rates. A study in Nigeria found that mothers with tertiary education were 40% more likely to fully immunize their children than those without formal education (Kashinka, 2023). In Ethiopia, targeted community-based health interventions have successfully improved maternal awareness and vaccine adherence (Tafuri et al., 2023).

In Ghana, national programs such as the Expanded Programme on Immunization (EPI) have increased awareness, but knowledge gaps persist. Research in the Northern Region found that 28% of mothers did not know the full immunization schedule (Danso et al., 2023). Mass media and health worker interventions have been recommended to bridge these gaps (Santos *et al.*, 2023).

Current literature highlights the effectiveness of integrating immunization education with maternal health services. A study in South Africa demonstrated that antenatal clinics providing immunization counseling saw a 15% increase in vaccine uptake (Walana et al., 2024). These findings emphasize the need for continuous maternal education to sustain immunization gains.

2.3 Immunization Uptake Among Children Less Than One Year

Globally, immunization uptake rates vary widely. The World Health Organization (2023) reports that while global immunization coverage for the DTP3 vaccine stands at 81%, significant disparities exist between high- and low-income countries. In Europe, coverage exceeds 90%, whereas in parts of Africa and South Asia, it is below 75%. (WHO, 2023).

Sub-Saharan Africa continues to experience lower immunization rates due to systemic challenges. In Nigeria, immunization uptake is hampered by poor healthcare access and cultural beliefs, with coverage for some vaccines as low as 65% (Galadima et al., 2023). Ethiopia and Kenya have implemented mobile vaccination programs to address these gaps, improving coverage rates in rural areas (Anokye et al., 2023).

In Ghana, immunization uptake is relatively high compared to other West African nations but remains below the national target of 95%. A study in the Ashanti Region found that 22% of mothers missed scheduled vaccinations due to transportation challenges (Kashinka, 2023). Innovative approaches, such as community health outreach and digital reminders, have been recommended.

To sustain immunization coverage, global best practices suggest strengthening healthcare infrastructure and adopting community-led interventions. In South Africa, incentive immunization programs have resulted in a 12% increase in vaccine uptake (Kuuyi & Kogi, 2024). Such strategies could be adapted for Ghana's immunization efforts.

2.4 Factors Influencing Childhood Immunization Uptake

2.4.1 Socio-Economic Factors

Globally, socioeconomic disparities significantly influence childhood immunization uptake. In low-income countries, immunization coverage is often lower due to financial constraints and a lack of healthcare infrastructure (World Health Organization, 2023). A study in India found that children from the wealthiest households were twice as likely to be fully immunized compared to those from the poorest (Santos et al., 2023).

In sub-Saharan Africa, financial and occupational barriers impact immunization rates. A study in Kenya found that salary earners were less likely to adhere to immunization schedules due to work commitments (Anokye et al., 2023). In Ethiopia, conditional cash transfers have effectively improved vaccine coverage among low-income households (Tafuri et al., 2023).

In Ghana, household income and maternal employment status are crucial in immunization uptake. Research in the Eastern Region found that unemployed mothers were 25% less likely to fully immunize their children compared to employed mothers (Walana et al., 2024). Addressing financial constraints through subsidized healthcare and targeted interventions remains essential.

2.4.2 Healthcare Accessibility

Healthcare accessibility remains a critical determinant of immunization uptake. Globally, regions with strong healthcare systems report higher vaccine adherence (World Health Organization, 2023). In Europe, widespread access to immunization centers has resulted in over 95% vaccine coverage (Kuuyi & Kogi, 2024).

In sub-Saharan Africa, geographical barriers limit healthcare access. Studies in Uganda and Tanzania have shown that children living more than 10 kilometers from a health facility are

significantly less likely to complete immunization schedules (Galadima et al., 2023). Ghana faces similar challenges, particularly in remote communities.

A study in the Northern Region of Ghana found that 30% of caregivers cited distance to health facilities as a barrier to immunization (Kashinka, 2023). Mobile vaccination clinics and community outreach programs have been suggested as potential solutions to bridge these gaps.

2.4.3 Cultural and Religious Beliefs

Cultural and religious beliefs significantly shape immunization behavior. Globally, vaccine hesitancy is influenced by misinformation, doctrines, and traditional beliefs (World Health Organization, 2023). In parts of Pakistan and Afghanistan, religious opposition has led to lower immunization rates (Santos et al., 2023).

In sub-Saharan Africa, traditional medicine and religious teachings sometimes discourage vaccine use. Studies in Nigeria and Ethiopia found that 20-30% of parents delayed immunization due to cultural beliefs (Tafuri et al., 2023). Ghana has reported similar trends, particularly in rural areas.

Research in the Ashanti Region found that religious misconceptions contributed to vaccine hesitancy among 18% of mothers (Danso et al., 2023). Public health campaigns engaging religious and traditional leaders have been recommended as effective interventions.

2.7 Conclusion

In conclusion, while global and national efforts have significantly improved childhood immunization coverage, critical gaps remain, particularly in low-resource settings like the Asuogyaman District. Maternal knowledge, healthcare accessibility, socio-economic status, and

cultural beliefs are key determinants influencing immunization uptake. Strengthening health education, improving access to healthcare services, and addressing financial and cultural barriers are vital for achieving universal immunization coverage. Evidence from global best practices highlights the importance of integrating immunization services with maternal care, community outreach, and strategic stakeholder engagement. Sustained, targeted interventions are essential to close the remaining gaps and protect children from vaccine-preventable diseases.

CHAPTER 3

3.0 METHODOLOGY

3.1 Study Design

The research was an analytical cross-sectional survey that aimed to examine the variables that affect the rate at which mothers in the Asuogyaman District, Eastern Region of Ghana, vaccinate their children under age one. This study design was suitable for collecting quantitative data to examine correlations between factors such as socio-economic status, vaccine knowledge, and healthcare accessibility.

3.2 Study Sites

The study was conducted in Boso, a community under Anum Boso sub-district which is one of the sub-districts in the Asuogyaman District, located in the Eastern Region of Ghana. Anum Boso is made up of both urban and rural settings, providing a comprehensive context for examining healthcare access and vaccine uptake, particularly in relation to maternal and child health services. The sub-district's diverse geography and population dynamics make it an ideal location for this study.

According to the 2021 Ghana Housing Census, Anum Boso sub-district has an estimated population of 23,023 of which women of reproductive age (15–49 years) is 5,296. The sub-district is home to a significant number of children less than one year, which is crucial for understanding childhood immunization patterns.

