

**SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA**



DETERMINANTS OF PRENATAL CARE UTILIZATION IN THE SHAI-OSU DOKU

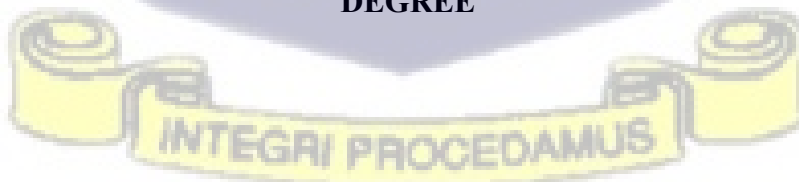
DISTRICT

BY

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
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DEGREE**



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Declaration

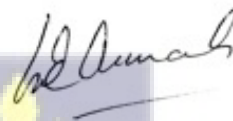
I, Jennifer Illeme Adibo do hereby declare that the work presented in this research work titled Determinants of prenatal care utilization Shai Osu-Doku District is my original work, and that this proposal has neither in part or whole been presented to the university or elsewhere for any degree. I further declare authors whose works were been referred to have been duly acknowledged.

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17th September, 2025



2nd October 2025



DEDICATION

I dedicate this work to my director, Dr. Abraham Rexford Oduro, for the wonderful support given me throughout my studies. I am very grateful and blessed to have such a great support.



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LIST OF ACRONYMS AND ABBREVIATIONS

ANC	Antenatal Care Clinic
CHPS	Community-based Health Planning and Services
FANC	Focused Antenatal Care
FMHCP	Free Maternal Health Care Policy
ICT	Information Communication Technology
LMIC	Low- and Middle-Income Countries
MCH	Maternal and Child Health
MMR	Maternal Mortality Ratio
NGOs	Non-Governmental Organizations
NMR	Neonatal Mortality Rate
NHIS	National Health Insurance Scheme
PHC	Population and Housing Census
PHC	Population and Housing Census
SSA	Sub-Saharan African
SDGs	Sustainable Development Goals
UNICEF	United Nations Children's Emergency Fund
SSA	Sub-Saharan African
SDGs	Sustainable Development Goals
UNICEF	United Nations Children's Emergency Fund

WHO

World Health Organisation

ABSTRACT

Background: Despite the importance of early and routine prenatal care utilization globally, most pregnant women in sub-Saharan African (SSA) initiate ANC visit in the second or third trimester of pregnancy, indicating poor and late prenatal care utilization. An estimated 810 women die from pregnancy-related complications daily with a disproportionate burden in SSA. The Shai-Osu Doku District in the Greater Accra region, Ghana, faces significant challenges regarding the effective use of antenatal care (ANC) services. A significant number of expectant mothers in Shai-Osu Doku begin their ANC visits late, with some not attending at all. This study examined the factors associated with prenatal care utilization at the Shai-Osu Doku district Hospital.

Aim: This study aimed to determine the factors associated with prenatal care utilization at Shai-Osu Doku District Hospital.

Methods: This study is a cross-sectional study among pregnant women seeking antenatal care at the Shai-Osu Doku District Hospital in November 2022. The study employed the use of questionnaires and observation checklists to collect data on prenatal care, and independent variables such as sociodemographic characteristics, knowledge and awareness about the importance of prenatal care, availability and accessibility factors, and cultural beliefs, practices and obstetric factors that may influence prenatal care utilization. The results were analyzed using descriptive statistics, ordinal logistic regression analysis, and a chi-square test of independence.

Results: Of the 106 participants included in the study, adequate prenatal care utilization coverage was 68(64%). The multivariate logistic model showed reduced odds of seeking timely and effective prenatal care among women pregnant women with no formal education (aOR = 0.75, 95%, CI: 0.11-5.02), and also for expectant mothers from rural areas (aOR = 0.29, 95%, CI: 0.09-0.93). Additionally, reduced odds of seeking prenatal care were observed among pregnant women with poor knowledge of the recommended gestational age for ANC (aOR = 0.44, 95%, CI: 0.13-1.49), long distance (greater than 5km) to reach ANC centre (aOR = 0.17, 95%, CI: 0.01-0.10), and long waiting time before seeking a specialist (aOR = 0.06, 95%, CI: 0.01-1.63). Similarly, reduced odds were also observed in pregnant women from communities that perceive ANC was not necessary (aOR = 0.10, 95%, CI: 0.20-0.56), communities with taboos and fear associated with hospital visits during pregnancy had increased odds of not seeking prenatal care (aOR = 22.18, 95%, CI: 2.29-14.48). However, women with parity were observed to have increased odds of seeking prenatal care (aOR = 4.36, 95%, CI: 4.73- 6.38).

Conclusion: Level of education, place of residence, parity, poor knowledge of recommended gestational age for imitating ANC, long distance to reach ANC centre, and long waiting time for seeing a specialist were statistically associated with prenatal utilization. Also, communities with taboos and fear associated with hospital visits during pregnancy as well as communities that perceive ANC as not necessary were statistically associated with prenatal care utilization. Thus, health directorates and health facilities in Greater Accra and beyond should employ strategies to address these determinants. Furthermore, special education and campaign programs about the importance of timely and effective prenatal care utilization should be incorporated into routine intervention programs in Shai-Osu Doku and the entire country as a whole.

CHAPTER ONE

INTRODUCTION

1.1 Background

Prenatal care, also known as antenatal care, is the routine medical monitoring provided by skilled healthcare professionals to expectant mothers to ensure optimal health of the mother and fetus throughout pregnancy (WHO, 2020). Globally, prenatal care is one of the evidence-based interventions recognized to improve Maternal and Child Health (MCH). It is estimated that more than 3.5 million lives are saved each year through timely prenatal care (Nove et al., 201; Deo, N. 2023). According to the World Health Organization (WHO), effective prenatal care encompasses regular check-ups, screenings, and counselling, which collectively contribute to healthier pregnancy outcomes. Also, it offers expectant mothers the opportunity to receive health promotion and preventive services to improve their health and transition to the post-natal phase with minimum challenges (WHO, 2023).

The utilization of prenatal care during pregnancy is crucial as it ensures maximum maternal and child health outcomes. Effective use of prenatal care also serves as an indicator for tracking progress towards achieving the Sustainable Development Goals (SDGs) (Raynes-Greenow C. 2017). Target 3.1 of the SDGs aims to reduce maternal deaths to less than 70 per 100,000 live births by 2030 through quality antenatal care (ANC) (Jolivet RR et al 2018). In 2003, the WHO recommended at least four ANC visits for expectant mothers before the 16th week of gestation. However, in 2016 the WHO updated the recommended framework to at least eight ANC visits to sufficiently prepare for the delivery process, and the first visit must be in the first trimester of gestation (WHO, 2019; Benova et al., 2018).

Over the years, timely antenatal care utilization has been effective in decreasing maternal and prenatal morbidities and mortalities (Sabari et al., 2023). For instance, in advanced countries prenatal care utilization is above 90.3% with a significant number of pregnant women having adequate antenatal care visits early thus contributing to a substantial reduction in pregnancy complications and mortalities (Yaya, S, & Ghose, 2019; Jolivet RR et al., 2018 & Tegegne et al., 2024). However, in low and middle-income countries, particularly in Sub-Saharan Africa (SSA), despite the significance of timely and routine antenatal care utilization, many pregnant women begin ANC visit in the second or third trimester of pregnancy, indicating poor and late prenatal care utilization (Mlandu et al., 2022). As a result, prenatal mortality is still very high in SSA despite the slow downward trend. An estimated 810 women die from pregnancy-related complications daily with a disproportionate burden in SSA. Studies by Ahinkorah and others have shown that SSA is one of the regions with the highest incidence of maternal and prenatal mortality globally (Ahinkorah BO et al., 2021). According to the WHO, in 2020 SSA regions contributed 62% of the global maternal mortality rate of 152 deaths per 100,000 live births due to poor prenatal care utilization (WHO, 2021). Unfortunately, West Africa recorded the highest rate of maternal deaths accounting for about 20% of the total maternal deaths worldwide (Warri D, George A, 2020). As a result, poor prenatal care utilization has become a public health concern, particularly in SSA. (Dulla D et al., 2021; Okedo-Alex IN et al., 2019)

In Ghana, the total coverage of ANC visits per the previous WHO recommendation of at least four visits is above the global average of 44.3% (Adu et al., 2022). However, studies have revealed that a significant number of expectant mothers in rural and urban settings in Ghana are unable to access

ANC services. It is estimated that only 64% of pregnant women in Ghana comply with the recommendation of starting ANC in the first trimester, and facility deliveries continue to hover around 57-79%. Expectant mothers' routine and timely utilization of prenatal care therefore remains a major challenge across the nation (Abuosi et al., 2024; Apanga PA et al., 2018). However, few recent studies have been conducted in developing countries such as Ghana to assess the factors influencing prenatal care utilization. For example, in Ethiopia, out of 117 expectant mothers that were studied only 26.2% started prenatal care early (Bekalu, A. 2021). In that same study pregnant women with null parity had good knowledge about early ANC and they were more likely to seek early prenatal care utilization. In South Africa, about 51% of rural and 29% of peri-urban expected mothers reported being late for the first ANC visit (Myburgh et al., 2024). The late and poor ANC visits in both rural and peri-urban areas were attributable to employment, marital status, being pregnant for the first time and unplanned pregnancy (Strong et al., 2024; Abuosi et al., 2024).

Similar trends of late and poor prenatal care utilization have been observed in Ghana even in the face of the various efforts to improve timely and routine ANC visits. The Greater Region, particularly the Shai-Osu Doku district, have been reporting poor prenatal care utilization coverage in recent years (Gbene J et al., 2024). The inadequate and poor utilization of prenatal care distorts the continuum of care and affects the health of the mother and fetus (Carroli G. et al., 2001). To achieve optimal prenatal care utilization, all expectant mothers should timely and routinely seek antenatal services. This can be achieved through reducing the potential factors that may influence pregnant women's decisions to utilize prenatal care. This study sought to assess the factors associated with prenatal care utilization among expectant mothers attending the ANC clinic at the Shai-Osu Doku District Hospital in the Greater Accra Region from 2nd to 29th November 2023.

1.2 Problem statement

Prenatal care is important for protecting expectant mothers and their babies from preventable pregnancy-related complications and associated deaths. However, many pregnant women fail to fully utilize this life-saving intervention due to delayed registration and poor antenatal care-seeking behaviours (Strong et al., 2024). According to the World Health Organization (WHO), prenatal care prevents more than 3.7 million maternal and prenatal deaths (WHO, 2022). However, in Ghana, although 93.2% of expectant mothers have access to ANC services at least once during pregnancy, many pregnant women do not meet the recommended number of ANC visits. Studies show that only 58.61% of expectant mothers in Ghana achieve adequate attendance (4-7 visits) (Precious et al., 2022; Edward et al., 2021). These trends in antenatal care utilization pose a serious public health concern.

A study in 2024 showed that pregnancy-related complications account for about 12% of all mortality among women aged 15-49 in Ghana (Yaw et al., 2024). According to United Nations Children's Emergency Fund (UNICEF), approximately 70 babies die each day due to pregnancy disorders as such as premature birth, infections and other complications during and after delivery. Currently, the maternal mortality ratio (MMR) and the neonatal mortality rate (NMR) in Ghana are 310 per 100,000 live births and 22.8 per 1,000 births respectively (UNICEF Ghana, 2024).

Additional evidence shows that the effective use of prenatal care among pregnant women in Ghana is below expectation with variations across the regions (Ekholuenetale et al., 2019). For instance in the Greater Accra region, the inadequate use of antenatal care (ANC) services has been a continuing challenge resulting adverse pregnancy outcomes. This trend is a public health concern

since timely and routine ANC is crucial for monitoring and helping to address potential health issues during pregnancy as stated earlier by Adu. (Adu et al., 2022; Gbene J et al., 2024)

The public health impact and consequences of inadequate utilization of prenatal care can lead to higher risks of preventable maternal and infant complications and mortalities (Strong, 2024). To avert these public health consequences, it is important that expectant mothers achieve the recommended ANC visits, especially those with health conditions such as hypertension, diabetes and other health problems which place them at a greater risk of developing adverse pregnancy outcomes (Adu et al., 2022).

In spite of the limited data on factors influencing prenatal care utilization in the sub-Saharan Africa region, to the best of my knowledge, no recent study has assessed the factors attributable to inadequate prenatal care utilization in Ghana, particularly in the Shai-Osu district. Therefore, this study seeks to assess the determinants of prenatal utilization in the Shai-Osu Doku District Hospital.

1.3 Justification of the study.

Prenatal care utilization by pregnant women in Ghana is suboptimal leading to maternal and prenatal mortalities in regions across the country. Failure to achieve timely and routine prenatal care puts pregnant women at risk of developing maternal and prenatal complications and related deaths. According to studies in other countries, effective use of prenatal care is associated with health system, socio-demographic, and traditional factors, however, in the context of Ghana particularly in Shai-Osu Doku district there is limited current data on factors influencing prenatal care utilization. Understanding the factors influencing prenatal care utilization among pregnant women is imperative to design interventions, strategies and policies to prevent pregnancy

complications. It is therefore important that a study is carried out to assess the factors influencing prenatal care utilization among expectant mothers to address possible barriers to prenatal care utilization.



1.4 Conceptual framework for prenatal care utilization

Figure 1 is a conceptual framework showing the relationship between factors that have the potential to influence timely and routine prenatal care utilization among pregnant women. The factors are grouped into socio-demographic factors, pregnant women's knowledge and awareness of prenatal care, accessibility and proximity, and cultural beliefs and practices characteristics.

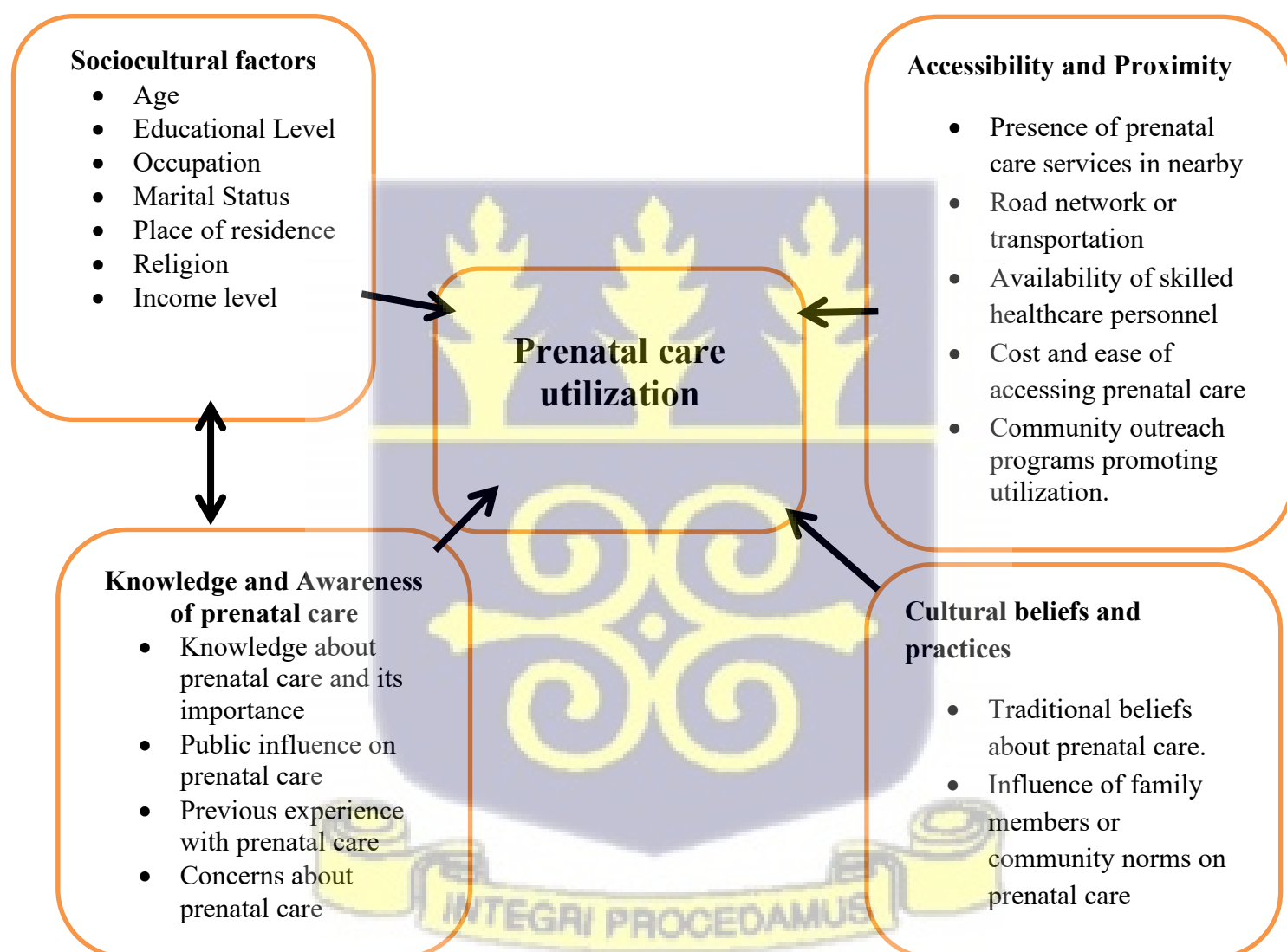


Figure 1: Conceptual framework depicting the factors that influence prenatal care utilization among pregnant women.

1.4.1 Narration of the conceptual framework

The above conceptual framework (Figure 1) shows the relationship between factors that have the potential to influence prenatal care utilization among expectant mothers. The conceptual framework is based on the Andersen Healthcare Utilization Model, a theoretical model first introduced in 1968 to explain the factors influencing healthcare utilization. According to this model, healthcare utilization is dependent on three primary factors: predisposing factors, which include characteristics like age, ethnicity, and health beliefs; enabling factors, such as access to health insurance and the availability of nearby healthcare facilities; and need factors, which encompass both the actual and perceived healthcare needs of individuals (Andersen, 1995).

In Figure 1, the four (4) factors are grouped according to Anderson's Healthcare Utilization Model. Sociodemographic factors, expectant mothers' knowledge and awareness and cultural beliefs and practices represent the predisposing factors. The accessibility and proximity factors represent the enabling factors.

From the figure above there are many modifiable and non-modifiable factors that determine prenatal care utilization among pregnant women. These include knowledge and awareness of prenatal care, cultural beliefs and practices, sociodemographic factors of expectant mothers and prenatal care accessibility and proximity (Okedo-Alex IN et al., 2019). This study looked at how these factors relate to the utilization of prenatal care.

Sociodemographic factors such as pregnant women's age, place of residence, occupation, educational and income level, and religious affiliation can influence their decision to seek timely and routine antenatal care. These factors, together with community/public opinion can influence

the knowledge and beliefs of pregnant women which will in turn influence their health-seeking behaviour (Okedo-Alex IN et al., 2019).

Accessibility and proximity factors such as cost and ease of accessing ANC services, road network, availability of skilled health personnel, and the quality of healthcare received can influence expectant mothers' decision to seek prenatal care.

1.5 Research Questions

This study seeks to answer the following questions:

1. What are the socioeconomic factors influencing antenatal care utilization among pregnant women in the Shai-Osu Doku District?
2. What is the awareness and knowledge level about the importance of antenatal care among pregnant women in the Shai-Osu Doku District?
3. What is the accessibility and proximity of antenatal care services to pregnant women in the Shai-Osu Doku District?
4. What are the cultural beliefs and practices that influence pregnant women's decision-making on prenatal care utilization in the Shai-Osu Doku District?

1.6 Research Objectives

The objectives of this study are:

1.6.1 General Objective

Identify the factors associated with prenatal care utilization among pregnant women in the Shai Osu Doku District.

1.6.2 Specific Objectives

1. To identify socio-demographic factors influencing antenatal care utilization.
2. To assess pregnant women's awareness and knowledge of the importance of antenatal care.
3. To examine the accessibility and availability of prenatal care services among expectant mothers at the Shai Osu Doku District Hospital.
4. To explore the cultural beliefs and obstetric factors that influence pregnant women's decision-making on prenatal care utilization in the Shai-Osu Doku District.



CHAPTER TWO

2.0 LITERATURE REVIEW

2.1. Prenatal care

Prenatal care, also known as antenatal care (ANC), is the healthcare provided to expectant mothers to ensure the well-being of both the mother and the unborn baby. Prenatal care is one of the life-saving interventions that reduces the risk of maternal and prenatal complications worldwide, with approximately 3.7 million maternal and infant deaths prevented globally (WHO, 2022). Prenatal care services encompass screening for pregnancy complications, assessing pregnancy risk, treating problems that may arise during and after the antenatal phase, and providing counseling that would prepare pregnant women physically and psychologically for childbirth and parenthood (Kisuule et al., 2013).

2.2. Global trend of prenatal care utilization

Routine and timely antenatal care play a critical role in enhancing positive pregnancy outcomes through early assessment and diagnosis of pregnancy-related problems (Abuosi et al., 2024). The World Health Organization (WHO) recommends a minimum of eight (8) antenatal care visits for pregnant women, with the first visit in the first trimester, and the subsequent visits throughout gestation (WHO, 2023). The utilization of prenatal care differs across the globe, for example in advanced nations; prenatal care utilization is above 90% with majority of pregnant women having adequate use of antenatal care services status (Jolivet RR et al., 2018 & Tegegne et al., 2024). However, in low and middle-income countries particularly in Sub-Saharan Africa, the trend of prenatal care is very low indicating that significant numbers of pregnant women do not achieve maximum utilization of prenatal care services (Mlandu et al., 2022). According to a recent study, only 64% of pregnant women in both rural and urban settings of Ghana initiate early prenatal care

in their first trimester, showing that many pregnant women start seeking antenatal care in the late phase of gestation which put them at a higher risk of pregnancy complications (Abuosi et al., 2024; Apanga PA et al., 2018).

2.3. Prenatal care utilization in Ghana

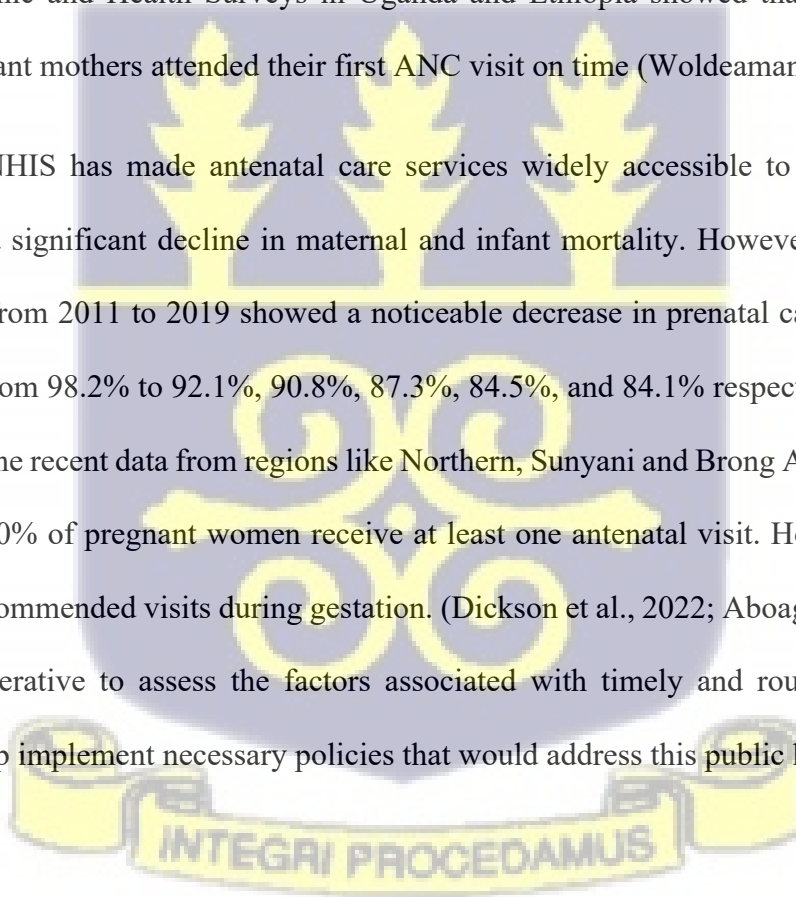
Prenatal care was established in the early 20th century and introduced across Europe between the 1920s and 1970s. Prenatal care is one of the pillars of the WHO's safe motherhood initiative. In 2016 the World Health Organization developed a model framework for antenatal care. The framework suggested a minimum of four ANC visits for expectant mothers (WHO, 2021). However, this model was revised and extended to at least eight numbers of visits with the first and eighth visits occurring within the 12th and at the 40th weeks of gestation. The aim of the new framework is to ensure that expectant mothers are medically prepared for delivery, especially mothers who start ANC late and are not able to complete the required number of visits (1).

Globally, although the ANC coverage for at least one visit is 86%, however, timely and routine initiation of ANC remains low, particularly in sub-Saharan Africa. A study in low- and middle-income countries found that only 44.3% of pregnant women had timely ANC visits, and just 11.3% completed at least eight visits (Jiwani et al., 2020). In Ghana, the Focused Antenatal Care (FANC) was introduced in 2002, which later led to the introduction of the Free Maternal Health Care Policy (FMHCP) through the National Health Insurance Scheme (NHIS) in 2008. These interventions were introduced to improve access to antenatal care and reduce maternal and infant mortality and disabilities.

Since the introduction of FANC and FMHCP in Ghana, there has been an effective reduction of preventable morbidities and mortalities among expectant mothers in Ghana over the years. There has been a significant fall in complications and rates of diseases such as preeclampsia, eclampsia and anemia among pregnant women (Anyamesem, 2021).

According to the World Health Organization, preventable maternal complications and morbidities remain a leading cause of death among pregnant women, particularly in Africa. In 2016, timely and routine ANC initiation by pregnant women in low-income countries was only 24.0%, compared to 81.9% in high-income countries (Moller et al., 2017). For example, data from the 2016 Demographic and Health Surveys in Uganda and Ethiopia showed that only 38.9% and 20.0% of expectant mothers attended their first ANC visit on time (Woldeamanuel et al., 2021).

In Ghana, the NHIS has made antenatal care services widely accessible to pregnant women, contributing to a significant decline in maternal and infant mortality. However, a review of the ANC coverage from 2011 to 2019 showed a noticeable decrease in prenatal care coverage, with rates dropping from 98.2% to 92.1%, 90.8%, 87.3%, 84.5%, and 84.1% respectively (Ministry of Health, 2021). The recent data from regions like Northern, Sunyani and Brong Ahafo revealed that approximately 80% of pregnant women receive at least one antenatal visit. However, only 50% complete the recommended visits during gestation. (Dickson et al., 2022; Aboagye et al., 2024). It is therefore imperative to assess the factors associated with timely and routine prenatal care utilization to help implement necessary policies that would address this public health concern.



2.4. Socio-demographic factors in prenatal care

Socio-demographic factors of expectant mothers play a significant role in determining the utilization of prenatal care services. Key socio-demographic factors revealed by studies include:

2.4.1. Educational level of expectant mothers and prenatal care utilization.

Significant number of studies particularly in Sub-Saharan Africa has linked educational level of pregnant women to prenatal care utilization. In Malawi, the proportions of expectant mothers with adequate prenatal utilization status were seen among those with higher maternal level of educational level. Pregnant women who had at least secondary school education were 24% more likely to achieve adequate use of prenatal care compared to those who had no formal education and expectant mothers with at least a tertiary level of education were 64% more likely to fully achieve the recommended times of ANC visits compared to pregnant women who had only secondary school education (Ng'Ambi et al., 2022). Similarly, in Ghana, prenatal care utilization by expectant mothers from the recent maternal health survey found that pregnant women who had higher education were twice as likely to initiate timely and routine ANC visits compared to those with no education. Also, women with the highest wealth index were 43% more likely to complete the recommended eight ANC visits compared to those with low wealth index (Abuosi et al., 2024).

2.4.2. Maternal age and prenatal care utilization

Data from the demographic health surveys showed maternal age as a contributing factor of effective prenatal care. According to these surveys, the expectant mother's age was significantly associated with the level of prenatal care utilization (Aboagye et al., 2024; Abuosi et al., 2024). From the findings, adult women were more likely to initiate timely and routine prenatal care

compared to adolescent girls. This is because most of the adolescent pregnancies were unplanned and unwanted; as a result, adolescent girls were hesitant to inform their parents or healthcare providers of their pregnancies to initiate early ANC or counsel them on the importance of prenatal care. Expectant mothers who prepared and wanted pregnancy had increased odds of early ANC visits compared to adolescent girls who were too prepared for their pregnancies (Duodu et al., 2022; Abuosi et al., 2024)

2.4.3. Religion of pregnant women and prenatal care utilization

With religion, early research in Ethiopia found that the religions of expectant mothers were significantly associated with the effective use of prenatal care. Pregnant women from Muslim homes were 4% less likely to seek early and routine antenatal care compared to expectant mothers from Christian homes. Pregnant women from Christian and other religions had a 9-11% higher chance of initiating early and routine prenatal care. This is because many pregnant women from Muslim homes have limited power in decision-making regarding their maternal health as compared to those who are from Christian homes (Almaw, D. Y., 2022). In Ghana, a study by Tabiri and colleagues reported that a significant portion of pregnant women in Ghana are Christians, with studies indicating that Christian women tend to have better knowledge and utilization of antenatal care (ANC) compared to their Muslim counterparts (Tabiri et al., 2024).

2.4.4. Occupation, socio-economic status and prenatal care utilization

In the context of maternal occupation, a study which was conducted in Kenya on prenatal care utilization showed that maternal occupation was significantly associated effective use of antenatal care. Expectant mothers who were employed were 2 times more likely to seek early and continued

prenatal care as compared to pregnant women who were housewives and unemployed (Jemutai, F., & Impwii, D. K. 2024).

Regarding socio-economic status, a study conducted in Ghana found that pregnant women in rural areas as well as those with a low wealth index were less likely to seek prenatal care which affects the effective use of antenatal care (Aboagye et al., 2024). Similar research in Uganda shows that expectant mothers with higher income levels are more likely to attend ANC services compared to those with poor socio-economic status. Indicating that poor socio-economic status correlates with lower utilization rates, leading to adverse pregnancy outcomes (Adeyemo et al., 2024).

2.5. Knowledge and awareness of prenatal care among expectant mothers

Awareness and knowledge of the benefits of prenatal care among expectant mothers have been highlighted to be a major factor that influence the decision to seek timely ANC services. Studies have revealed that a significant number of expectant mothers who do not use prenatal care effectively lack awareness and knowledge about the importance of adequate use of prenatal care (Shiferie et al., 2023; Sabari et al., 2023).

For instance, a qualitative study which assesses why pregnant women in low and middle countries report inadequate use of antenatal care found that some expectant mothers especially those in rural settings were of the view that pregnancy is a natural process. Some were of the view that not all pregnancies require additional attention or care unless complications arise (Finlayson & Downe, 2013). Also, others perceive hospital visits and deliveries at health centres were necessary for only pregnancies, deliveries, or medical conditions with serious challenges (Joana et al., 2022). A similar study conducted in central and southern Ethiopia found that many pregnant women do not

seek antenatal care because they do not view pregnancy as a medical condition or disorder, and therefore see no need for healthcare during pregnancy. In this context, a lack of awareness emerges as the primary factor discouraging these women from accessing and utilizing prenatal care services (Shewaye et al., 2023). A current study found that some pregnant women do not attend antenatal care routinely because they felt that they would consult or seek care if they start experiencing complications (Dibaba et al., 2024).

In Tanzania, research which focused on assessing the link between knowledge of complication signs during pregnancy and health-seeking behaviour, found that expectant mothers who noticed any danger signs or symptoms were more likely to visit health facilities or consult a specialist than those who lack knowledge about danger signs of pregnancy (Mwilike et al., 2018). This shows that pregnant women who initiate early antenatal care are more likely to visit regularly due to the education, advice and counseling they receive about the importance of routine care during the ANC sessions. Moreover, a descriptive cross-sectional study in Jamaica among expectant mothers revealed that pregnant women's knowledge regarding prenatal care is significantly associated with the number of ANC visits. Women who with four or more ANC visits had good knowledge about prenatal care as compared to those with less than four visits who showed poor knowledge of prenatal care (Jolly et al., 2022).

Also, a study by Ogboghodo and his group in southern Nigeria (Ogboghodo et al, 2019), indicated that good knowledge of maternal health issues was significantly associated with skilled birth attendance (SBA). Previous research in Manipur found that while the majority (97.9%) of postpartum mothers were aware of the need for timely and routine check-ups during pregnancy, only 55.2% had accurate knowledge of the minimum number of antenatal visits required (Laishram, Thounaojam Ud, Mukhia, & Sanayaima, 2020). On the other hand, a similar study in

the urban settings of Amritsar, Punjab found that 53% of pregnant women, were more abreast with the importance of effective use of antenatal care, out of this proportion 88% were able to tell the minimum number of ANC visits required of a pregnant woman (Kaur et al., 2018).

In the Ghanaian context, a cross-sectional study which was conducted revealed that approximately 79% of expectant mothers had good knowledge about ANC services. However, this knowledge does not always translate into the recommended frequency of visits; only 69% of women had four or more times of ANC visits during pregnancy (Afaya et al., 2020). Another prior study in southwestern Nigeria found no significant link between knowledge and attendance at antenatal clinics (Ogunba and Abiodun, 2017). This finding was confirmed by Mululeke, who also showed that no association was found between educational level of pregnant women and their understanding of antenatal services. (Mululeke, 2017).

2.6. Accessibility and availability of prenatal care to pregnant women

Poor standards of the healthcare system in low and middle-income countries have been reported to be a contributing factor to the ineffective use of prenatal care services. Studies have shown that late and inadequate use of antenatal care is significantly associated with a higher risk of maternal and neonatal disabilities and complications. Inadequate ANC visits have been considered a common risk factor for developing disorders in pregnancy (ChasanTaber et al., 2016). Poor and Non-attendance of ANC by expectant mothers has been linked to challenges of geographical accessibility and poor road networks. The long hours of distance travelled by pregnant women to seek ANC can be a barrier to accessing these healthcare services for their health (Aljouf, 2022.) Similar studies also revealed that distance to health facilities, poor antenatal care schedules, and

quality of care received by consumers are factors that influence the timing and adequacy of ANC utilization (Jiwani et al., 2020; Tessema et al., 2022).