Participants for the study were recruited from both urban and rural communities within the sub-district, ensuring a balanced representation of different demographic and socioeconomic groups. Specifically, recruitment targeted rural communities such as Labolabo Tornu, Nkwakwubew, and

Torsen where healthcare access challenges are more pronounced, as well as bigger areas like Anum, Boso, and Asikuma which are more developed and have better access to healthcare facilities. These communities were selected based on low immunization turn out among children, as obtained from the District Health Information Management System (DHIMS).

Economically, the sub-district's inhabitants primarily engage in agriculture, fishing, and small-scale trading, with a significant portion of the population living below the poverty line. The major ethnic groups include the Akans, Ewes, and Krobos, with diverse cultural practices influencing health-seeking behaviours.

The choice of Anum Boso Sub-District for this study was informed by its varied healthcare access across urban and rural areas, which provided a unique opportunity to examine factors affecting immunization uptake in both settings. The presence of underutilized healthcare services, despite the availability of facilities, highlights the need for research to uncover the barriers to vaccine acceptance and usage.

3.3 Study Population

The study population was made up of caregivers. These children were selected from the 921 children born to 921 caregivers in the Anum Boso District. The sub-district has an estimated population of 23023 using projections of the 2021 census. The 921 participants form 4% of the total population and represent children below one year, constituting the target population.

3.4 Inclusion Criteria

Mothers who had children under the age of one and reside in the Anum, Boso, Asikuma, Labolabo Tornu, Nkwakubew and Torsen.

3.5 Exclusion Criteria

The exclusion criteria are mothers who did not stay in the study area and mothers who were in the study area but had children more than one year.

3.6 Sample Size

Based on the total population of mothers of children less than one year in the district, the sample size was determined using the Yamane formula. A margin of error of 5% and a 95% confidence level guided this estimation.

Yamane Formula:

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

Where:

- n = Sample size
- N = Population size (921)
- e = Margin of error (usually 0.05 for a 95% confidence level)

Calculation:

Given:

- $N = 921$
- $e = 0.05$

Substituting these values into the formula:

$$n = \frac{921}{1 + 921(0.0025)} = 279$$

The calculated sample size for your study using the Yamane formula is approximately 279

This was adjusted for a non-response rate of 10% which is 28 was added so the final sample was 307.

3.7 Data Collection Methods and Instruments

For this study, data was collected using KoboCollect, a widely used mobile-based platform, leveraging a structured questionnaire designed to capture key information related to childhood immunization. The questionnaire was structured into four main sections, namely: Biodata of the Child, Demographic and Socio-Economic Information of Caregiver, Knowledge About Childhood Immunization, and Access to Immunization Services. Each section was tailored to collect data aligned with the study objectives and to explore the various factors that influence immunization uptake.

Section A: Biodata of the Child

This section gathered vital information on the child, including age, possession of a maternal health book, vaccines received, immunization status, and place of birth. These indicators were crucial for understanding the child's immunization trajectory and assessing the coverage of specific vaccines. For example, the inclusion of a comprehensive checklist of vaccines helped to identify which immunizations had been received, while the question on immunization status (fully immunized, partially immunized, or not immunized) provided insight into the extent of vaccine coverage. The place of birth (hospital, health center, CHPS compound, TBA, or home) provided valuable information on healthcare access points and their potential influence on vaccine uptake.

Section B: Demographic and Socio-Economic Information of Caregiver

This section seeks to understand the caregiver's demographic and socio-economic background, which was crucial for identifying possible determinants of vaccine uptake. Key variables include:

1. Age of mother in years which allowed for the analysis of age-related differences in healthcare-seeking behaviour.
2. Religious affiliation and ethnic group were included to explore cultural and religious influences on immunization practices.
3. Marital status and highest educational level were crucial for understanding the social support and knowledge levels that may influence vaccine decisions.
4. Employment status helped assess economic barriers which affected access to healthcare facilities.

Section C: Knowledge About Childhood Immunization

This section evaluated the caregiver's awareness and understanding of childhood immunization. Questions explored whether caregivers had heard about immunization, whether they believed that immunization protects children from diseases or promotes growth, and whether they are aware of the immunization schedule for children under one year. The section also addresses misconceptions, such as whether sick children should be immunized or if partial immunization offers full protection. By examining caregivers' beliefs, this section helped identify gaps in knowledge that could be addressed through health education and outreach programs.

In addition, questions on knowledge of risks associated with not immunizing and awareness of side effects provide insight into caregivers' perceptions of immunization safety and potential

barriers related to fears of adverse reactions. Understanding these perceptions is key to designing interventions that could mitigate vaccine hesitancy.

Section D: Access to Immunization Services

This section addressed logistical and systemic factors that may have affected access to immunization services. Questions focused on:

1. Where immunization services are accessed (government facility, private facility) to identify service utilization patterns.
2. Costs of immunization services and potential barriers at the health facility (attitudes of health workers, lack of vaccines, long waiting times) are also explored, as they directly impact service delivery and user satisfaction.
3. Finally, caregivers were asked about their satisfaction with the immunization services, using a Likert scale to rate their experience (very satisfied, satisfied, neutral, dissatisfied, very dissatisfied).

3.8 Outcome and Explanatory variables

Variable	**Explanatory variables**
Age of babby	Age of baby of caregiver
Sex of baby	Sex of baby of the caregiver
Immunization status	Immunization status of the baby
Age of mother	Age of mother/ caregiver
Religion	Religious status of caregiver
Mother's source of income	Sources of income of mother/caregiver
Number of BCG vaccine required	Caregiver's knowledge of number of vaccines required for the baby
Recommended age for first vaccine	Age at which baby starts vaccination
Common side effect after vaccination	Common side effects observed after baby's vaccination
Motivation for child immunization	What motivates caregiver to have the baby vaccinated
Diseases prevented by immunization	List of diseases prevented by immunization

3.9 Pre-testing

Prior to the research, the same data collecting tool that was used for the primary study did undergo a pre-test in Atimpoku as it has similar demographic characteristics to the study area. This was done to ensure clarity, relevance, and reliability of the questions to confirm the accuracy and consistency of the instrument. A subset of individuals who match the specified criteria for inclusion, but are not part of the primary research, were engaged in this preliminary testing phase. The collected data was analysed. Modifications were made to the format, wording, and duration of the questionnaire, as necessary.