2.7. Cultural beliefs and practices that influence prenatal care utilization

Cultural beliefs and practices in societies have been noticed to significantly influence prenatal care utilization. Early studies among pregnant women in both low and middle-income countries have found that traditional beliefs and certain practice of expectant mothers greatly influence their choice of seeking antenatal care and even the diet to take during the entire phase of pregnancy (Nove et al., 2020; Jiwani et al., 2021). A study by Kusila and colleagues in Indonesia found that some beliefs dictate and instill dietary restrictions, social life and healthcare practices in pregnant women which limit their access and utilization of prenatal care services (Kusila et al., 2023). In Kenya, research shows that many pregnant women use home remedies as a recommendation from their trusted traditions norms rather than seeking antenatal services at the health centres (Ngotie et al., 2024). According to Musie and colleagues in their studies in Nigeria showed that , cultural beliefs and practices such as confinement, delay initiation and utilization of antennal care due to perceived fear of evil forces. These practices predispose expectant mothers to a higher risk of developing preventable maternal complications and mortalities (Musie et al., 2022).

Similarly in Ghana, a significant number of pregnant women use herbal medications due to personal beliefs and perceptions regarding the spiritual benefits of those local treatments. Studies from the southern part of Ghana have shown that socio-cultural beliefs and practices are widespread affecting the effective use of antenatal and postnatal care services among the obstetric population (Joana et al., 2022). Some also believe that early initiation of ANC would expose their unborn babies to harmful spirits and evil forces. Thus, protecting their pregnancies from evil forces results in confinement and consequently a the late seeking of prenatal care (Gbene et al.,

2024). A qualitative study amongst pregnant women in the south Tongu District, Ghana, revealed that societal and cultural beliefs tend to affect adequate use of essential maternal and child health practices (Barbi et al., 2021).



CHAPTER THREE

3.0 METHODS

3.1 Study design

This study was a cross-sectional study which employed the use of questionnaires and an observational checklist to collect data from a representative sample of pregnant women attending antenatal clinics.

3.2 Study area

The study took place in the Shai Osudoku District within the Greater Accra Region. The district shares its borders with the North Tongu District to the north-east, the Upper Manya District and Yilo Krobo Municipality to the north-west, the Akwapim North Municipality to the west, the Kpone Katamanso Municipality to the south-west, and the Ningo-Prampram District to the east. According to the 2021 population and housing census, the Shai Osudoku District has a population of 51,913 with approximately 13,269 constituting females within 15-49 years of age. The report shows that the majority of the district's population (56.7%) is made up of individuals between the ages of 15 and 64 (Afull et al.,2022).

The Shai Osudoku District has 5 sub-districts which operate under the District Health Directorate namely, Dodowa, Ayikuma, Agomeda, Duffor and Osudoku with 38 various facilities that provide quality health care to the doorsteps of people living in and around the communities within the various sub-districts. Among these facilities is the Shai-Osu Doku District Hospital.

3.3 Shai-Osudoku District Hospital and Prenatal Care

The Shai-Osudoku District Hospital is situated in the Shai-Osudoku District at Dodowa in the Greater Accra region in Ghana. The hospital has a 244-bed capacity, with 14 wards and 2

operation theatres. The hospital serves as the referral Hospital not to only the district but to other districts and regions nearby. The Shai-Osudoku District Hospital plays an integral role in antenatal care services for pregnant women seeking prenatal care services.

The ANC department provides pre-screening to identify normal and “at-risk” pregnancies. The unit provides pregnancy education through visual and audio display and counselling to expectant mothers and families, as well as treatment of conditions.

3.4 Study Population

The study population were pregnant women seeking antenatal care at the Shai-Osu Doku District Hospital during November 2023 and consented to participate in this study. The eligible pregnant women for this study were selected from the overall expectant mothers attending antenatal clinics (ANC) at the Shai-Osu Doku District Hospital at the time of the study. A purposive sampling technique was employed to select this health facility due to the trends in prenatal care utilization which was a public concern and requires investigation.

3.5 Sampling Technique

A convenient sampling technique was used to select study participants. Pregnant women attending antenatal care at Shai Osu Doku Hospital during the study period were recruited into the study.

3.5.1 Inclusion criteria

Pregnant women 28 weeks of gestation who were attending the antenatal clinic at the Shai-Osu Doku District Hospital during November 2024 were included in the study. To minimize recall biases, selected participants who had their ANC record books available were reviewed to confirm gestational age and ANC history.

3.5.2 Exclusion criteria

Pregnant women who met all the inclusion criteria but due to some reasons cannot be part of the study were exempted from the study. Also, expectant mothers who were seeking antenatal care but were admitted for intensive care or emergency treatment were not included in the study.

3.6 Variables.

The following variables were considered in this study.

3.6.1 Dependent Variables.

The dependent variable for this study was prenatal care utilization. Prenatal care utilization was measured on the basis of the number of ANC visits during pregnancy. The level of prenatal care utilization was measured on two levels: adequate utilization and inadequate utilization.

Table 1a. Below is the operational definition and scale of measurement for the dependent and independent variables.

3.6.2 Independent variables.

The independent variables of this study were; socio-demographic factors (age, education level, place of residence, tribe, occupation, religious affiliation, marital status, and decision-making at home), accessibility and availability of prenatal care services (number of times of antenatal visits, availability of skilled health care provider, proximity to the antenatal centre, road network, cost of antenatal care services, community outreach programs promoting antenatal care utilization) and awareness and knowledge of prenatal care (where did you hear about antenatal care, knowledge on the importance of prenatal care, previous experience of antenatal care).

Table 1: Operational definition and scale of measurement of dependent and independent variables

Dependent variable	Operational definition	Scale of measurement	Source of data
Prenatal Care Utilization	Adequate utilization, Partial Utilization or No Utilization. Adequate utilization: Have had eight visits. Partial: Have had at least one visit. No visit: Had no visit	Categorical: - Adequate - Partial - No visit	Antenatal card
Independent variables			
Socio-Demographic Factors			
Age	Age in completed years	Continuous	Questionnaire
Level of education	“Highest level of education attained by the woman -No education. -Primary education -Senior high/vocational -Tertiary education”	Ordinal: -None -Primary education -Secondary education -Tertiary education	Questionnaire
Place of residence	Where the woman resides Rural- those residing in remote areas in the region and outside.	Nominal: -Urban -Rural	Questionnaire
Occupation	Occupation of the woman	Ordinal: -Civil servant/NGO -Student -Self-employed -Unemployed	Questionnaire
Marital status	Legally defined marital state	Binary: - -Married -Single -Cohabiting	Questionnaire

Religion	Religion denomination of pregnant woman.	Nominal: -Christian -Muslim -Traditional -other	Questionnaire
Tribe	Tribe of the pregnant woman	Nominal: -Dagomba -Akan -Ga -Mamprusi -Frafra -Ewe	Questionnaire
Decision-making at home	Pregnant woman's Involvement in decision-making at home.	Nominal: -Husband only -Wife only -Husband and wife only	Questionnaire
Accessibility and Proximity of antenatal care services.			
Ease of access	Accessibility of antenatal services by pregnant women in the district.	Nominal: - Easy, -very Easy, -Neutral, -Difficult, -Very Difficult	Questionnaire
Insurance status	Enrolled on the National Health Insurance Scheme (NHIS).	Binary: -Yes -No	Antenatal card
Challenges in Access	How difficult it is for pregnant women to access antenatal care.	Nominal: -Hypertension -Diabetes mellitus -Sickle cell disease	Questionnaire
Trust in Healthcare providers	The trust expectant mothers have in antenatal care service providers.	Binary -Yes -No	Antenatal Card
Health seeking behaviour	How often do pregnant women seek prenatal care services.	Nominal: Regularly, Occasionally, Rarely or Never	Questionnaire

Satisfaction with ANC services	Whether pregnant women are satisfied with the antenatal services they receive.	Binary -Yes -No	Questionnaire
Obstetric factors			
Parity	The number of times a woman had given birth to a fetus with a gestational age of 28 weeks or more.	Ratio	Questionnaire
Antenatal Visits	Number of times a woman has attended antenatal care. in the index pregnancy.	Interval	Antenatal Card
Multiple pregnancies	The number of times a woman had given birth to a twin or more	Ratio	Questionnaire and Antenatal card
Gestational age	Age in weeks of the pregnancy.	Ratio	Questionnaire
Gravida	The number of times the woman has been pregnant.	Ratio	Antenatal card
Expecting pregnancy	Was the woman expecting the pregnancy.	Binary: -Yes -No	Questionnaire
Gestational age at booking ANC	The gestational age at which the pregnant woman registered for the first antenatal visit.	Ratio	Questionnaire and antenatal card
Abortion	When pregnancy ends so that does not result in the birth of a child.	Binary: -Yes -No	Antenatal Card
Knowledge and awareness of prenatal care			

Importance of antenatal care	Are expectant mothers aware of the benefits of prenatal care service.	Binary: -Yes - No	Questionnaire
Perceptions about prenatal care	Different views about the concept of prenatal care.	Nominal	Questionnaire
Source of information about antenatal care	Where pregnant women first heard about prenatal care or antenatal care.	Nominal: -Health centre -Family members or friends -Community outreach programs	Questionnaire
Concerns about antenatal care services	Some experience of concern or information pregnant women had about antenatal care that needs to be addressed.	Nominal	Questionnaire
Cultural beliefs and practices of expectant mothers			
Traditional beliefs about prenatal care	Whether expectant mothers' traditional beliefs support prenatal care.	Binary: -Yes -No	Questionnaire
Influence of family members or community norms on prenatal care	Are family members of pregnant women in support of seeking antenatal care.	Binary: -Yes -No	Questionnaire
Cultural views and beliefs regarding antenatal	Whether seeking antenatal care challenges the cultural views of expectant mothers.	Nominal: -Yes -No -Not sure	Questionnaire

3.7 Sample size determination

The sample size for the study was calculated using the Yamane formula. The formula is appropriate for calculating the sample size for this type of study.

$$n = [z^2 * p * (1-p) / e^2] / [1 + (z^2 * p * (1-p) / (e^2 * N))],$$

Where:

n = the sample size

N = population size

Z = 1.28 for a confidence level (α) of 80%,

e = margin of error, a customary 5% margin, or 0.05, for precision

Hence, $z = 1.28$, $p = 0.5$, $N = 300$, $e = 0.05$

$$n = [1.282 * 0.5 * (1-0.5) / 0.052] / [1 + (1.282 * 0.5 * (1-0.5) / (0.052 * 300))]$$

$$n = 163.84 / 1.5461 = 105.968$$

$$n = 106$$

3.7 Data Collection Techniques and Protocol

A quantitative closed-ended structured questionnaire which addresses the study objectives was used to collect data from study participants. The questionnaire was partly adapted from the WHO-focused antenatal care (FANC) utilization model. Most of the information that was provided by the pregnant women was also verified from their antenatal books.

Well-trained research assistants were employed in the data collection. The questionnaire was designed in the English language; however, the questions were explained to participants in a language that they were conversant with (i.e., Ga, Twi), to ensure better understanding of participants, especially those who had challenges with speaking and understanding the English language.

The questionnaire used for the study was in 5 sections namely sections A, B, C, D, and E. Section A captured data the socio-demographic characteristics of respondents, Section B on the obstetric characteristics of respondents, Section C on knowledge and awareness of antenatal care services and section D collected information on issues regarding healthcare services availability and accessibility. The questionnaire is attached as (Appendix 1). The Participants' medical records on their pregnancy statues were reviewed to confirm the determination of their eligibility for the

study. The data collection tools were forward and back translated into Dangbe, Ewe, Twi and Ga as well as pretested in the field before use to test the validity and reliability of the questionnaire.

Two data collectors (midwives in the facility) went on a two-day training led by the researcher to ensure the quality of the field exercise. The training also centered on how to fill the questionnaires and the informed process. Interpreting the questions from English to local dialects and filling out the questionnaire.

3.8 Quality Control

Experienced research assistants were engaged and trained on how to obtain informed consent during data collection as well as the protocols to follow to ensure data quality. The study's goals and objectives, the methods for collecting data, and the ethical standards for data collection were also covered in the training session. Monitoring activities were done by the principal investigator to ensure reliability and validity. The data extraction tool was checked for errors and complete and appropriate corrections were made before data was entered into the statistical software for analysis.

3.9 Data Processing and Analysis.

Collected data was entered into Microsoft Excel version 2016 spreadsheet, cleaned and then exported to STATA VERSION 17 for analysis. Descriptive analysis was performed and expressed in the form of frequencies and percentages. Pearson's Chi-square test of independence, Fisher's exact test and logistic regression analyses were carried out to determine the association between independent factors influencing prenatal care utilization among expectant mothers seeking antenatal care at the Shai-Osu Doku District Hospital. Factors that were significantly associated with prenatal care utilization in the bivariate analysis level at 5% were assessed in univariate and

multivariate ordinal logistic regression analyses. Multivariate logistic regression analysis was done and reported as odds ratio (aOR) with 95% confidence intervals (CI). P-values <0.05 were used to assess the significance of statistical tests.

3.10. Ethical Consideration

Ethical clearance was obtained from the Ethics Review Committee of the Ghana Health Service. Permission was sought from the Shai Osu Doku District Health Directorate to use the Shai Osu Doku District Hospital as my study site for data collection. Permission was also sought from all Departmental Heads. Informed consent was sought from the pregnant women before enrollment into the study. Confidentiality was assured by identifying participants by a assigned and unique number and not by their names. Study participants were given enough information about the purpose, procedure, risks, and benefits of participating in the study. Pregnant women who could not read the consent form were read and explained to them.

3.11. Voluntary participation

All pregnant women who were involved in the study were duly informed of their right to partake or drop out at any point in time

3.12. Risks

Participants were not exposed to any form of physical risk as far as the study was concerned. However, some participants were psychologically stressed and anxious during the period of the study, particularly during the interviews. These participants were counselled and found emotionally and psychologically stable, but they were excluded from the study. Additionally, participants were informed that they were free to decline to answer any of the questions asked or to withdraw from the study at any time they felt the questions were triggering a strong emotional

response. Administration of the questionnaire was conducted in a private location for each respondent to ensure that others were not privy to the respondent's responses.

3.13. Compensation

There was no payment whether physical or in-kind to participants. Participants did not bear any cost in participating in the research. However, participants were told that involvement in the study would be highly recognized and appreciated. Even though the participants may not benefit directly from the study, however, their contribution would be of great benefit to policymakers.

3.14. Informed Consent

Consent was sought before any interview was conducted. This was done by explaining the purpose of the study to the participants to ensure they acquired the needed information about the study. Those who refused to give their consent were not forced and participants had the choice to opt out at any point in time.

3.15. Confidentiality

Participants were assured of the confidentiality of all information that we obtained from them. Their identities were kept unknown and in situations where they would be referenced, their privacy was told to be strictly confidential.

3.16. Storage and Sharing of Participants Information/data

The data from this study were stored safely in a file, away from access by any third party. This data was then transferred onto a Microsoft Excel template and backed up to prevent loss of data.

The data generated from this study was solely for the principal investigator's use and only be shared with other individuals or organizations for studies concerning prenatal care utilization.

3.17. Dissemination plan

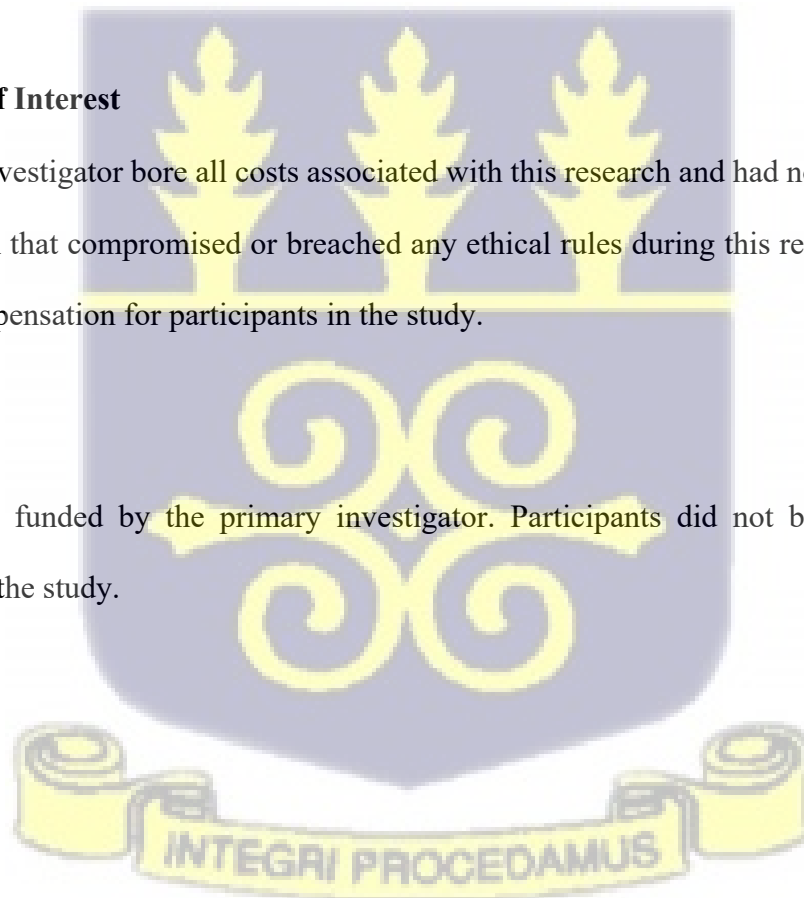
Participants were assured that the findings of this study will be shared in a manner that is ethical, effective, and beneficial to all relevant stakeholders. This will enhance the understanding of the factors associated with prenatal care utilization and the trends of prenatal care utilization. Also, this means of dissemination will provide evidence-based recommendations that can influence healthcare policies and clinical practices, which will empower expectant mothers and enhance maternal health.