3.10 Data Handling

All completed questionnaires were checked for completeness and accuracy through KoboCollect before exported in a Microsoft Excel csv file format for analysis. The original entries in KoboCollect served as the data source. Soft copies of the dataset and all related work were emailed to the investigator and backed up on an external drive. All completed questionnaires within the KoboCollect system were securely stored, and any paper-based records kept under lock and key.

3.11 Data Analysis

Stata version 18.0 was used to analyse data collected during the research. Descriptive statistics such as frequencies, percentages, and measures of central tendency (mean, median) were used to summarize data.

3.12 Dissemination of Results

The findings of the study were disseminated through presentations at district health directorates, academic conferences, and publications in peer-reviewed journals. Reports will also be shared with stakeholders such as the Ghana Health Service and local healthcare facilities.

3.13 Ethical Issues

Ethical approval for this study was obtained from the Ensign Global College Institutional Review Board with an ethics number ENSIGN/IRB/EL/SN-284/01. Permission to conduct the study in the health facilities obtained from the regional and municipal health directorates through a letter of introduction provided by the Ensign Global College. Informed consent was obtained from all participants before data collection. Participants were informed that their involvement in the study was entirely voluntary. Their right to withdraw at any time by choice was retained without any consequences. Anonymity and privacy were assured by giving the participants codes for identification instead of using their names. The purpose of the study was made known to the participant. Participants were assured that no one would have access to their information. Information provided by the participant are kept confidential and used for research purposes only.

CHAPTER 4

4.0 RESULTS

4.1 Introduction

The result of this study was presented based on the following objectives of the study: 1. Mothers' knowledge and awareness levels about the importance and schedule of childhood immunization in the Asuogyaman District. 2. The level of immunization uptake mothers of children less than one in the Asuogyaman District, 3. The factors that influence childhood immunization uptake among children less than one in the Asuogyaman district.

4.2 Socio-demographic characteristics of children

Table 4.1 shows the sociodemographic characteristics of children in the study. Among the 313 children included in the study, most respondents were aged 1 to 10 weeks with 131(41.9%), followed by 107(34.2%) aged 11 to 20 weeks, 42(13.4%) aged 31 to 40 weeks, 22(7.0%) who were 41 weeks and above, and the least were 21 to 30 weeks old at 11(3.5%). Females made up slightly more than half of the sample, with 164(52.4%), while males accounted for 149(47.6%). Most children had their maternal health books, recorded at 309(98.7%).

Table 4.1: Socio-demographic characteristics of children

Variable	Frequency (n=313)	Percentage (%)
Age of baby (weeks)		
0 to 10 weeks	131	41.9
11 to 20 weeks	107	34.2
21 to 30 weeks	11	3.5
31 to 40 weeks	42	13.4
41 weeks and above	22	7.0
Sex of Baby		

Female	164	52.4
Male	149	47.6
Maternal Health Book		
No	4	1.3
Yes	309	98.7

4.3 Socio-demographic characteristics of Mothers

Table 4.2 shows the socio-demographic characteristics of Mothers. About two-third of the mothers surveyed, most were aged 25 to 34 years, comprising 58.8%, followed by a quarter aged 35 and above (23.3%). In terms of religion, Christianity was predominant with 262(83.7%), followed by Islam with 49(15.7%) and Traditionalism with only 2(0.6%). The Ewe group was the largest ethnicity at 204(65.2%), followed by Akan 64(20.5%), and Ga-Dangme 31(9.9%). Regarding marital status, most mothers were married 191(61.0%), while 85(27.2%) were co-habiting, 33(10.5%) never married, and 4(1.3%) were separated. Educationally, most respondents had completed SHS 174(55.6%), followed by tertiary education 87(27.8%), JHS 44(14.1%), and primary education 8(2.6%). Employment status was fairly split with 160(51.1%) being unemployed and 153(48.9%) employed.

When asked about the consequences of children contracting preventable diseases, 173(55.3%) indicated the child would fall sick, 75(24.0%) believed the child could die, 64(20.5%) feared deformities, and 1(0.3%) cited other outcomes. An overwhelming majority 307(98.1%) agreed that immunization protects children, while only 6(1.9%) disagreed. Side effects of vaccines discouraged 117(37.4%) of mothers from vaccinating, but 196(62.6%) were not deterred. Most mothers 272(86.9%) received reminders once a month, followed by 22(7.0%) weekly, 12(3.8%) never received reminders, and 7(2.2%) rarely received any. Despite side effects, 275(87.9%) said

they would return for immunization, while 38(12.1%) said they would not. Factors that could enhance immunization completion included more information about vaccines 153(48.9%), better access to centers 110(35.1%), family support 36(11.5%), and financial assistance 14(4.5%). The majority (48.4%) had their sources from their business followed by 26.9% receiving theirs from their husbands.

Table 4.2: Socio-demographic characteristics of Mothers

Variable	Frequency (n=313)	Percentage (%)
Age of mothers (years)		
15 to 24 years	56	17.9
25 to 34 years	184	58.8
35 years and above	73	23.3
What is your religious affiliation		
Christian	262	83.7
Muslim	49	15.7
Traditionalist	2	0.6
Which ethnic group do you belong		
Akan	64	20.5
Dagomba	7	2.2
Ewe	204	65.2
Ga-Dangme	31	9.9
Others	7	2.2
What is your marital status		
Never married	33	10.5
Co-habiting	85	27.2
Married	191	61.0
Separated	4	1.3

What is your highest educational level		
Primary	8	2.5
JHS	44	14.1
SHS	174	55.6
Tertiary	87	27.8
Employment status		
Employed	153	48.9
Unemployed	160	51.1
What will be the consequences if your child were to contract a disease		
Child can be deformed	64	20.4
Child can die	75	24.0
Child will fall sick	173	55.3
Other	1	0.3
Do you agree that Immunization protects a child from serious diseases		
No	6	1.9
Yes	307	98.1
Does the side effects of vaccines prevent you from taking your Child for immunization		
No	196	62.6
Yes	117	37.4
How often do you receive reminders about your child's vaccination schedule		
Never	12	3.8
Once a month	272	86.9
Once a week	22	7.0
Rarely	7	2.2
Will you send your child again to immunization section if he/she has side effect		
No	38	12.1

Yes	275	87.9
What could make it easier for you to complete your child's immunization schedule		
Better access to vaccination centers	110	35.1
Financial assistance	14	4.5
More information about the benefits of vaccines	153	48.9
Support from family	36	11.5
Mother's Sources of Income		
Salary	58	18.5
Husband	84	26.9
Business	151	48.4
Others	19	6.2

4.4 Knowledge and awareness on immunization schedule

Table 4.3 shows the knowledge and awareness of immunization schedule. When asked about the number of BCG doses required, most mothers 297(95.2%) correctly identified one dose, while 10(3.2%) said three, and 5(1.6%) said two. A majority 273(87.2%) knew the first polio dose is administered at birth, while 40(12.8%) thought it was at six months. Fever was the most commonly recognized side effect post-vaccination, selected by 295(94.3%), followed by rash 9(2.9%), vomiting 6(1.9%), cough 2(0.6%), and others 1(0.3%). Nearly all participants 308(98.4%) correctly identified the Measles-Rubella vaccine as preventing measles, with only 5(1.6%) incorrectly choosing BCG. On the pentavalent vaccine, 290(92.7%) correctly selected three doses, 14(4.5%) said two, 6(1.9%) said four, and 3(1.0%) said one. The majority 242(77.3%) believed immunization can protect against polio, while 52(16.6%) did not know, 15(4.8%) said only in some cases, and 4(1.3%) said no. Most mothers 296(94.6%) acknowledged that missing vaccines could lead to disease outbreaks, while 12(3.8%) had other views and 5(1.6%) believed in faster recovery from illness. For the measles vaccine schedule, 298(95.2%) correctly indicated 9 months, 14(4.5%) said 6 months, and 1(0.3%) said 1 year.

Regarding growth, 246(78.6%) believed immunization supports child growth, 42(13.4%) were unsure, 20(6.4%) said no, and 5(1.6%) believed it only helped with some diseases. Most mothers 298(95.2%) recognized BCG as the vaccine given at birth, while others mentioned OPV1 6(1.9%), Penta1 2(0.6%), Rota1 1(0.3%), and others 6(1.9%). When asked if children with mild fever should be immunized, 149(47.6%) said yes, 69(22.0%) said no, 48(15.3%) said it depends, and 47(15.0%) were unsure. Almost all mothers 307(98.1%) knew that completing the immunization schedule offers full protection against preventable diseases, while only 3(1.0%) mentioned protection from other illnesses or other benefits. Regarding whether a child can be fully protected

without completing the full schedule, 260(83.1%) said no, 25(8.0%) said yes, 19(6.1%) said it depends, and 9(2.9%) did not know. Lastly, when asked about common side effects after the measles vaccine, 258(82.4%) mentioned fever, 31(9.9%) said rash, 22(7.0%) indicated diarrhoea, while 1(0.3%) each said none or other.

Table 4.3 Knowledge and awareness on the immunization schedule

Variable	Frequency (n=313)	Percentage (%)
How many doses of the BCG vaccine are required for full immunization		
1	297	95.2
2	5	1.6
3	10	3.2
What is the recommended age for administering the first dose of the polio vaccine		
6 months	40	12.8
At birth	273	87.2
What is a common side effect after vaccination		
Cough	2	0.6
Fever	295	94.3
Rash	9	2.9
Vomiting	6	1.9
Others	1	0.3
Which vaccine is given to prevent measles		
BCG	5	1.6
Measles-Rubella	308	98.4
How many doses of the pentavalent vaccine are given to children		

1	3	1.0
2	14	4.5
3	290	92.7
4	6	1.9
Can immunization protect your child from poliomyelitis		
Yes	242	77.3
No	4	1.3
I don't know	52	16.6
Only in some cases	15	4.8
What are some potential risks of missing vaccines		
Faster recovery from illness	5	1.6
Higher chance of disease outbreaks	296	94.6
Other	12	3.8
At what age should the first dose of the measles vaccine be administered		
1 year	1	0.3
6 months	14	4.5
9 months	298	95.2
Can childhood immunization help in promoting growth		
Yes	246	78.6
No	20	6.4
Not sure	42	13.4
Only for some diseases	5	1.6
Which of the following vaccines is given at birth		
BCG	298	95.2
OPV1	6	1.9
Penta1	2	0.6

Rota1	1	0.3
Others	6	1.9
Should children with mild fever still be immunized		
Yes	149	47.6
No	69	22.0
Don't know	47	15.1
It depends on the severity of the fever	48	15.3
What is the main benefit of completing the full immunization schedule		
Full protection from preventable diseases	307	98.0
Protection against other illnesses	3	1.0
Others	3	1.0
Can a child be fully protected without completing all recommended vaccines		
Yes	25	8.0
No	260	83.0
Don't know	9	2.9
It depends on the child's health condition	19	6.1
What is the most common side effect after receiving the measles vaccine		
Diarrhoea	22	7.0
Fever	258	82.5
None	1	0.3
Rash	31	9.9
Other	1	0.3

4.4.1 Diseases prevented by childhood immunization

Figure 4.1 shows the diseases prevented by childhood immunization. Most of the participants (55.1%) noted that polio was preventable through childhood immunization. Also, a few respondents (0.7%) believed that immunization could prevent typhoid.

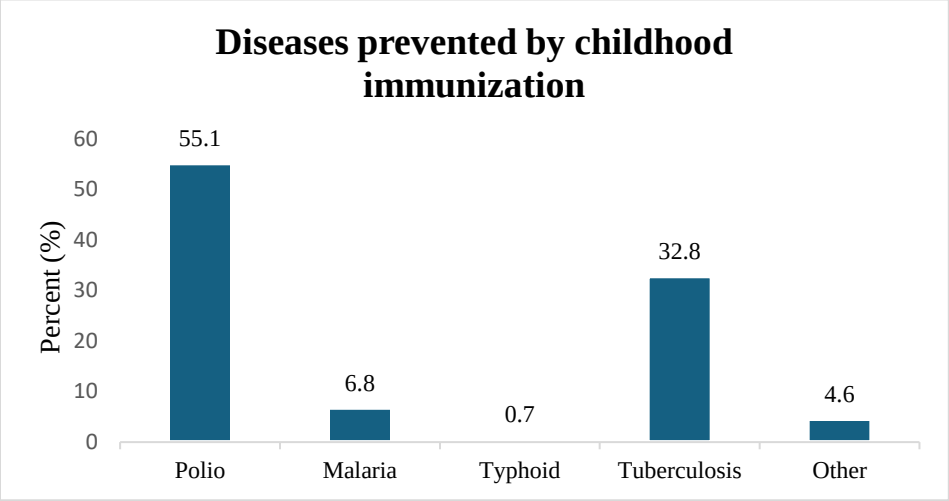


Figure 4.1 Diseases prevented by childhood immunization

4.5 Level of immunization uptake, motivation and challenges to vaccination

Table 4.4 Shows the level of immunization uptake by children it was revealed that, 280(89.5%) were fully immunized and 33(10.5%) were not. This immunization status is by individual ages of children and their immunization status at the time of data collection.