3.18. Conflict of Interest

The principal investigator bore all costs associated with this research and had no personal interest or consideration that compromised or breached any ethical rules during this research. There was no form of compensation for participants in the study.

3.19. Costs

This study was funded by the primary investigator. Participants did not bear any costs for participation in the study.



CHAPTER FOUR

4.0 RESULT

4.1 Introduction

This chapter presents the results of the study. The first section presents the sociodemographic characteristics of study participants. This is followed by the awareness and knowledge of expectant mothers regarding prenatal care utilization. The third section presents the availability and accessibility of prenatal care services to expectant mothers, and the final section focuses on the exploration of cultural beliefs, practices and obstetric factors that influence expectant mothers' decision-making on prenatal care utilization.

4.2 Prenatal care Utilization among pregnant women attending ANC at Shai-Osu Doku District Hospital.

A total of 106 pregnant women within 28- 40+ weeks of gestation attending the antenatal clinic at the Shai-Osu Doku District Hospital were studied. Out of the total participants, more than half of the respondents 68 (63.55%) had four (4) or more ANC visits, twenty-eight (26.17%) had 2-3 ANC visits and 11(10.2%) had only one visit. Figure 2 below shows the pictorial view of prenatal care utilization among study participants.

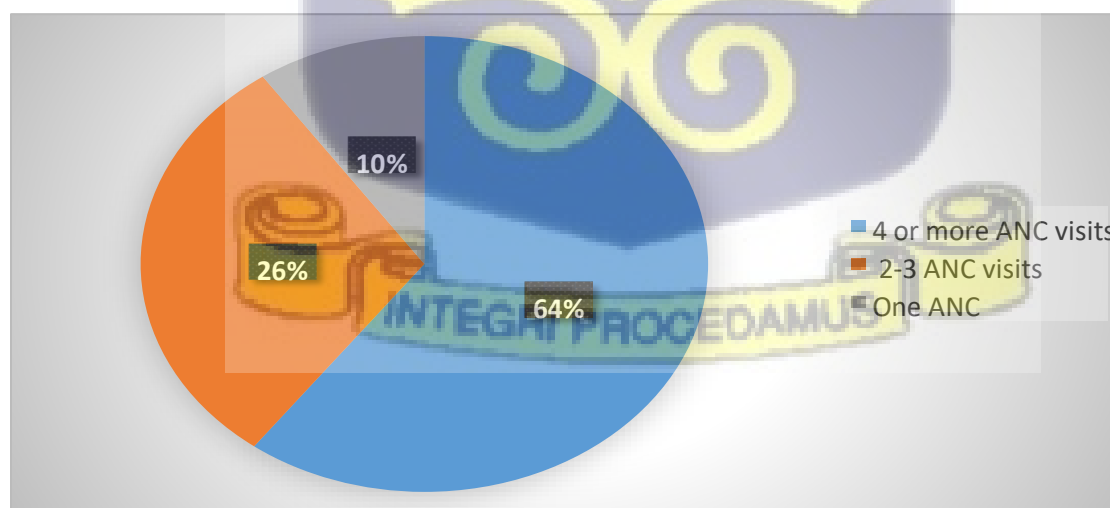


Figure 2: Prenatal care utilization among study participants (n=106)**Table 2:** Rate of prenatal care utilization among pregnant women from 28-41 weeks of gestation at the Shai- Osu Doku District Hospital.

Utilization Rate	Frequency (n=106)	Percentage (%)
Adequate (4 or more ANC visits)	68	64.15
Partial (1-3 ANC visits)	38	35.84

4.3 Sociodemographic characteristics of pregnant women.

The first specific objective of this study was to determine the sociodemographic factors associated with prenatal care utilization. This study assessed eight sociodemographic factors that may influence prenatal care utilization. Table 3 below shows the sociodemographic characteristics of the expectant mothers who participated in the study.

Out of the 106 expected mothers, forty-five (42.45%) of the pregnant women were between 26 and 31 years of age, while twenty-eight (26.42%) of them were within 18-24 years of age. When we looked at the educational status, 7(6.60%) of the expectant mothers were illiterate but 34(32.07%) of the study participants had educational status above the primary level. Regarding marital status 97(91.57%) of the pregnant women were married. In terms of occupation, 33(31.13%) of the pregnant women were unemployed. The majority of the expectant mothers 77(72.64%) were urban residents, regarding religion, 94(88.68%) of the study participants were Christians.

In terms of tribe, forty-six (43.40%) of the pregnant women were Krobo and 48(45.28%) comprised Ga, Akan and Ewe. Of the total participants, 59(55.66%) were from homes where decisions are made by husband and wife only.

Table 3: Sociodemographic characteristics of the expectant mothers.

Variable	Frequency	Percentage (%)
Age group (in years)		
18-24	28	26.42
25-31	45	42.45
32- 38	27	25.47
≥ 39	6	5.66
Education		
No formal education	7	6.60
Primary	31	29.25
Junior High School	30	28.30
Senior High School	16	15.09
Tertiary	18	16.98
Other	4	3.77
Marital Status		
Single	9	8.49
Married	97	91.51
Religion		
Christians	94	88.68
Muslims	12	11.32
Occupation		
Unemployed	33	31.13
Farmer	8	7.55
Trader	51	48.11
Artisan	6	5.66
Civil Servant	5	4.72
Other	3	2.83
Residence		
Rural	29	27.36
Urban	77	72.64
Tribe		
Krobo	46	43.40

Ga	27	25.47
Akan	14	13.21
Ewe	7	6.60
Dagomba	8	7.55
Frafra	4	3.77
Decision making at home		
Wife only	36	33.96
Husband only	11	10.38
Husband and wife only	59	55.66

4.4 Association between sociodemographic factors and prenatal care utilization.

In the Pearson chi-square and fisher's exact test (bivariate analysis), educational status and residence were found to be significantly associated with prenatal care utilization ($p=0.035$), ($p=0.010$) as shown in Table 4. The age of the expectant mothers was not significantly associated with prenatal care utilization ($p=0.153$). Also, religion, marital status and occupation of the study participants were not significantly associated with prenatal care utilization ($p=0.792$), ($p=0.640$) and ($p=0.729$) respectively. Tribe and decision making at home of the respondents did not show any significant association with prenatal care utilization ($p=0.223$) ($p=0.0907$). (Table 4).

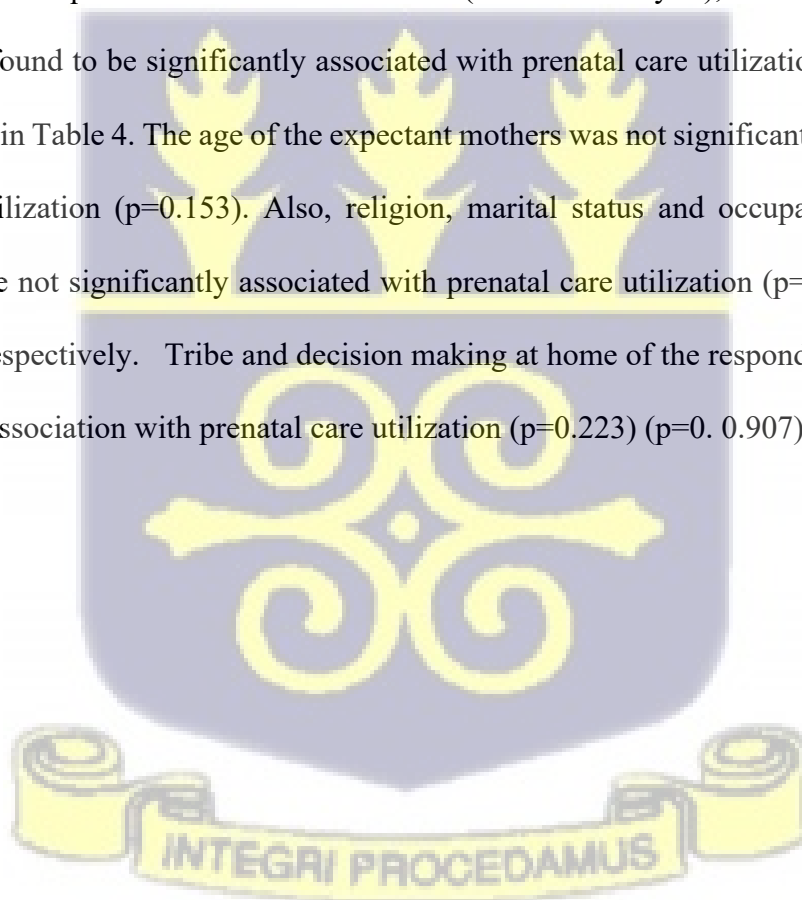


Table 4: Association between sociodemographic factors and prenatal care utilization

Variable	Prenatal care utilization (N=106)		Chi-Square (X ²)	P-value
	Partial Utilization n (%)	Adequate Utilization n (%)		
Age group (years)			5.27	0.153
18-24	19(28.36)	9(.50)		
25-31	32(47.76)	13(33.33)		
32- 38	14(20.90)	13(33.33)		
≥ 39	2 (2.99)	4(10.26)		
Educational			11.97	0.03
No formal education	4(5.97)	3(7.69)		
Primary	22(32.84)	9(23.08)		
Junior High School	24(35.82)	6(15.38)		
Senior High School	7(10.45)	9(23.08)		
Tertiary	7(10.45)	11(28.21)		
Others	3(4.48)	1(2.56)		
Marital Status			0.22	0.640
Single	7(10.45)	3(7.69)		
Married	60(89.55)	36(92.31)		
Religion			*	0.792
Christians	59(88.06)	35(89.74)		
Muslims	8(11.94)	4(10.26)		
Occupation			*	0.729
Unemployed	23(34.33)	10(25.64)		
Farmer	5(7.46)	3(7.69)		
Trader	30(44.78)	21(3.85)		
Artisan	4(5.97)	2(5.13)		
Civil Servant	4(5.7)	1(2.56)		
Others	1(1.49)	2(5.13)		
Residence			6.56	0.010
Rural	24(35.82)	5(12.82)		
Urban	43(64.18)	34(87.18)		
Tribe			6.97	0.223
Krobo	30(44.78)	17(43.59)		
Ga	21(31.34)	7(17.95)		
Akan	6(8.96)	8(20.51)		
Ewe	4(5.97)	4(10.26)		
Dagomba	3(4.48)	3(7.69)		

Variable	Prenatal care utilization (N=106)		Chi-Square (X ²)	P-value
	Partial Utilization n (%)	Adequate Utilization n (%)		
Frafra	3(4.48)	0(0.00)	0.19	0.907
Decision making at home				
Wife only	22(32.84)	14(35.90)		
Husband only	6(8.996)	4(10.26)		
Husband and wife only	39(58.21)	21(53.85)		

Note: *Fisher's exact

4.5 Univariate analysis of association between socio-demographic factors and prenatal care utilization.

In the univariate logistic regression, residence and education were the only socio-demographic factors found to be statistically associated with prenatal care utilization.

Expectant mothers with primary education had 26% an increase in the odds of having adequate prenatal care (cOR=0.26, 95%, CI: 0.07-0.89) as compared to those with tertiary education. Pregnant women with secondary education also had 15% increased odds of having adequate prenatal care (cOR=0.15, 95%, CI: 0.04-0.58) compared to those with tertiary education. However, pregnant women with no education/illiterate had 53% decreased odds of having adequate prenatal care (cOR=0.47, 95%, CI: 0.81-2.80) compared to those with tertiary education. The univariate logistic analysis showed that study participants from rural areas had 74% reduced odds of having adequate prenatal care (cOR=0.26, 95%, CI: 0.09-0.76) compared to those from urban areas.

Details of the association of sociodemographic characteristics and prenatal care utilization is shown in Table 5 below.

Table 5: Univariate analysis of sociodemographic factors associated with adequate prenatal care

Age group years					
18-24	19(28.36)	9(23.08)	0.23	[0.04-1.54]	0.132
25-31	32(47.76)	13(33.33)	0.95	[0.03-1.25]	0.143
32- 38	14(20.90)	13(33.33)	0.95	[0.07-2.98]	0.418
≥ 39	2 (2.99)	4(10.26)	Reference		
Educational					
No formal education	4(5.97)	3(7.69)	0.47	[0.81-2.80]	0.413
Primary	22(32.84)	9(23.08)	0.26	[0.07-0.89]	0.031
Junior High School	24(35.82)	6(15.38)	0.75	[0.04-0.58]	0.006
Senior High School	7(10.45)	9(23.08)	0.82	[0.21-3.22]	0.927
Tertiary	7(10.45)	11(28.21)	Reference		
Others	3(4.48)	1(2.56)	0.21	[0.18-2.46]	0.215
Marital Status					
Single	7(10.45)	3(7.69)	0.71	[0.17-2.32]	0.641
Married	60(89.55)	36(92.31)	Reference		
Religion					
Christians	59(88.06)	35(89.74)	Reference		
Muslims	8(11.94)	4(10.26)	1.86	[0.33-4.22]	0.792
Residence					
Rural	24(35.82)	5(12.82)	0.26	[0.09-0.76]	0.014
Urban	43(64.18)	34(87.18)	Reference		
Occupation					
Unemployed	23(34.33)	10(25.64)	Reference		
Farmer	5(7.46)	3(7.69)	1.38	[0.27-6.92]	0.695
Trader	30(44.78)	21(3.85)	1.61	[0.63-4.07]	0.315
Artisan	4(5.97)	2(5.13)	1.15	[0.18-7.33]	0.882
Civil Servant	4(5.7)	1(2.56)	0.57	[0.05-5.81]	0.639
Other	1(1.49)	2(5.13)	0.46	[0.37-5.67]	0.231
Tribe					
Krobo	30(44.78)	17(43.59)	Reference		
Ga	21(31.34)	7(17.95)	0.58	[0.20-1.66]	0.318
Akan	6(8.96)	8(20.51)	2.35	[0.69-7.92]	0.167
Ewe	4(5.97)	4(10.26)	1.76	[0.39-7.97]	0.460
Dagomba	3(4.48)	3(7.69)	1.75	[0.32-9.73]	0.514
Frafra	3(4.48)	0(0.00)	1.00	empty	
Decision making at home					
Wife only	22(32.84)	14(35.90)	1.18	[0.50-2.78]	0.702
Husband only	6(8.996)	4(10.26)	1.23	[0.34-4.88]	0.760
Husband and wife only	39(58.21)	21(53.85)	Reference		

4.6 Multivariate analysis of association between socio-demographic factors and prenatal care utilization

A multivariable logistic regression analysis was done for variables that were significant at 5% significance level in the univariate analysis. The analysis showed that education and residence were statistically associated with prenatal care utilization. However, other socio-demographic factors were not associated with prenatal care utilization.

In the multivariate analysis, education and residence were the only sociodemographic predictors of prenatal care utilization. Expectant mothers who were illiterate had 25% reduced odds of having adequate prenatal care utilization (aOR= 0.75, 95%, CI: 0.11-5.02) compared to women with tertiary education. Study participants with secondary level of education had an 18% increase odd of having adequate prenatal care (aOR= 0.18), 95% CI: 0.04-0.69) compared to those with tertiary education. Additionally, pregnant women from rural areas had 71% reduced odds of having adequate prenatal care (aOR= 0.29, 95% CI:0.09-0.93) compared to women from urban areas.