Table 4.4 level of immunization uptake

Variable	Frequency (n=313)	Percentage (%)
Immunization status		
Fully immunized	280	89.5
Not immunized	33	10.5

4.6 Factors that influence childhood immunization uptake among children less than one (1) in the Asuogyaman district

Figures 4.6.1 and 4.6.1 shows challenges that prevent vaccination and Motivation for child immunization. Regarding Challenges that prevent vaccination, Most, 32.5% of the participants noted that the immunization days were inconvenient. Furthermore, regarding motivation for child immunization, Most, 44.6%, had their motivation from media campaigns, followed by 32.2% saying reminders from family and friends were also a motivation for their child's immunization. The least motivation was the health worker recommendation, which was only 0.7% of mothers' motivation.

4.6.1 Challenges that prevent vaccination

Figure 4.2 shows the challenges that prevent vaccination. Most, 32.5% of the participants noted that the immunization days were inconvenient, 28.3% revealed that long waiting time at the clinic was a challenge that prevented vaccination uptake.

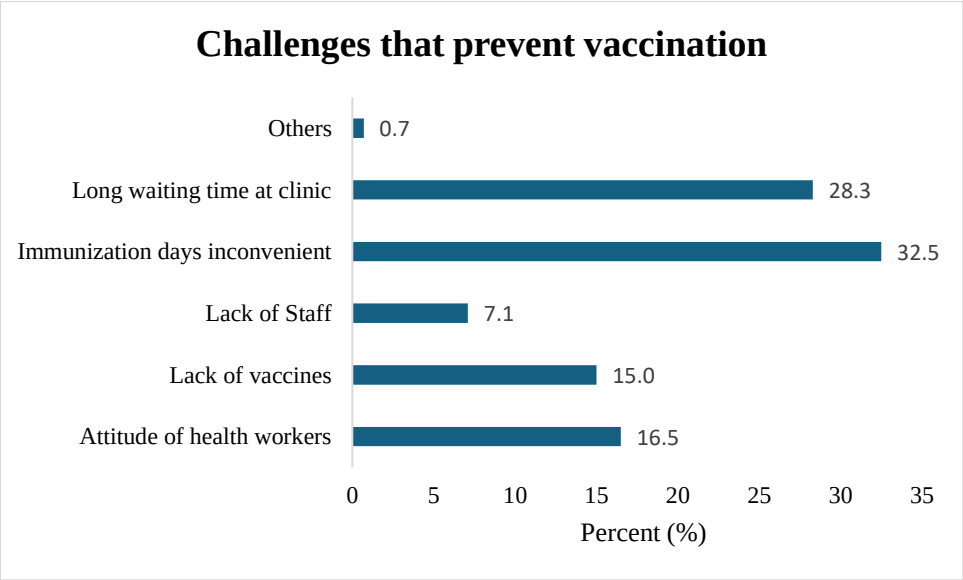


Figure 4.2: Challenges that prevent vaccination

4.6.2 Motivation for child immunization

Figure 4.3 shows the motivation for child immunization. Most, 44.6%, had their motivation from media campaigns, followed by 32.2% saying reminders from family and friends were also a motivation for their child's immunization. The least motivation was the health worker recommendation, which was only 0.7% of mothers' motivation.

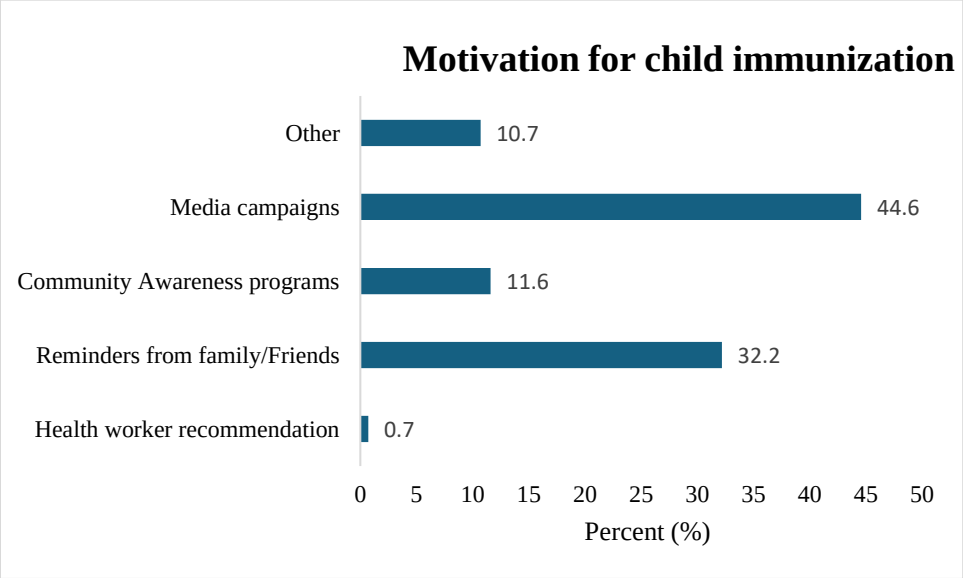


Figure 4.3 Motivation for child immunization

4.7 Result Summary

The study on childhood immunization in the Asuogyaman District of Ghana revealed critical insights into maternal knowledge, immunization practices, and systemic challenges affecting vaccine uptake. Conducted among 313 mothers and their children under one year of age, the research highlighted both strengths and gaps in immunization awareness and adherence.

The socio-demographic profile of participants underscored a predominantly young maternal population, with 58.8% of mothers aged 25–34 years. Most mothers identified as Christian (83.7%) and belonged to the Ewe ethnic group (65.2%). Educationally, over half (55.6%) had completed

senior high school, while nearly equal proportions were employed (48.9%) or unemployed (51.1%). Children in the study were predominantly female (52.4%), and nearly all (98.7%) possessed maternal health books, indicating a baseline engagement with healthcare systems.