(Table 6)

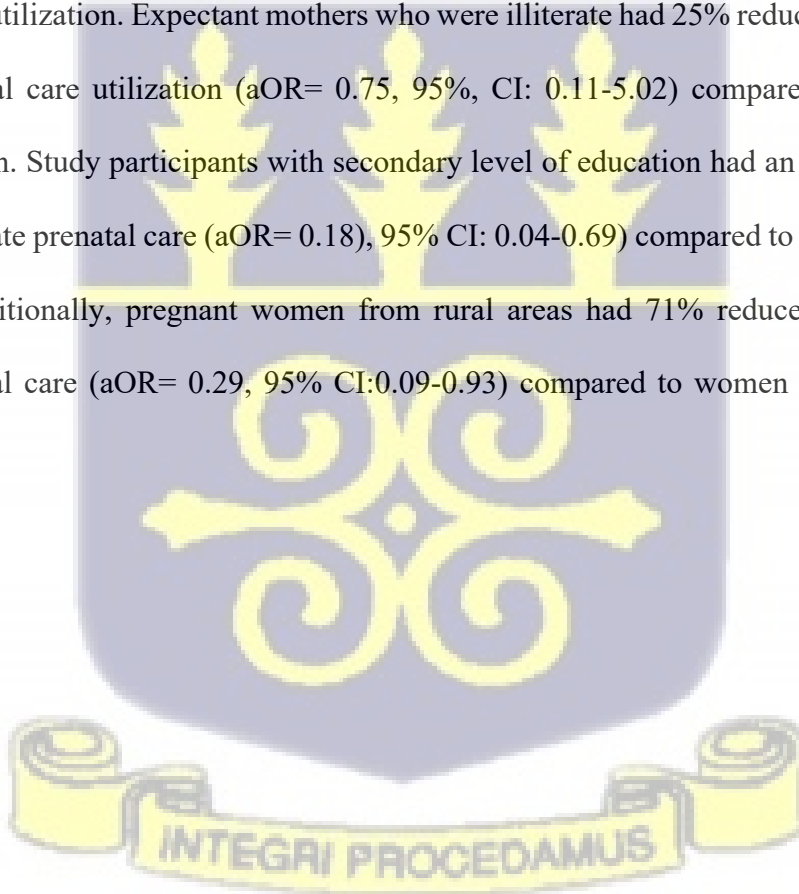
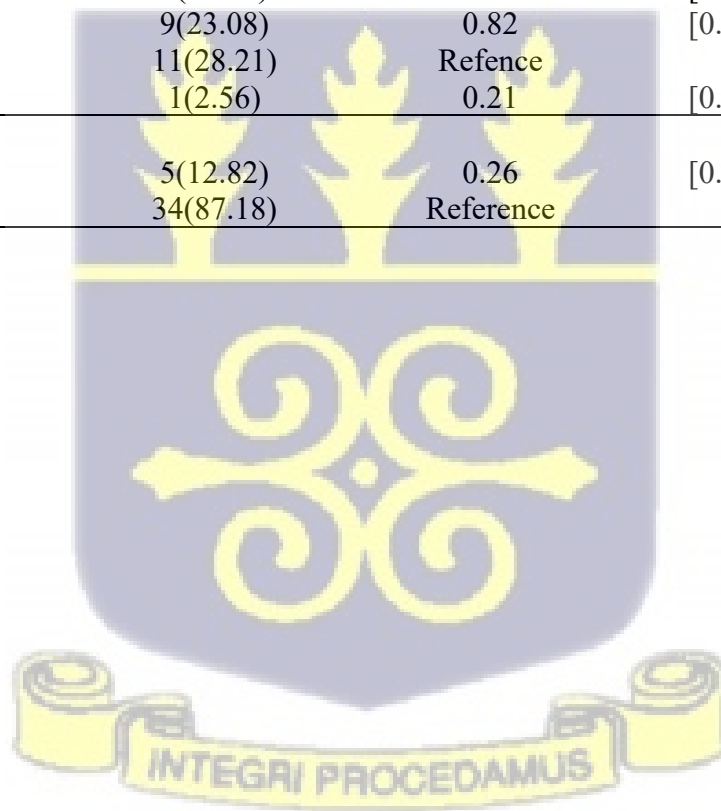


Table 6: Multivariate analysis of sociodemographic factors associated with prenatal care utilization

Prenatal Care Utilization						
Variable	Partial Utilization	Adequate Utilization	Odds Ratio		AOR	Odds Ratio [95% CI]
	n(%)	n(%)	Crude OR	[95% CI]		
Educational						
No formal education	4(5.97)	3(7.69)	0.47	[0.81-2.80]	0.75	[0.11-5.02]
Primary	22(32.84)	9(23.08)	0.26	[0.07-0.89]	0.27	[0.07-0.98] **
Junior High School	24(35.82)	6(15.38)	0.15	[0.04-0.58]	0.18	[0.04-0.69] **
Senior High School	7(10.45)	9(23.08)	0.82	[0.21-3.22]	0.71	[0.17-2.64]
Tertiary	7(10.45)	11(28.21)	Refence			
Other	3(4.48)	1(2.56)	0.21	[0.18-2.46]	0.21	[0.01-2.64]
Residence						
Rural	24(35.82)	5(12.82)	0.26	[0.09-0.76]	0.29	[0.09-0.93] **
Urban	43(64.18)	34(87.18)	Reference			

Note: **Statistically significant



4.7 Knowledge and Awareness of prenatal care utilization among expectant mothers.

The second specific objective of this study was to assess knowledge, awareness and importance of prenatal care utilization amongst pregnant women. The results from the knowledge and awareness about prenatal care utilization analysis is presented in Table 7.

Of the 106 pregnant women interviewed, 96 (90.57%) had heard of prenatal care/antennal care (ANC, and had utilized it during their pregnancy. Furthermore, and 81(76.42%) had heard of it for the first time during their the first antenatal clinic visits. Out of the total study participants of 106, only 47 (44.34%) knew the recommended gestational age to register for ANC. Eighty-nine (83.6%) of the participants believed that it was beneficial for a pregnant woman to register for ANC and take the benefits it offers at least within the first two months of pregnancy. Ninety-five (89.62%) of the expectant mothers were of the view that prenatal care protects against potential pregnancy complications. Also, about 98 (93.33%) of respondents responded that ANC has had a positive pre-and-postnatal impact on their lives and their babies. Ninety-one 91(85.85%) indicated that the risk of probably risk of pregnancy complications influenced their decision to seek prenatal care.

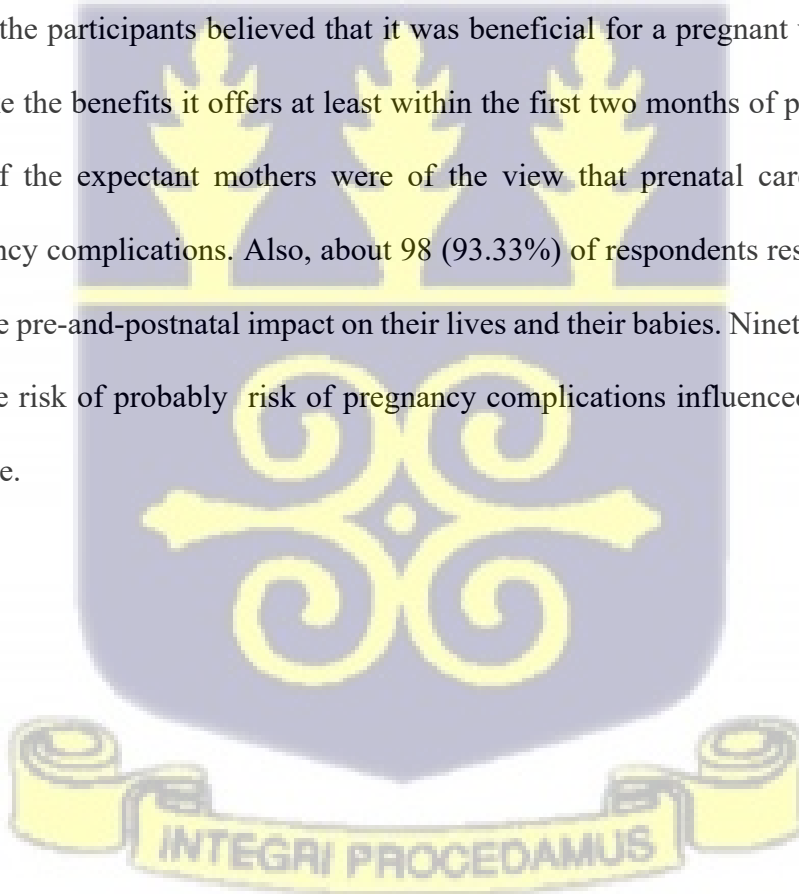


Table 7: Knowledge and awareness of prenatal care among expectant mothers

Variable	Frequency	Percentage (%)
Have heard of ANC Utilization		
Yes	96	90.57
No	10	9.43
Where did you first hear of it?		
On the media (tv, radio, etc)	8	7.55
Family and friends	6	5.66
During antenatal clinic visits	81	76.42
In school	4	3.77
Other	7	6.60
What is the recommended gestational age for ANC		
Correct	47	44.34
Incorrect	43	40.57
No idea	16	15.09
Is it advantageous to start ANC with the first two months pregnancy?		
No	10	9.43
Yes	89	83.6
No idea	7	6.60
Reason for ANC		
To protect against pregnancy complications	95	89.62
No knowledge	11	10.34
List ANC preventable complications/diseases		
One correct disease mentioned	71	66.98
Two or more correct diseases mentioned	25	23.58
No idea	10	9.43
Has pregnancy complications influenced your decision to seek ANC?		
Yes	91	85.85
No	15	14.15
Do you believe ANC has pre and postnatal positive impact?		
No	7	6.67
Yes	98	93.33

4.8 Relationship between expectant mothers knowledge/awareness and prenatal care utilization.

In the Person chi-square and fisher's exact test analysis, knowledge on recommend gestational age for ANC ($p=0.002$), advantageous to start ANC within the first two months of pregnancy ($p=0.014$) and reasons why pregnant women attend pregnancy ($p=0.008$) were significantly associated with prenatal care utilization.

Other factors such as: Heard of ANC utilization ($p=0.640$), placed first head of ANC ($p=0.023$), list of ANC preventable complications/ diseases($p=0.659$), pregnancy complications influenced decision to seek ANC ($p=0.764$) and believe that ANC has pre and postnatal positive impact($p=0.627$) were not statistically associated with prenatal care utilization. (Table 8)

Table 8: Association between pregnant women knowledge/awareness and prenatal care utilization.

Variable	Prenatal care utilization (N=106)		Chi-Square (X^2)	P-value
	Partial Utilization n (%)	Adequate Utilization n (%)		
Have heard of ANC Utilization			0.22	0.640
Yes	60(89.55)	36(92.31)		
No	7(10.45)	3(7.69)		
Where did you first hear of it?			5.58	0.233
On the media (tv, radio, etc)	4(5.94)	4(10.24)		
Family and friends	6(8.6)	0(0.00)		
During antenatal clinic visits	51(76.12)	30(76.92)		
In school	3(4.48)	1(2.56)		
Other	3(4.48)	4(10.26)		

Prenatal care utilization (N=106)				
Variable	Partial Utilization n (%)	Adequate Utilization n (%)	Chi-Square (X ²)	P-value
What is the recommended gestational age for ANC			12.98	0.002
Correct	19(28.36)	24(61.54)		
Incorrect	10(14.93)	6(15.38)		
No idea	38(6.72)	9(23.08)		
Is it advantageous to start ANC with the first two months pregnancy?			*	0.014
No	9(13.43)	1(2.56)		
Yes	51(76.12)	38(97.44)		
No idea	7(10.45)	0(0.00)		
Reason for ANC			7.14	0.008
To protect against pregnancy complications	56(83.58)	39(100)		
No knowledge	11(16.42)	0(0.00)		
List ANC preventable complications/diseases			0.833	0.659
One correct disease mentioned	46(68.66)	25(64.10)		
Two or more correct diseases mentioned	16(23.88)	9(23.08)		
No idea	5(7.46)	5(12.82)		
Has pregnancy complications influenced your decision to seek ANC?			0.08	0.764
Yes	57(85.07)	34(87.18)		
No	10(14.93)	5(12.82)		
Do you believe ANC has pre and postnatal positive impact?			*	0.627
No	5(7.58)	2(5.13)		
Yes	61(92.42)	37(94.87)		

Note: *Fisher's exact

4.9 Univariate analysis of association between pregnant women knowledge, awareness and prenatal care utilization.

At the univariate logistic regression level, pregnant women knowledge and awareness on recommend gestational age for ANC registration was the only factor found to be statistically associated with prenatal care utilization. (Table 9)

Pregnant women who had no knowledge about the recommended gestational age for ANC registration had 82% chance of reduced odds of seeking prenatal care (cOR=0.18, 95%, CI: 0.07-0.48) compared to pregnant women who had knowledge about the recommended gestational age. Likewise, study participants who gave incorrect responses regarding the recommended gestational age for ANC registration had a 53% reduced odds of seeking prenatal care (cOR=0.47, 95%, CI: 0.14-1.54) compared to those who had the right knowledge about the recommended gestational age for ANC registration.

However, factors such as place heard of ANC utilization, placed first heard of ANC, list of ANC preventable complications/ diseases, pregnancy complications influenced decision to seek ANC, believe that ANC has pre and postnatal positive impact, important to start ANC within the first two months of pregnancy, and reasons why pregnant women attend pregnancy were not associated with prenatal care utilization as shown in table 9 below.



Table 9: Univariate analysis of expectant mothers' knowledge and awareness of prenatal care and its utilization.

Prenatal Care Utilization					
Variable	Partial Utilization n(%)	Adequate Utilization n(%)	Crude OR	[95% CI]	p-value
Have heard of ANC Utilization					
Yes	60(89.55)	36(92.31)	1.40	[0.34-5.75]	0.641
No	7(10.45)	3(7.69)	Reference		
Where did you first hear of it?					
On the media (tv, radio, etc)	4(5.94)	4(10.24)	0.75	[0.09-5.76]	0.09
Family and friends	6(8.6)	0(0.00)	1.0	empty	
During antenatal clinic visits	51(76.12)	30(76.92)	0.44	[0.04-0.58]	0.305
In school	3(4.48)	1(2.56)	0.25	[0.02-3.77]	0.317
Other	3(4.48)	4(10.26)	Reference		
What is the recommended gestational age for ANC					
Correct	19(28.36)	24(61.54)	Reference		
Incorrect	10(14.93)	6(15.38)	0.47	[0.14-1.54]	0.215
No idea	38(6.72)	9(23.08)	0.18	[0.07-0.48]	0.001
Is it advantageous to start ANC with the first three months pregnancy?					
No	9(13.43)	1(2.56)	0.15	[0.02-1.22]	0.077
Yes	51(76.12)	38(97.44)	Reference		
No idea	7(10.45)	0(0.00)	1	empty	
Reason for ANC					
To protect against pregnancy complications	56(83.58)	39(100)	Reference		
No knowledge	11(16.42)	0(0.00)	1	[0.20-0.72]	0.084
List ANC preventable complications/diseases					
One correct disease mentioned	46(68.66)	25(64.10)	1.78	[0.37-2.50]	0.447
Two or more correct diseases mentioned	16(23.88)	9(23.08)	Reference		
No idea	5(7.46)	5(12.82)		[0.40-7.84]	0.447

Prenatal Care Utilization					
Variable	Partial Utilization n(%)	Adequate Utilization n(%)	Crude OR	[95% CI]	p-value
Has pregnancy complications influenced your decision to seek ANC?					
Yes	57(85.07)	34(87.18)	Reference		
No	10(14.93)	5(12.82)	0.84	[0.26-2.65]	0.765
Do you believe ANC have pre and postnatal positive impact?					
No	5(7.58)	2(5.13)	0.65	[0.12-3.57]	0.625
Yes	61(92.42)	37(94.87)	Reference		

4.10 Multivariate Analysis of expectant mothers' knowledge and awareness of prenatal care and its utilization.

Multivariate logistic analysis was done to assess the strength of association of the variables that were significant at the 5% significance level in the univariate analysis. Recommended gestational age for ANC registration was the only variable that was statistically significant with prenatal care utilization. (Table 10). Pregnant women who had no knowledge about recommended gestational age for ANC registration had 78% reduced odds of registering for ANC within the recommended age (cOR=0.22, 95%, CI: 0.08-0.60) compared to pregnant women who had accurate knowledge about the recommended gestational age for ANC registration. Similarly, respondents who gave incorrect responds regarding the recommended gestational age for ANC registration had 56% reduced odds of seeking prenatal care (cOR=0.44, 95%, CI: 0.13-1.49) compared to those who had the right knowledge about the recommended gestational age for ANC registration. Shown in table 10 below.

Table 10: Multivariate analysis of expectant mothers' knowledge, awareness and prenatal care utilization

Prenatal Care Utilization						
Variable	Partial Utilization n(%)	Adequate Utilization n(%)	Crude OR	<u>Odds Ratio</u> [95% CI]	AOR	<u>Odds Ratio</u> [95% CI]
What is the recommended gestational age for ANC						
Correct	19(28.36)	24(61.54)	Refence			
Incorrect	10(14.93)	6(15.38)	0.47	[0.14-1.54]	0.44	[0.13-1.49]**
No idea	38(6.72)	9(23.08)	0.18	[0.07-0.48]	0.22	[0.08-0.60]**
Reason for ANC						
To protect against pregnancy complications	56(83.58)	39(100)	Reference			
No knowledge	11(16.42)	0(0.00)	1.00	[0.20-0.72]	1.00	empty
List ANC preventable complications/diseases						
One correct disease mentioned	46(68.66)	25(64.10)	1.78	[0.37-2.50]	0.80	[0.28-2.31]
Two or more correct diseases mentioned	16(23.88)	9(23.08)	Reference			
No idea	5(7.46)	5(12.82)		[0.40-7.84]	4.12	[0.8-99.24]

Note: **Statistically significant



4.11 Characteristics of accessibility and availability of prenatal care services among pregnant women.

The third specific objective of this study was to assess the characteristics of accessibility and availability of prenatal care services among pregnant women. Table 11 below shows details of prenatal care availability and accessibility characteristics among expectant mothers.

Of the 106 pregnant women, half of them 53 (50.00%) traveled more than 2 hours to assess prenatal care services whilst twenty-two (20.75%) took between under one hour to reach ANC centres from their place of residence. In terms of mode of transportation, majority of the respondents 65(61.32%) use commercial vehicles to antenatal clinics. Similarly, 11(10.38%) responded that the source of transportation to access antenatal clinics was by motor bicycles whilst about 6.6% (7) walked to the antenatal clinics.

Forty-seven (44.34%) of the study participants responded that on a regular basis it cost them more than Ghc20 to reach the facility for ANC services. Only 9 (8.49%) indicated that they spend less than Ghc10 on transportation to the hospital for prenatal care services. Regarding pay for prenatal care services, 85 (80.19%) respondents stated that they do not pay for services because of insurance. Also, majority 102. (96.23%) of the pregnant women indicated that they do not face language barrier during services delivery, usually healthcare providers communicate in language they comprehend. Unfortunately, 17 (16.04%) relay concerns long waiting hours before seeing specialists. On the other hand, 96 (90.57%) of the study responded that they are satisfied with the services they receive. Out of the total expectant mothers who were studied 68(63.55%) had four or more ANC visits but it was 11(10.28%) who had only one ANC visit at the time of the study.

Table 11: Characteristics of accessibility and availability of prenatal care services among pregnant women.

Variable	Frequency	Percentage (%)
Distance to ANC centre (time travelled)		
Less than 30 mins	13	12.26
30-59 mins	22	20.75
1-2 hours	18	16.98
More than 2 hours	53	50.00
Mode of transport to ANC clinic		
Walking	7	6.60
Commercial vehicle	65	61.32
Personal vehicle	23	21.70
Motor bicycle	11	10.38
Cost of transportation to ANC centre		
Less than C10	9	8.49
C10 - C20	43	40.57
More than C20	47	44.34
Not applicable	7	6.60
Required to make payment for ANC services		
No	85	80.19
Yes	21	19.81
Is there language barrier in accessing services		
Yes	4	3.77
No	102	62.3
Long waiting time		
Yes	17	16.04
No	89	83.96
Satisfaction with the level of prenatal care		
Neither satisfied nor unsatisfied	4	3.77
Satisfied	96	90.57
Not Satisfied	6	5.66
Number of antenatal clinic visits		
1	11	10.28
2-3	28	26.17
≥ 4	68	63.55

4.12 Relationship between the characteristics of prenatal care services accessibility and availability and its utilization among pregnant women.

In the Person chi-square and fisher's exact test analysis, Distance to ANC Centre (time travelled) ($p < 0.000$) and long waiting time ($p=0.004$) were statistically associated with prenatal care utilization.

Other factors such as Mode of transport to ANC clinic ($p=0.254$), Cost of transportation to ANC centre ($p=0.097$), language barrier in accessing services ($p=0.577$), required to make payment for ANC services ($p=0.520$), Satisfaction with the level of prenatal care ($p=0.494$) and Number of antenatal clinic visits ($p=0.131$) were not statistically associated with prenatal care utilization. (Table 12)

Table 12: Association between Accessibility and availability of prenatal care services and utilization among expectant mothers.

Variable	Prenatal care utilization (N=106)		Chi-Square (X^2)	P-value
	Partial Utilization n (%)	Adequate Utilization n (%)		
Distance to ANC centre (time travelled)			46.03	<0.000
Less than 30 mins	3(4.48)	10(25.64)		
30-59 mins	6(8.96)	16(41.03)		
1-2 hours	8(11.94)	10(25.64)		
More than 2 hours	50(74.63)	3(7.69)		
Mode of transport to ANC clinic			*	0.254
Walking	2(2.99)	5(12.82)		
Commercial vehicle	42(62.69)	23(58.97)		
Personal vehicle	16(23.88)	7(17.95)		
Motor bicycle	7(10.45)	4(10.26)		

Prenatal care utilization (N=106)				
Variable	Partial Utilization n (%)	Adequate Utilization n (%)	Chi-Square (X ²)	P-value
Cost of transportation to ANC centre			6.32	0.097
Less than ₵10	4(5.97)	5(12.82)		
₵10 - ₵20	23(34.33)	20(51.28)		
More than ₵20	34(50.75)	13(33.33)		
Not applicable	6(8.96)	1(2.56)		
Required to make payment for ANC services			0.41	0.520
No	55(82.09)	30(76.92)		
Yes	12(17.91)	9(23.08)		
Is there language barrier in accessing services			0.31	0.577
Yes	65(97.01)	37(94.87)		
No	2(2.99)	2(5.13)		
Satisfaction with the level of prenatal care			*	0.494
Neither satisfied nor unsatisfied	3(4.48)	1(2.56)		
Satisfied	59(88.06)	37(94.87)		
Unsatisfied	5(7.46)	1(2.56)		
Number of antenatal clinic visits			4.06	0.131
1	10(14.93)	1(2.56)		
2-3	17(25.37)	11(28.21)		
≥ 4	40(59.70)	27(69.23)		
Long waiting time			8.32	0.004
Yes	16(23.88)	1(2.56)		
No	51(76.12)	38(97.44)		

Note: *Fisher's exact

4.13 Univariate analysis of association between pregnant women knowledge, awareness and prenatal care utilization.

At the univariate logistic regression level, distance to ANC centre (time travelled) and long waiting time factor were found to be statistically associated with prenatal care utilization. (Table 13)

Pregnant women who take more than two hours distance long to reach the hospital for prenatal care had 79% reduced odds of seeking ANC services (cOR=0.21, 95%, CI: 0.03-0.10) compared to those who spend less than 30 minutes to reach to the facility. Likewise pregnant women who spend 1-2 hours to reach the hospital had 63% reduced odds of seeking antenatal care (cOR=0.38, 95%, CI: 0.07-1.83) compared to those who spend less than 30 minutes to the ANC centre. Regarding long waiting hour for services, pregnant women who complained of long waiting hours of services had 92% reduced odds of seeking ANC again (cOR=0.08, 95%, CI: 0.10-0.66) compared those who do not relay any concern regarding waiting time as shown in table 13 below.

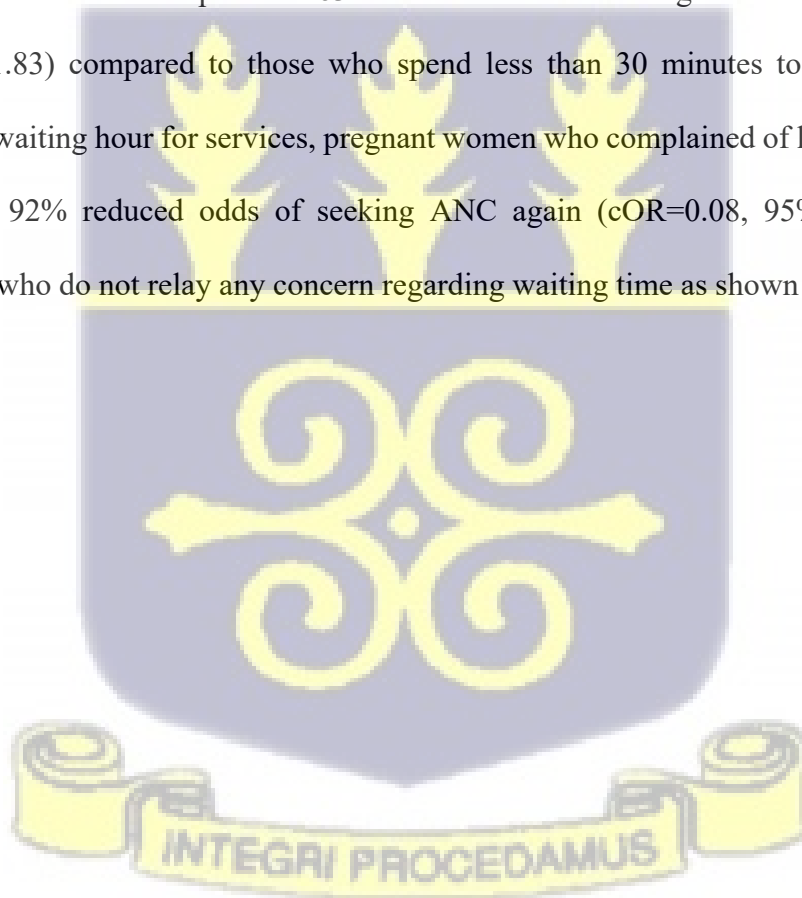


Table 13: Univariate analysis of association between accessibility and availability of prenatal care services and its utilization among expectant mothers.

Prenatal Care Utilization					
Variable	Partial Utilization n(%)	Adequate Utilization n(%)	Crude OR	[95% CI]	p-value
Distance to ANC centre (time travelled)					
Less than 30 mins	3(4.48)	10(25.64)	reference		
30-59 mins	6(8.96)	16(41.03)	0.08	[0.16-3.94]	0.784
1-2 hours	8(11.94)	10(25.64)	0.38	[0.07-1.83]	0.227
More than 2 hours	50(74.63)	3(7.69)	0.21	[0.03-0.10]	<0.000**
Mode of transport to ANC clinic					
Walking	2(2.99)	5(12.82)	5.71	[0.88-0.67]	0.067
Commercial vehicle	42(62.69)	23(58.97)	1.25	[0.44-3.48]	0.667
Personal vehicle	16(23.88)	7(17.95)	Reference		
Motor bicycle	7(10.45)	4(10.26)	1.30	[0.28-5.94]	0.730
Cost of transportation to ANC centre					
Less than ₵10	4(5.97)	5(12.82)	Reference		
₵10 - ₵20	23(34.33)	20(51.28)	0.69	[0.16-2.95]	0.623
More than ₵20	34(50.75)	13(33.33)	0.30	[0.07-1.32]	0.121
Not applicable	6(8.96)	1(2.56)	0.13	[0.11-1.61]	0.113
Required to make payment for ANC services					
No	55(82.09)	30(76.92)	Reference		
Yes	12(17.91)	9(23.08)	1.37	[0.52-3.63]	0.521
Is there language barrier in accessing services					
Yes	65(97.01)	37(94.87)	1.03	[0.23-4.58]	0.966
No	2(2.99)	2(5.13)	Reference		
Satisfaction with the level of prenatal care					
Neither satisfied nor unsatisfied	3(4.48)	1(2.56)		[0.05-5.30]	0.590
Satisfied	59(88.06)	37(94.87)	Reference		
Unsatisfied	5(7.46)	1(2.56)		[0.35-2.83]	0.306
Number of antenatal clinic visits					
1	10(14.93)	1(2.56)	0.14	[0.17-1.22]	0.076

Prenatal Care Utilization					
Variable	Partial Utilization n(%)	Adequate Utilization n(%)	Crude OR	[95% CI]	p-value
2-3	17(25.37)	11(28.21)	0.95	[0.38-2.36]	0.927
≥ 4	40(59.70)	27(69.23)	Reference		
Long waiting time					
Yes	16(23.88)	1(2.56)	0.08	[0.10-0.66]	0.019**
No	51(76.12)	38(97.44)	Reference		

Note: **Statistically significant



4.14. Multivariate analysis of association between accessibility and availability of prenatal care services and its utilization among expectant mothers.

Multivariate logistic analysis was done to assess the strength of association of the variables that were significant at the 5% significance level in the univariate analysis. Distance to ANC centre (time travelled) and long waiting time were the variables that were statistically significant with prenatal care utilization. (Table 14).

Pregnant women who take more than two hours to reach the hospital for prenatal care had 83% reduced odds of seeking ANC services (cOR=0.17, 95%, CI: 0.01-0.10) compared to those who spend less than 30 minutes to reach to the facility. Also, expectant mothers who spend 1-2 hours to reach the hospital had 59 % reduced odds of seeking antenatal care (cOR=0.41, 95%, CI: 0.07-2.31) . Similarly, pregnant women complained about waiting long hours for prenatal services had a 94% reduced odds of seeking ANC again (cOR=0.06, 95%, CI: 0.01-0.63) compared those who were pleased with the waiting time. shown in table 14 below.

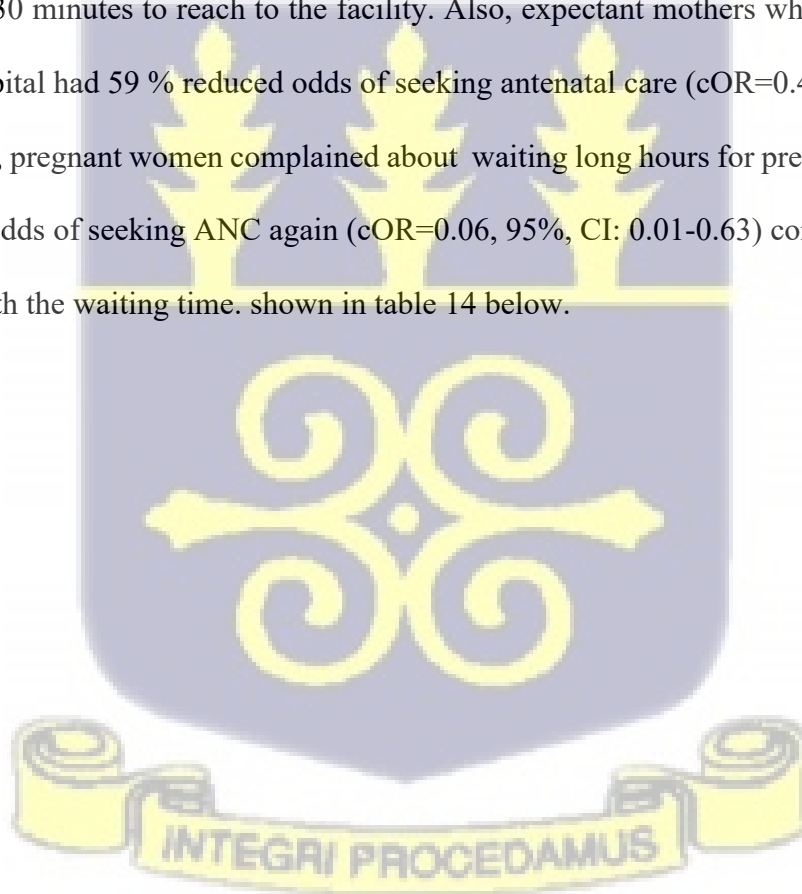


Table 14: Multivariate analysis of association between accessibility and availability of prenatal care services and its utilization among expectant mothers.

Variable	Prenatal Care Utilization		Crude OR	<u>Odds Ratio</u> [95% CI]	AOR	<u>Odds Ratio</u> [95% CI]
	Partial Utilization	Adequate Utilization				
	n(%)	n(%)				
Distance to ANC centre (time travelled)						
Less than 30 mins	3(4.48)	10(25.64)	reference			
30-59 mins	6(8.96)	16(41.03)	0.08	[0.16-3.94]	0.81	[0.14-4.53]
1-2 hours	8(11.94)	10(25.64)	0.38	[0.07-1.83]	0.15	[0.07-2.31]
More than 2 hours	50(74.63)	3(7.69)	0.21	[0.03-0.10]	0.17	[0.01-0.10] **
Long waiting time						
Yes	16(23.88)	1(2.56)	0.08	[0.10-0.66]	0.06	[0.01-0.63]**
No	51(76.12)	38(97.44)	Reference			

Note: ** Statistically significant



4.15 Characteristics of cultural practices, obstetric factors and prenatal care utilization

The fourth specific objective was to determine the cultural practices and obstetric factors associated with prenatal care utilization among pregnant women seeking antenatal care at the Shai-Osu Doku District Hospital. This study examined fourteen cultural practices and obstetric factors that may influence prenatal care utilization.

Table 15 below illustrates the cultural practices and obstetric factors characteristics of expectant mothers with partial and adequate prenatal care utilization.

The proportion of pregnant women who believe that pregnancy is a natural process and that does not require medical attention were 8 (14.93%) among those who had partial utilization and 1 (2.26%) among those who had adequate utilization. About 14 (20.0%) women among those with partial ANC utilization responded that there are specific diets and medication in their culture recommended for them instead of early prenatal care, and 7 (17.95%) women among those with adequate prenatal care utilization status.

Almost half 46 (68.66%) of the study participants perceived ANC necessary in the community they live in, however these women were among those with partial prenatal care utilization status compared to 37 (94.87%) who were among those with adequate utilization status. Among the pregnant women who had partial prenatal care utilization status, thirty-seven (39.78%) indicated that traditional beliefs in their communities discourage them from seeking prenatal care compared to 2 (15.38%) women with adequate prenatal care. Nine (23.08%) of the study participants among those with adequate prenatal care responded that there are cultural taboos and fears that influence their decision for ANC during pregnancy.

With obstetric factors, 37 (55.22%) of the study participants with null parity had partial prenatal care utilization compared to 3 (7.69%) who had adequate prenatal care utilization. Seven (10.45%) with partial prenatal care and 5 (12.82%) of study participant with adequate prenatal care had four or more parity. Based on the collection tool we used, 34 (50.75%) of the pregnant women with partial prenatal status and 21 (53.85%) with adequate prenatal care had gravida between 2-4. About 63 (94.03%) of the study participants with partial prenatal care utilization and 38 (99.44%) adequate prenatal care utilization had no multiple pregnancies.

In terms of gestational age of booking first antenatal care 45 (67.16%) of the pregnant women with partial prenatal care and 19 (48.48.72%) with adequate prenatal care were within their third trimester of gestation. Fifty-nine (88.06%) of expectant mothers with partial prenatal and 34 (57.18%) women with adequate prenatal care had no history of abortion. Likewise, 62 (92.54%) of study participants among those with partial prenatal care and 31(79.49%) women among those with adequate antenatal care responded that they have no history of Miscarriage. More than half 59 (88.06%) of the study with partial prenatal care status and 3 (74.49%) women with adequate prenatal care were expecting pregnancy.

4.16 Association between cultural practices, obstetric factors and prenatal care utilization

In the Pearson chi-square and fisher's exact analysis, the following cultural practices and obstetric factors were found to be the predictors of prenatal care utilization: perceived ANC as necessary for all pregnant women in your community ($p = <0.001$), cultural taboos or fears associated with hospital visits during pregnancy ($p = <0.001$), and parity ($p = <0.000$).