Maternal knowledge about immunization schedules and vaccine efficacy was notably high. For instance, 95.2% of mothers correctly identified the single dose requirement for the BCG vaccine, and 92.7% recognized the three-dose schedule for the pentavalent vaccine. Awareness of measles-rubella vaccine efficacy reached 98.4%, aligning with global health guidelines. However, gaps persisted in understanding post-vaccination protocols. Nearly half (47.6%) of mothers approved vaccinating children with mild fever, while 22.0% opposed it, reflecting uncertainty about managing minor adverse effects. Misconceptions about disease consequences also emerged, with 20.5% fearing deformities from preventable illnesses and 24.0% associating such diseases with mortality. Despite these gaps, 94.6% of mothers acknowledged the risks of disease outbreaks due to missed vaccinations, and 87.9% expressed willingness to continue immunization despite side effects.

Immunization coverage among children under one year stood at 89.5%, indicating progress yet falling short of Ghana's national target of 95%. This gap underscores systemic barriers identified in the study. Inconvenient immunization schedules (32.5%) and prolonged clinic wait times (28.3%) emerged as primary logistical challenges, deterring timely visits. Vaccine hesitancy linked to side effects affected 37.4% of mothers, while 48.9% emphasized the need for clearer vaccine information. Motivations for immunization were largely external, with media campaigns (44.6%) and reminders from family or friends (32.2%) driving adherence. Strikingly, health worker recommendations had minimal influence (0.7%), suggesting a need for improved healthcare communication strategies.

CHAPTER 5

5.0 DISCUSSION

5.1 Introduction

This discussion will delve into the implications of the findings of this study, exploring the barriers that mothers face in ensuring their children receive timely vaccinations. It will also examine the broader context of childhood immunization in Ghana, emphasizing the need for targeted interventions to enhance maternal awareness and address systemic challenges within healthcare delivery. By synthesizing these insights, this section aims to contribute to the ongoing dialogue surrounding childhood immunization and inform strategies to improve health outcomes for children.

5.2 Mothers' Knowledge and Awareness of Childhood Immunization

Mothers correctly identified one dose as required for BCG vaccination and perceived that immunization can protect against polio. Furthermore, the mothers had a high knowledge on the measles vaccine schedule which aligns with the World Health Organization (WHO) guidelines for routine immunization in most countries. The study also found that mothers were aware that immunization supports child growth by preventing infections that can impair nutrition and development. Majority of respondents in this study affirmed that missing vaccines could result in potential risks of disease outbreaks.

The BCG vaccine and the first polio vaccines are typically administered at birth or as soon as possible after birth by the health birth attendant, which makes most mothers more knowledgeable about these vaccinations. This finding is consistent with a study conducted by Akakpo (2024), which also found that the majority of mothers have good knowledge on the correct dose of the

BCG vaccine. As reported by other scholars, mothers are more knowledgeable about vaccines taken at birth, like BCG and OPV, as compared to other vaccines (Mugada et al., 2017; Schaltz-Buchholzer et al., 2021). Furthermore, in the same study, 83.1% of mothers believe that a child cannot be fully protected without completing the recommended vaccination schedule. Studies have associated knowledge on immunization with a higher level of education (Danso et al., 2023), Consistent with this finding, a study conducted In India by Agiwal et al. (2024), revealed 68% of mothers understood that partial vaccination was insufficient, with lower rates in less resourced communities due to distrust in the health system.

The majority of participants in this study rightly identified that three doses of the Pentavalent vaccine ("5-in-1 vaccine) should be administered to children. In contrast to the findings of this study, Samontry et al. (2023) found that more than half participants had inadequate knowledge of the pentavalent vaccine. differences in participant interpretation could play a role in result disparities. In this study, terms like "doses" were explicitly framed as "three clinic visits for injections" to avoid ambiguity, whereas Samontry et al. may not have contextualized technical jargon for their participants.

Vittrup et al. (2025) found in their study that the commonly reported post-vaccination side effects of immunization for children under 12 months of age were fever, rash, gastrointestinal symptoms, respiratory tract symptoms, conjunctivitis, and symptoms related to the general condition of the infant (Vittrup et al. 2025). Khatereh et al. (2023) also found that the most frequent effects were high fever, mild local reaction, swelling, and pain. The least common effects were encephalitis, convulsion, and nodules (Khatereh et al., 2023). Side effects following immunizations vary from person to person due to several factors, for instance, the type of vaccines administered. Data from

this study also revealed that fever was the most commonly recognized post-vaccination side effect, followed by rash, vomiting, cough, and others.

In this study, 77.3% believed Polio vaccination typically begins at birth, which may explain high awareness. This aligns with findings by the World Health Organization, which found that at an interval of (95% confidence interval (CI) 57--82%), the target diseases.

5.3 Immunization Uptake Among Children Less Than One Year

In this study, the immunization uptake level among children under one year of age was reported at 89.5%, indicating that the majority of children in the district were fully immunized. However, this figure falls short of Ghana's national immunization coverage target of 95% (Kuuyi & Kogi, 2024). Although the district's coverage is higher than in some other areas, the discrepancy between the national baseline and the reported coverage of 89.5% which shows ongoing issues that need to be addressed. One of the main obstacles to reaching fully immunisation coverage was found to be operational issues in the healthcare system. The study found that long clinic wait times and inconsistent immunisation days were major barriers. For example, 32.5% of participants stated that one of the main obstacles to meeting vaccine deadlines is cumbersome immunisation schedules. As mentioned in the conversation, lengthy wait times at clinics were also seen to deter prompt visits. Long waiting times in low-resource settings are associated with increased dropout rates, as carers balance conflicting obligations like childcare or work, according to research referenced in the paper, such as Ekhaguere et al. (2021).

In Ghana, the national immunization coverage target for all antigens is set at 95%. Over the year, the country has maintained high coverage rates, ranging between 90 and 95% (Kuuyi & Kogi, 2024). However, studies conducted in 2014 revealed the proportion of infants who did not receive

all basic immunizations decreased from 79% to 77%.in the same year, the proportion of children who had not received any childhood vaccinations increased from 1% to 2% (Kuuyi & Kogi, 2024). Several factors influence the immunization status of a child, such as the level of education of the caregiver, level of income etc, a Similar study conducted in Southwest Ethiopia among children bellow 12 months revealed that 8.4% were not immunized at all, 49.4% were partially immunized, and 42.2% were fully immunized (Meleko et al., 2017), the vaccination coverage in this study maybe due to the socio-economic status of the geographical location. This finding is inconsistent with findings from this study, which showed that the level of immunization uptake by children who were fully immunized was 89.5%, and 10.5% were not.