The cultural practices were not statistically associated with prenatal care utilization in the person-chi square and fisher's exact analysis were Believe that pregnancy is a natural process that does

not require medical attention unless complications arise ($p= 0.059$), specific foods, medicines, or herbs recommended in your culture instead of medical prenatal care ($p= 0.714$), Traditional beliefs in your community discourage pregnant women from seeking prenatal care ($p= 0.076$) and traditional birth attendants or elders in your community influence your decision to attend prenatal care ($p= 0.392$).

The following obstetric factors were not statistically associated with prenatal care utilization in the person-chi square and fisher's exact analysis; Gravida ($p=0.216$) Multiple pregnancies ($p=0.390$), gestation age at booking first ANC ($p=0.135$), gestation ($p=0.233$), abortion ($p=0.894$), Miscarriage ($p=0.083$), expecting pregnancy ($p=0.234$). Table 15 shows below.



Table 15: Association between cultural practices, obstetric factors and prenatal care utilization

Variable	Prenatal care utilization (N=106)		Chi-Square (X ²)	P-value
	Partial Utilization n (%)	Adequate Utilization n (%)		
Believe that pregnancy is a natural process that does not require medical attention unless complications arise			*	0.059
Yes	8(14.93)	1(2.26)		
No	49(73.13)	36(92.31)		
Not sure	10(14.93)	2(5.13)		
Are there specific foods, medicines, or herbs recommended in your culture instead of medical prenatal care?			0.13	0.714
Yes	14(20.0)	7(17.95)		
No	53(79.10)	32(82.05)		
ANC is perceived as necessary for all pregnant women in your community			*	0.001
Yes	46(68.66)	37(94.87)		
No	21(31.34)	2(5.13)		
Traditional beliefs in your community discourage pregnant women from seeking prenatal care.			*	0.076
Yes	37(39.78)	2(15.38)		
No	56(60.22)	11(84.62)		
Are there any cultural taboos or fears associated with hospital visits during pregnancy			*	< 0.000
Yes	1(1.49)	9(23.08)		

Prenatal care utilization (N=106)				
Variable	Partial Utilization n (%)	Adequate Utilization n (%)	Chi-Square (X ²)	P-value
No	66(98.51)	30(76.992)	*	
Do traditional birth attendants or elders in your community influence your decision to attend prenatal care?			0.732	0.392
Yes	8(11.4)	7(17.95)		
No	59(88.06)	32(82.05)		
Obstetric factors				
Parity			24.74	<0.000
Null parity	37(55.22)	3(7.69)		
1-3	23(34.33)	31(79.49)		
≥ 4	7(10.45)	5(12.82)		
Gravida			3.06	0.216
1	22(32.44)	16(41.03)		
2-4	34(50.75)	21(53.85)		
5+	11(16.42)	2(5.13)		
Multiple pregnancies			*	0.390
No	63(94.03)	38(97.44)		
Yes	4(5.97)	1(2.56)		
Gestation age at booking ANC			*	0.135
First trimester	3(4.48)	4(10.26)		
Second trimester	19(28.36)	16(41.03)		
Third trimester	45(67.16)	19(48.72)		
Gestation (weeks)			*	0.233
28-32	10(14.93)	1(2.56)		
33-38	17(25.37)	11(28.21)		
≥ 39	40(59.70)	27(69.23)		
Abortion			0.02	0.894
No	59(88.06)	34(87.18)		
Yes	8(11.94)	5(12.82)		
Miscarriage			*	0.083
Yes	5(7.46)	8(20.51)		
No	62(92.54)	31(79.49)		
Expecting pregnancy			1.45	0.234
No	8(11.94)	8(20.51)		

Prenatal care utilization (N=106)				
Variable	Partial Utilization n (%)	Adequate Utilization n (%)	Chi-Square (X ²)	P-value
Yes	59(88.06)	31(79.49)		

Note: *Fisher's exact

4.17 Univariate Analysis of Association between cultural practices, obstetric factors and prenatal care utilization.

At the univariate level, ANC is perceived as necessary for all pregnant women in your community and cultural taboos or fears associated with hospital visits during pregnancy, were the only cultural practices that were statistically associated with prenatal care utilization. The obstetric factors that was statistically associated with prenatal care was only parity.

Pregnant women who did not perceived ANC as necessary for all pregnant women had 89% reduced odds of seeking prenatal care (cOR=0.11, 95%, CI: 0.02-0.53) compared to those who ANC is perceived necessary for all pregnant women in their community. Expectant mothers from communities with taboos or fears associated with hospital visits during pregnancy were 19 times higher risk of not seeking prenatal care (cOR=19.8, 95%, CI: 2.93-6.10) compared to those from communities that do not practice those beliefs. With obstetric factors, pregnant women with four (4) or more parity had 5-fold increased odds of seeking prenatal care (cOR=5.30, 95%, CI: 1.70-4.57) compared to those who had none. Similarly, pregnant women with 1-3 parity status had 3-fold increased odds of seeking prenatal care (cOR= 3.12, 95%, CI:4.55-13.64) compared to those who had none. Shown in table 16 below.

Table 16 :Univariate Analysis of Association between cultural practices, obstetric factors and prenatal care utilization.



Prenatal Care Utilization					
Variable	Partial Utilization n(%)	Adequate Utilization n(%)	Crude OR	[95% CI]	p-value
Believe that pregnancy is a natural process that does not require medical attention unless complications arise					
Yes	8(14.93)	1(2.26)	0.14	[0.02-1.42]	0.102
No	49(73.13)	36(92.31)	Reference		
Not sure	10(14.93)	2(5.13)	0.27	[0.56-1.31]	0.106
Are there specific foods, medicines, or herbs recommended in your culture instead of medical prenatal care?					
Yes	14(20.0)	7(17.95)	0.82	[0.30-2.26]	0.714
No	53(79.10)	32(82.05)	Reference		
ANC is perceived as necessary for all pregnant women in your community					
Yes	46(68.66)	37(94.87)	Reference		0.006
No	21(31.34)	2(5.13)	0.11	[0.02—0.53]	
Traditional beliefs in your community discourage pregnant women from seeking prenatal care.					
Yes	37(39.78)	2(15.38)	0.27	[0.05-1.31]	0.106
No	56(60.22)	11(84.62)	Reference		
Are there any cultural taboos or fears associated with hospital visits during pregnancy					
Yes	1(1.49)	9(23.08)	19.8	[2.93-6.10]	0.005
No	66(98.51)	30(76.992)	Reference		
Do traditional birth attendants or elders in your community influence your					

Prenatal Care Utilization					
Variable	Partial Utilization n(%)	Adequate Utilization n(%)	Crude OR	[95% CI]	p-value
decision to attend prenatal care?					
Yes	8(11.4)	7(17.95)	1.61	[0.53-4.85]	0.395
No	59(88.06)	32(82.05)	Reference		
Parity					
Null parity	37(55.22)	3(7.69)	Reference		
1-3	23(34.33)	31(79.49)	3.12	[4.55-13.64]	<0.000**
≥ 4	7(10.45)	5(12.82)	5.30	[1.70-4.57]	0.009**
Gravida					
1	22(32.44)	16(41.03)	Reference		
2-4	34(50.75)	21(53.85)	0.89	[0.35-1.97]	0.704
5+	11(16.42)	2(5.13)	0.25	[0.04-1.25]	0.097
Multiple pregnancies					
No	63(94.03)	38(97.44)	0.41	[0.04-3.84]	0.438
Yes	4(5.97)	1(2.56)	Reference		
Gestation age at booking ANC					
First trimester	3(4.48)	4(10.26)	Reference		
Second trimester	19(28.36)	16(41.03)	0.63	[0.12-3.24]	0.582
Third trimester	45(67.16)	19(48.72)	0.32	[0.06-1.55]	0.156
Gestation (weeks)					
28-32	10(14.93)	1(2.56)	Reference		
33-38	17(25.37)	11(28.21)	0.29	[0.10-0.85]	0.064
≥ 39	40(59.70)	27(69.23)	0.74	[0.11-4.94]	0.757
Abortion					
No	59(88.06)	34(87.18)	Reference		
Yes	8(11.94)	5(12.82)	1.08	[0.32-3.58]	0.894
Miscarriage					
Yes	5(7.46)	8(20.51)	3.20	[0.96-10.559]	0.057
No	62(92.54)	31(79.49)	Reference		
Expecting pregnancy					
No	8(11.94)	8(20.51)	1.90	[0.65-5.56]	0.239
Yes	59(88.06)	31(79.49)	Reference		

Note: ** Statistically significant

4.18 Multivariate analysis of cultural beliefs and practices associated with prenatal care utilization

Multivariate logistic analysis was done for variables that were significant at the 5% significance level in the univariate analysis. From the analysis cultural factors: ANC is perceived as necessary for all pregnant women in your community, indicated that cultural taboos or fears associated with hospital visits during pregnancy were found to be significantly associated with prenatal care utilization. (Table 17). Obstetric factors such as parity and gestation were significantly associated with prenatal care utilization

Pregnant women from communities that do not perceive ANC as necessary for all pregnant women had 90% reduced odds of seeking prenatal care (aOR =0.10, 95%, CI: 0.20-0.56) compared to those communities that perceive ANC as necessary for all pregnant women. Also, expectant mothers from areas where cultural taboos and fears interfere with hospital visits during pregnancy had 22% increased odd of not seeking early antenatal care (aOR=22.18, 95% CI: 2.29-14.48) compared to those from communities where such practice are not observed.

With obstetric factors study participants with four or more parity had 7-fold increased odds of seeking timely prenatal care (aOR=22.18, 95% CI: 2.29-14.48) compared to those who had none, similarly, expectant mothers with parity from 1-3 had 4-fold increased odds of seeking timely prenatal care (aOR=4.36, 95% CI: 4.73-6.38) and compared to those who had none. (Table 17)

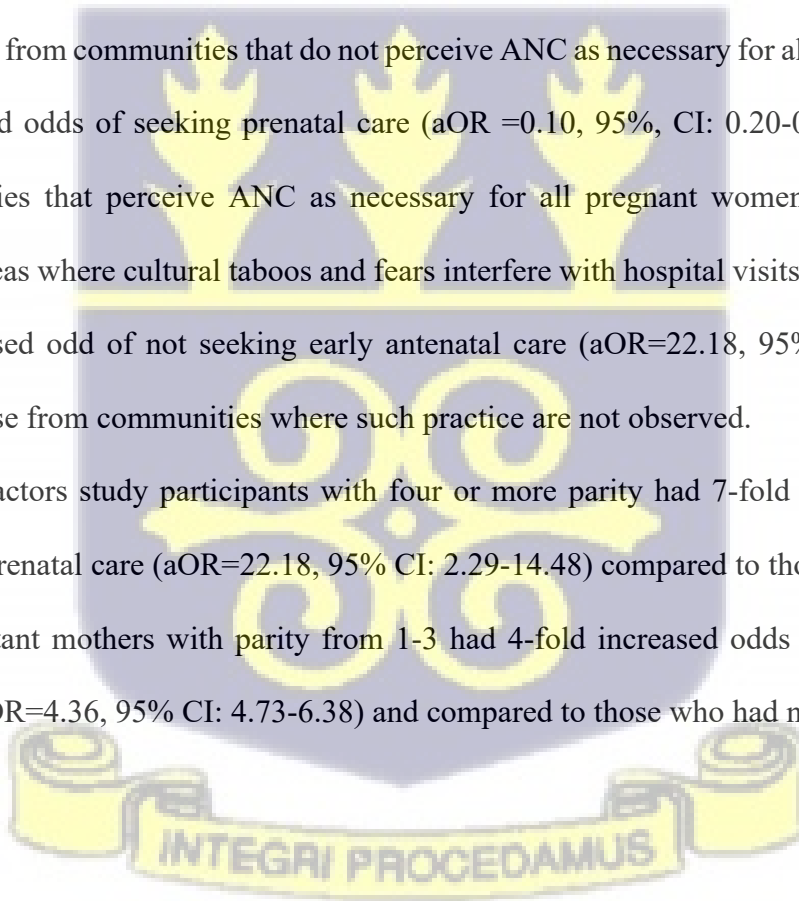


Table 17: Multivariate analysis of cultural practices and obstetric factors associated with prenatal care utilization

Prenatal Care Utilization						
Variable	Partial Utilization	Adequate Utilization		<u>Odds Ratio</u>		<u>Odds Ratio</u>
	n(%)	n(%)	Crude OR	[95% CI]	AOR	[95% CI]
ANC is perceived as necessary for all pregnant women in your community						
Yes	46(68.66)	37(94.87)	Reference			
No	21(31.34)	2(5.13)	0.11	[0.02—0.53]	0.10	[0.20-0.56]**
Are there any cultural taboos or fears associated with hospital visits during pregnancy						
Yes	1(1.49)	9(23.08)	19.8	[2.93-6.10]	22.18	[2.29-14.48]**
No	66(98.51)	30(76.992)	Reference			
Obstetric factors						
Parity						
Null parity	37(55.22)	3(7.69)	Reference			
1-3	23(34.33)	31(79.49)	16.62	[4.55-13.64]	4.36	[4.73-6.38]**
≥ 4	7(10.45)	5(12.82)	8.80	[1.70-4.57]	7.29	[1.34-9.41]**

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 DISCUSSION

5.2 Introduction

This study aimed to determine factors associated with prenatal care utilization at Shai-Osu Doku District Hospital. This chapter discusses the result of the study in relation to the specific objectives and key variables of the research.

5.3 Prenatal Care Utilization

Prenatal care, also known as antenatal care (ANC), according to the World Health Organization (WHO) refers to the healthcare provided to pregnant women to ensure their well-being throughout phase of pregnancy. The utilization of prenatal care reduces the risk of maternal and prenatal complications during pregnancy (WHO, 2022). However, in low and middle-income countries particularly in Sub-Saharan Africa, the trend of prenatal care is low with a significant number of pregnant women not achieving adequate prenatal care utilization. In this study, 36% of partial prenatal care utilization was recorded among expectant mothers. This trend of prenatal care utilization confirms prior studies that a significant proportion of pregnant women still fall short of the number of ANC attendance per WHO recommendations of four (4) or more ANC visits during pregnancy (WHO, 2022; Abuosi et al., 2024; Mlandu et al., 2022).

Many studies have highlighted some factors which influence pregnant mothers' decisions regarding prenatal care utilization among these factors include sociodemographic factors, expectant mothers' awareness and knowledge level of prenatal care, availability and accessibility

of ANC services and cultural or societal beliefs and practices. The first objective of this study was to determine which demographic factors are associated with prenatal care utilization among expectant mothers in Shai-Osu Doku District Hospital.

5.4 Socio-demographic determinants of prenatal care utilization.

Sociodemographic factors are known to be predictors of prenatal care utilization in studies in Europe and recent studies in sub-Saharan Africa (Al-Zubayer et al., 2024; Muya et al., 2024). In this study, sociodemographic factors such as educational level, place of residence, tribe, religion, marital status, age, decision-making at home and occupation were assessed. At the multivariate logistic regression analysis educational level and place of residence were the only sociodemographic factors that were statistically associated with prenatal care utilization.

5.5 Educational Level and Prenatal Care Utilization

Our study found that expectant mothers who were illiterate had 25% reduced odds of having adequate prenatal care utilization compared to expectant mothers who had tertiary education status. The significant association between education and prenatal care utilization in this study agrees with a similar study conducted in Tanzania, and southern Assia found that pregnant women who were illiterate/ had no formal education had 33% and 21% reduced odds of obtaining adequate prenatal care compared to those with tertiary education (Muya, Ilembo, & Anasel, 2024; Al-Zubayer et al., 2024). Prior studies according to the literature highlighted that education is an important factor that affects antenatal care (ANC) utilization. Pregnant women with a higher level of education are more likely to seek timely and adequate prenatal care (Abera et al., 2021; Nzioki, et al., 2015). The reduced odds of prenatal care utilization in this study and prior research among pregnant women who had no education can be attributable to the fact that these expectant mothers may have never been counselled, educated or oriented about the importance of timely and adequate

prenatal care utilization. While those with junior and senior high education status had increased odds of seeking prenatal care, indicating that higher education is a greater predictor of prenatal care utilization. At the univariate analysis level, pregnant women with senior high education status had a 75% increase in odds of obtaining adequate prenatal care compared to those with no formal education. From our study, about 90% of expectant mothers with formal education had adequate prenatal care. This explains that most of the expectant mothers with higher education have had or been informed or abreast about the risks associated with poor prenatal care utilization as well as the importance of effective use of prenatal care. Findings from this study are consistent with similar studies in some parts of Ghana which indicated that an expectant mother's level of education is statistically associated with prenatal care utilization (Gbene et al., 2024; Appiah et al., 2021). However, a study by Sekyere and colleagues in Sunyani Municipality Ghana found no significant association between education and prenatal care utilization (Sekyere, S. O., & Freda, K. 2021).