5.4 Factors Affecting the Uptake of Childhood Immunization Among Children Less Than One

About one-third of the children were not fully immunised. The current study found inconsistent immunization days and long waiting time at the clinic as the predominant factors affecting the uptake of childhood immunisation. Consistent with findings of this study, Kuuyi and Kogi (2024) also found inconsistent immunization days and long waiting time at the clinic as major service-related barriers affecting childhood immunization uptake.

Vaccination coverage remains insufficient in many parts of the world, particularly in low- and middle-income countries, where issues related to demand and supply significantly hinder access to vaccines (Frew & Lutz, 2017). This hesitancy can create pockets of unvaccinated individuals, posing a risk to herd immunity. Achieving herd immunity typically requires vaccination coverage of at least 90% for most vaccines, and even higher levels, such as 95% coverage, for highly contagious diseases like measles (Anderson, 2016)

Consistent with our findings, the Center for Disease Control (CDC) revealed that inconsistent immunization days significantly affect vaccine uptake and contribute to dropout rates among children (Jones et al., 2024). The wait time clients spend during immunization clinic visits in low- and middle-income countries is not well-understood reported barrier to vaccine completion. The wait time clients spend during immunization clinic visits in low- and middle-income countries is not well-understood reported barrier to vaccine completion. Ekhaguere et al. (2021), revealed in their findings that the time from arrival to discharge varied significantly by the clinic and ranged between 57 and 235 minutes. The findings revealed that clinics with longer waiting times have a smaller number of clients attending the child welfare clinic, hence causing a higher dropout rate (Ekhaguere et al., 2021).

Moreover, most respondents in this study were motivated by media campaigns that encouraged them to vaccinate. This finding is consistent with a similar study conducted by Recio-Román et al. (2023), which also revealed that the media is a key element of decision making for many, including engaging in immunization exercises. Consistent with findings from the Asuogyaman District Health Directorate (2023), health promotion officers prioritize media campaigns (radio, community announcements) as a primary strategy for disseminating immunization information. The district's health promotion reports indicate that 72% of caregivers cite radio jingles and local FM programs (e.g., Asuogyaman 87.7FM) as their main source of vaccine reminders—a finding corroborated by this study, where 44.6% of respondents identified media as their key motivator for immunization (Table 4.3). This aligns with Ghana Health Service's emphasis on media engagement to combat misinformation and improve routine immunization uptake (GHS, 2023).

5.5 Chapter summary

In conclusion, this study not only enhances our understanding of mothers' knowledge and awareness regarding childhood immunization but also highlights the critical need for targeted interventions to address existing gaps. By recognizing the strengths in maternal awareness while also identifying misconceptions and barriers to vaccine uptake, stakeholders can develop more effective strategies to improve immunization rates among children under one year in Ghana.

CHAPTER 6

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter provides a brief overview of study findings, and conclusion, as well as recommendations for future research. The findings are provided based on the theory on which the study was premised and the literature that was reviewed earlier.

6.2 Conclusion

In conclusion, this study has revealed the importance of mothers' knowledge and awareness regarding childhood immunization in shaping health outcomes for infants. The findings indicate that while a significant majority of mothers have a strong understanding of essential vaccines, such as BCG and polio, there are remaining gaps in knowledge on the complete immunization schedule, and the management of post-vaccination side effects.The high recognition of the protective benefits of immunization reveals the potential for enhancing vaccination uptake; however, the hesitancy surrounding vaccinations during mild illnesses presents a barrier that must be addressed. Moreover, the study identified several factors influencing immunization uptake, including inconsistent immunization days, long waiting times, and healthcare worker attitudes. These barriers not only hinder access to vaccines but also contribute to dropout rates, which can jeopardize community immunity and public health efforts.

6.3 Recommendations

Based on the findings of this study, the following recommendations are suggested:

1. The health directorate must implement targeted educational programs aimed at mothers to improve their understanding of the full immunization schedule, including the importance of completing vaccinations even during mild illnesses, with the help of

active media forums, for example, the Asuogyaman 87.7 FM within the Asuogyaman District.

2. The government should develop strategies to mitigate fears surrounding adverse events following immunization (AEFIs). This could involve creating informational materials that explain common side effects, their management, and the overall benefits of vaccination, thereby reassuring mothers and encouraging timely immunization.

3. Asuogyaman District Hospital, in collaboration with the preliminary health facilities within the district (Aboasa CHPS, Adjena Health Center, Akwamufie Health Center, Anyansu Health Centre, Asuogyaman District Hospital, Atimpoku CHPS zone, and Boso Health Center), must provide ongoing training for healthcare workers to enhance their communication skills and attitudes towards vaccination. Positive interactions between healthcare providers and mothers can significantly influence mothers' willingness to vaccinate their children and adhere to the recommended schedules.

4. There should be a fostered collaboration among community leaders, health authorities, and non-governmental organizations to create a supportive environment for immunization. Engaging local influencers can help to promote the importance of vaccines and address cultural beliefs that may hinder vaccination uptake.

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APPENDICES

Appendix 1 : Questionnaire

SN	Question	Response
SECTION A: BIODATA OF CHILD		
A1	Age of baby (Weeks)	
A2	Maternal Health Book	1. Yes **2.** No
	How many vaccines has your child taken? (Select as many as apply)	1. BCG 2. OPV0 3. OPV1 4. OPV2 5. OPV3 6. Rota1 7. Rota2 8. Rota3 9. Penta1 10. Penta2 11. Penta3 12. PCV1 13. PCV2 14. PCV3 15. IPV 16. Yellow fever 17. Measles-Rubella 1
A3	Immunization status (System generate)	1. Fully immunized 2. Not immunized
A4	Where did you give birth to the baby?	1. Hospital 2. Health Center 3. CHPS 4. Home delivery
SECTION B: DEMOGRAPHIC AND SOCIO ECONIMIC INFORMATION OF CAREGIVER		
B1	Age of mothers (years)	
B2	What is your religious affiliation	1. Christian 2. Muslim 3. Traditionalist
B3	Which ethnic group do you belong	1. Ga-Dangme 2. Akan 3. Ewe 4. Dagomba 5. Others (Specify) ……
B4	What is your marital status	1. Never married 2. Co-habiting 3. Married 4. Separated 5. Divorced

B5	What is your highest educational level	1. Primary 2. JHS 3. SHS 4. Tertiary
B6	Employment status	1. Employed 2. Unemployed
B7	What is/are your source(s) of income	1. Salary 2. Husband 3. Business 4. Others (Specify)……
SECTION C: KNOWLEDGE ABOUT CHILDHOOD IMMUNIZATION		
C1	Which diseases are prevented by childhood vaccination?	1. Polio 2. Malaria 3. Typhoid 4. Tuberculosis
C2	How many doses of the BCG vaccine are required for full immunization?	1. 1 2. 2 3. 3 4. 4
C3	What is the recommended age for administering the first dose of the polio vaccine?	1. At birth 2. 6 months 3. 1 year 4. 2 years
C4	What is a common side effect after vaccination?	1. Fever 2. Rash 3. Vomiting 4. Cough
C5	Which vaccine is given to prevent measles?	1. BCG 2. OPV 3. Measles-Rubella 4. Hepatitis B
C6	How many doses of the pentavalent vaccine are given to children?	1. 1 2. 2 3. 3 4. 4
C7	Can immunization protect your child from diphtheria?	1. Yes 2. No 3. Only in some cases 4. I don't know
C8	What are some potential risks of missing vaccines?	1. Higher chance of disease outbreaks 2. Increased immunity 3. Faster recovery from illness 4. Other (Please specify) …….
C9	At what age should the first dose of the measles vaccine be administered?	1. 6 months 2. 9 months 3. 1 year 4. 18 months

C10	Can childhood immunization help in promoting growth?	1. Yes 2. No 3. Only for some diseases 4. Not sure
C11	Which of the following vaccines is given at birth?	1. BCG 2. Penta1 3. OPV1 4. Rota1
C12	Should children with mild fever still be immunized?	1. Yes 2. No 3. It depends on the severity of the fever 4. I don't know
C13	What is the main benefit of completing the full immunization schedule?	1. Full protection from preventable diseases 2. Partial protection 3. Protection against other illnesses 4. Other (Please specify) ……..
C14	Can a child be fully protected without completing all recommended vaccines?	1. No 2. Yes 3. It depends on the child's health condition 4. I don't know
C15	What is the most common side effect after receiving the measles vaccine?	1. Rash 2. Fever 3. Diarrhoea 4. None 5. Other (Please specify) ……
SECTION D: HEALTH BELIF		
D1	What will be the consequences if your child were to contract a disease that could have been prevented by vaccination?	1. Child will fall sick 2. Child can die 3. Child can be deformed 4. Other (Specify) ……
D2	Do you agree that Immunization protects a child from serious diseases?	1. Yes 2. No
D3	What are some of the challenges that may prevent you from taking your child for vaccinations service? (Select all that apply)	1. Attitude of health workers 2. Lack of vaccines 3. Lack of staff 4. Immunization days not inconvenient 5. Long waiting time at the clinic 6. Other (Please specify) …….
D4	Does the side effects of vaccines prevent you from taking your Child for immunization?	1. Yes 2. No
D5	What factors motivate you to bring your child for immunization?	1. Health worker recommendations 2. Reminders from family/friends

		3. Community awareness programs 4. Media campaigns 5. Other (please specify) ……..
D6	How often do you receive reminders about your child's vaccination schedule?	1. Once a month 2. Once a week 3. Rarely 4. Never
D7	Will you send your child again to immunization section if he/she has side effect from the previous immunization?	1. Yes 2. No
D8	What could make it easier for you to complete your child's immunization schedule?	1. Better access to vaccination centers 2. More information about the benefits of vaccines 3. Support from family 4. Financial assistance 5. Other (please specify):

Appendix 2: Ethical clearance

ENSIGN GLOBAL
COLLEGE

OUR REF: ENSIGN/IRB/EL/SN-284/01
YOUR REF:

January 3, 2025

INSTITUTIONAL REVIEW BOARD SECRETARIAT

Grace Selase Etsra
Ensign Global College
Kpong.

Dear Grace,

ETHICAL CLEARANCE TO UNDERTAKE POSTGRADUATE RESEARCH

At the General Research Proposals Review Meeting of the *INSTITUTIONAL REVIEW BOARD (IRB)* of Ensign Global College held on Friday, January 3, 2025, your research proposal entitled **"Factors Influencing Childhood Immunization Among Infants in the Asuogyaman District in the Eastern Region of Ghana"** was considered.

You have been granted Ethical Clearance to collect data for the said research under academic supervision within the IRB's frameworks and guidelines.

We wish you all the best.

Sincerely,

Dr. (Mrs.) Rebecca Acquaah-Arhin
IRB Chairperson

P.O. Box AK 136 | Tema-Akosombo Highway, Kpong, Eastern Region, Ghana|
https://www.ensign.edu.gh |+233 245 762 229

Appendix 3: Informed consent

INFORMED CONSENT

FACTORS INFLUENCING CHILDHOOD IMMUNIZATION AMONG INFANTS IN THE ASUOGYAMAN DISTRICT IN THE EASTERN REGION OF GHANA.

INTRODUCTION AND INFORMED CONSENT FORM TO PARTICIPANTS

My name is GRACE SELASE ETSRA, I am a student at Ensign College of Public Health, Kpong**.** I am undertaking research on factors influencing Childhood Immunization among infants in the Asuogyaman District in the Eastern Region of Ghana. This is academic work which could be used to formulate a policy. I would very much be grateful if you could help in answering this questionnaire. For further information kindly contact me on 0244218002

Confidentiality

Please, your name will not be written, but a number will be assigned to your questionnaire. All information from this research will be kept private and under lock and key. These responses will be used for academic purposes only

Risks

This survey might require you to give very personal details about yourself and your child's immunization status. Bear in mind you don't have to explain if you refuse to participate in this survey or not.

Benefits

Please not that you will not be given anything to motivate you to participate in this survey. However, your participation might assist us to identify factors that influence the uptake of immunization which can help in making an informed decision.

Duration

This research will involve some questions about your perception and experiences related to immunization and might take about 15 to 25 minutes to complete

It is not compulsory to participate in this survey and you're not obliged to answer any or all the questions.

Do you have any questions to ask about the interview?

Do you want to partake in it? **YES** ☐ **NO** ☐

ANSWER ANY QUESTIONS AND ADDRESS RESPONDENT'S CONCERNS.

RESPONDENT *AGREES* TO BE INTERVIEWED

1	-- - - - → BEGIN

RESPONDENT *DOES NOT AGREE* TO BE INTERVIEWED

2	- - - - → END

Voluntary Withdrawal

At any point during the interview, you are free to withdraw and discontinue this interview for any or no reason.

Name of Interviewer _____

Date: _____

RESPONDENT'S SIGNATURE: _____

THUMB PRINT