5.6 Place of residence and prenatal care utilization

Expectant mothers in this study from rural areas had 71% reduced odds in the multivariate analysis level compared to those from urban areas. About 24 (36%) of respondents with partial prenatal care utilization status were found to be rural residents compared to 5 (13%) of respondents with adequate prenatal care who were found to be urban residents. These findings corroborate the results of a study by Tessema and colleagues from 36 countries that found that place of residence was statistically significant to prenatal care utilization. Their study highlighted those expectant mothers from rural areas had significantly reduced odds of seeking timely and adequate prenatal care compared to those from urban areas (Tessema, et al., 2021). Moreover, findings from Angko, Wulifan, & Sumankuuro, (2023) a prior study in Ghana affirms that pregnant women in rural areas are less likely to register for early prenatal care and seek for services. Furthermore, a similar study

revealed that expectant mothers in rural areas have lower chances of achieving adequate prenatal care compared to those from urban areas (Yemane, G. D. 2022). These findings could be due to the fact that residents in rural areas have poor access to primary healthcare services compared to urban residents, indicating that the place of residence of pregnant women is a great predictor of either adequate or partial prenatal care utilization (Sasu, 2023). The place of residence determines the number of health services available and how they can easily be accessed by health seekers. The reduced odds of prenatal care utilization in some parts of Ghana especially in rural and remote areas is a result of inadequate primary health facilities leading to higher demand for the limited services (Muya et al., 2024).

5.7 Prenatal care services knowledge and awareness and its importance among expecting mothers.

Findings from this study revealed that 96 (91%) of the study participants have heard about antenatal care services. About 81 (76.42%) of the respondents first heard it from antenatal clinic visits. Out of the total study participants, only 47 (44.34%) knew the WHO-recommended gestational age to start registering for ANC. It was again noted that less than half 47 (44.34%) of the expectants knew when pregnant women should initiate prenatal care. As a result, 99 (93%) of expectant mothers initiated their ANC after the first trimester indicating a late initiation of prenatal care. This shows that the knowledge gap about the recommended gestational age of booking or registering for ANC had a negative effect on their decision which led to a late initiation of prenatal care. This agrees with a preceding study in Nigeria and Ethiopia which revealed that a significant number of expectants have inadequate knowledge and information about basic concepts and benefits of timely and effective use of prenatal care (Obeagu, E. I. 2022; Janakiraman et al., 2021). However, similar research in Ghana found not to agree with this study's findings. For instance, a study by Sekyere & Freda (2021) revealed that the majority of expectant mothers have adequate knowledge

about antenatal care services, but not significant number of women did not know the recommended number of ANC for pregnant women. Also, a study in Cape Coast Metropolitan highlighted that although pregnant women who were interviewed in their study had good knowledge about ANC but lacked enough information about the time to initiate ANC and even the recommended number of ANC required of them (Amoako, B. K., & Anto, F. 2021). At the multivariate analysis level in this study participants who had no knowledge idea of the recommended age of initiating ANC had 78% reduced odds of seeking timely prenatal care compared to those who had good knowledge of the recommended gestational age of seeking or initiating ANC.

5.8 Accessibility and availability of prenatal care services and their utilization among expectant mothers.

The third objective of our study was to examine the accessibility and availability of prenatal care services and their utilization among expectant mothers. At the multivariate analysis level distance to the ANC centre was statistically associated with prenatal care utilization. This study revealed that pregnant women who spent more than two 2 hours had 83% reduced odds of seeking antenatal care compared to those who spent less than 30 minutes to reach the facility for services. Similarly, pregnant women who usually take 1-2 hours distance long had 49% reduced odds of seeking antenatal care compared to those who take less than 30 minutes distance to reach the facility for ANC services. This finding has been stressed by a lot of prior studies. Taking a study by Pervin and colleagues (2021) in Bangladesh for example, mothers who take long distances especially those in rural areas had less than the recommended number of ANC visits compared to those who stay close to the ANC centres. Also, a similar study in Nigeria found that distance was one of the significant factors that determine the utilization of antenatal care among expectant mothers (Obeagu, 2022). Agreement of these findings could be due to the fact that pregnant women who take long hours of distance to reach ANC centres see it to be stressful and thus feel reluctant to

decide to visit antenatal care regularly at the right time to meet the recommended number of visits. In Ghana, a study by Duodu, et al, (2022) revealed that was one of the main factors that influence prenatal care utilization among the obstetric population. In this same study, expectant mothers stated concern about long waiting hours which sometimes discourages them from seeking antenatal. This was also true in our study, respondents who laid concerns for long waiting hours had 94% reduced odds of seeking prenatal care compared to those who had no concerns for waiting hours.

5.9 The cultural beliefs and obstetric factors that influence pregnant women's

The fourth objective of this was to determine the cultural beliefs and obstetric factors that influence pregnant women's decisions on prenatal care utilization. This study found that pregnant women from communities with cultural taboos and fear associated with early antenatal care initiation had 22% increased odds of not seeking antenatal care compared to those from communities with such beliefs. Prior literature approves of this observation, for instance, a study in Nigeria found an association between cultural practice, beliefs and prenatal care utilization (Adeosun, A. 2022). Again, similar research in Ghana by Aberese-Ako et al. (2021) found socio-cultural practices and beliefs to be significantly associated with antenatal care utilization. In this same study, expectant mothers from communities with practices that do not perceive prenatal care necessary were less likely to seek timely and adequate prenatal care compared to those from communities that do not support such practices and beliefs.

Furthermore, this study found that pregnant women from societies and communities that do not perceive ANC necessary for all expectant mothers had 90% reduced odds compared to those who reside in communities that recognize ANC as a necessity for pregnant women. In a study done in Talon, Ghana, a similar observation was made where pregnant women from areas that do not

perceive ANC as necessary, about 72% of women from those areas had late antenatal initiation indicating poor antenatal care utilization (Ziblim et al., 2022). Also, according to Amares, Tura, Semahegn, & Teji Roba (2022), community-based study in Ethiopia, they found that 48% of pregnant women reported the presence of pregnancy-related food taboos and revealed that some of their communities do not support timely antenatal care utilization. Consistency of these findings may be because such communities frown on seeking early antenatal care with the belief that pregnant women would be exposing their babies to spirits. Expectant mothers residing in these communities would be reluctant to initiate early antenatal care.

The obstetric factors that were assessed in this study party were the only variable that was statistically associated with prenatal care utilization. Expectant mothers with 1-3 parity 4 times were likely to seek prenatal care compared to those with null parity. Similarly, pregnant women with parity 4 and above were 7 times more likely to initiate timely and effective prenatal care compared to those with null parity. A spatial pattern and Multilevel analysis of factors associated with antenatal care visits in Nigeria found parity to be statistically associated with ANC utilization. Pregnant women with two (2) or more parity were more likely to seek timely prenatal care compared to those with null parity (Bolarinwa et al., 2021). In their study, they found that as parity increases the likelihood of initiating timely and adequate increases. Earlier studies in Uganda and New Guinea found a significant association between parity and prenatal care utilization (Agaba et al., 2021; Seidu, 2021). This could be the reason that women who have had one or more parity could have had the opportunity to be educated on various visits of ANC which have informed their decision to seek, and timely prenatal care compared to those who have null parity. However, Odusina and colleagues' findings debate against the fact that in their study most expectant mothers

with two or more parity were reluctant to seek early prenatal care, thus they found no association between parity and prenatal care utilization (Odusina, et al., 2022).

5.10 Strength of the study

This study opted for the latter because it eliminates the issue of recall bias. Per available literature reviewed, this study explored an area of prenatal care utilization, that provides relevant information about the underpinning factors associated with prenatal care utilization in Ghana.

5.11 Limitation of the study.

This study would have benefitted from a larger sample size which was not attained due to the limited timeframe of the study. A more representative sample would have enabled the generalizability of the findings of this study to develop strategies to improve the effective use of prenatal care among obstetric populations.

5.12 Conclusion

It has been revealed by this study that, the majority of expectant mothers with 28 weeks of gestation and above had adequate antenatal care utilization at the Shai-Osu Doku District Hospital, however, a significant number had partial prenatal care utilization. Adequate prenatal utilization was measured based on four (4) or more ANC attendance from the first trimester and partial was less than four (4) ANC visits.

Sociodemographic factors such as education and residence were found to be factors which predispose expectant mothers either to have adequate prenatal care or not. In addition, under the knowledge and awareness of prenatal care among study participants, recommended gestational age for booking first ANC was statistically associated with prenatal care utilization, similarly distance to ANC and long waiting hours were associated with prenatal care utilization.

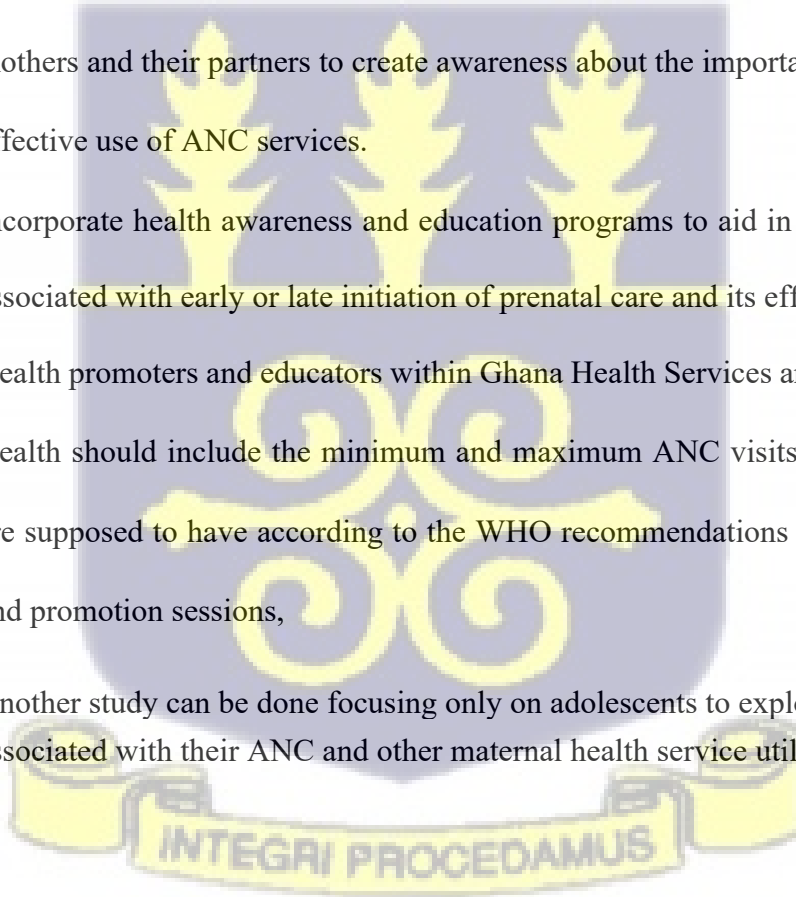
Finally, cultural beliefs and practices such as ANC services are perceived as necessary for all pregnant women in your community and cultural taboos or fears associated with hospital visits during pregnancy, likewise, parity was the only obstetric factor that was statistically associated with prenatal care utilization.

5.13 Recommendations

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

The Shai-Osu Doku Health Directorates and other Health Directorate within Ghana should ensure that:

1. Health education programs should be carried out to target potential expectant mothers and their partners to create awareness about the importance of timely and effective use of ANC services.
2. Incorporate health awareness and education programs to aid in debunking myths associated with early or late initiation of prenatal care and its effective utilization.
3. Health promoters and educators within Ghana Health Services and the Ministry of Health should include the minimum and maximum ANC visits pregnant women are supposed to have according to the WHO recommendations in their education and promotion sessions,
4. Another study can be done focusing only on adolescents to explore the factors associated with their ANC and other maternal health service utilization.



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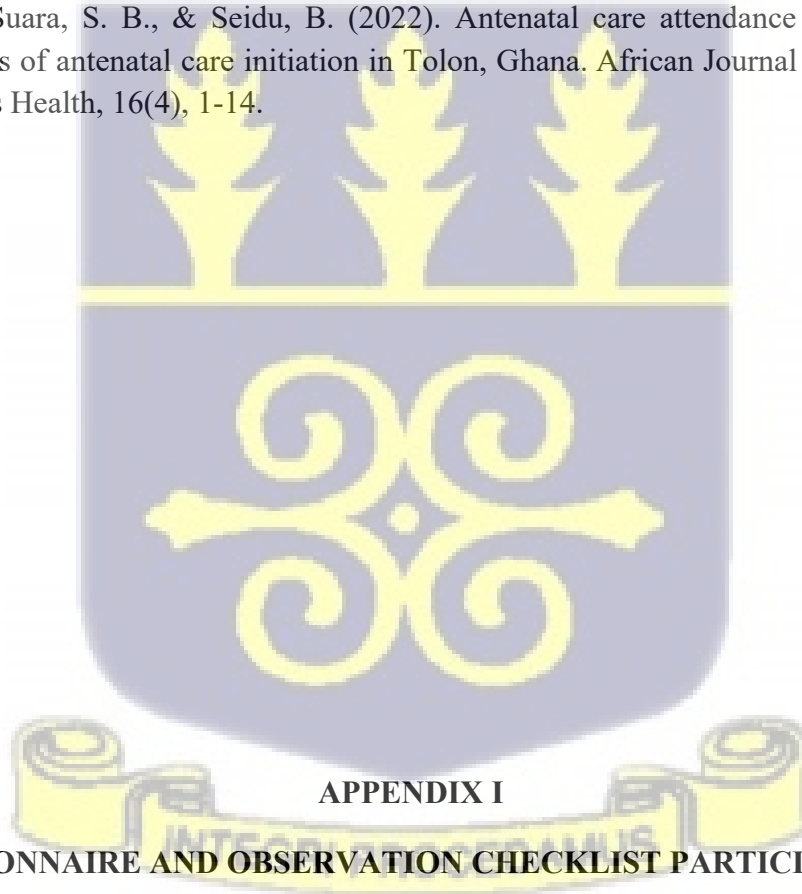
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NO.	QUESTION	RESPONSE (Write or tick as appropriate)	CODE
SECTION A: SOCIO-DEMOGRAPHIC FACTORS			

1.	Age (age at last birthday)	/...../.....	
2.	Place of residence	Rural Urban	1 2
3.	Marital Status	Single [] Married [] Cohabiting [] Widowed []	1 2 3 4
4.	Highest educational level attained	No formal education [] Primary education [] Junior high education [] Senior high education [] Tertiary education []	0 1 2 3 4
5.	Religious affiliation	Christianity [] Islam [] Traditionalist [] Other [] (please specify)	1 2 3 7 8
6.	Tribe:	[] Ewe [] Akan [] Ga [] Krobo [] Dagomba [] Frafra [] Others	1 2 3 4 5 6
7.	Decision making at home.	[] Husband only [] Wife only [] Husband and wife only Others.....	1 2 3 7
8.	Occupation	Unemployed [] Farming [] Civil Servant [] Other [] (please specify)	1 2 3 7
9.	Monthly Income:	Less than C1000.00 [] C1001.00 - C2000.00 [] C2001.00 - C3000.00 [] More than C3000.00 [] NA []	1 2 3 4 8

10.	How long does it take you to get to ANC centre? (Time in minutes or hours)	Less than 30 mins [] 30 mins – 59 mins [] 1 hour – 2 hours [] More than 2 hours [] NA []	1 2 3 4 8
11.	How much does it cost you to travel to the ANC centre?	Less than ₵10.00 [] ₵10.00 - ₵20.00 [] More than ₵20.00 [] NA []	1 2 3 8
12.	What is your main mode of transportation to the vaccination centre?	Walking [] Commercial vehicle(E.g. trotro, taxi)[] Personal vehicle [] Other (please specify) [] NA []	1 2 3 7 8
13.	Occupation of partner	Unemployed [] Farming [] Civil Servant Other [] (please specify) NA []	1 2 3 7 8
SECTION B: KNOWLEDGE AND AWARENESS OF THE IMPORTANCE OF ANTENATAL CARE.			
14.	Have you heard of ANC Utilization?	Yes [] No []	1 0
15.	Where did you first hear of it?	On the media (tv, radio, etc) [] Family and friends [] During antenatal clinic visits [] Other []	1 2 3 7
16.	What is the recommended gestational age for ANC	Correct [] Incorrect [] No idea []	1 2 0
17.	Reason for ANC seeking ANC	To protect against pregnancy [] No knowledge []	1 0
18.	Do you believe ANC has pre and postnatal positive impact?	Yes [] No []	1 0
19.	List ANC preventable complications/diseases	One correct disease mentioned [] Two or more disease mentioned [] No idea []	1 2 0

20.	Before this pregnancy, were you aware of the importance of attending antenatal care visits?	Yes No	1 0
21.	Has pregnancy complications influenced your decision to seek ANC?	Yes [] No []	1 0
22.	Is it advantageous to start ANC with the first two months pregnancy?	Yes [] No [] No idea []	1 2 0
SECTION C: ACCESSIBILITY AND AVAILABILITY OF PRENATAL CARE SERVICES			
23.	Distance to ANC centre (time travelled)	Less than 30 mins[] 30-59 mins[] 1-2 hours[] More than 2 hours []	1 2 3 4
24.	Mode of transport to ANC clinic	Walking [] Commercial vehicle Personal vehicle Motor bicycle	1 2 3 4
25.	Cost of transportation to ANC centre	Less than C10 [] Between C10 - C20 More than C20 [] Not applicable []	1 2 3 0
26.	Required to make payment for ANC services	Yeso No	1 0
27.	Is there language barrier in accessing services	Yes No	1 0
28.	Satisfaction with the level of prenatal care	Neither satisfied nor unsatisfied Satisfied Unsatisfied	0 1 2
29.	Do you find the distance to the healthcare facility a barrier to attending antenatal care Visits?	Yes No	1 0
30.	How far is the nearest healthcare facility where you receive antenatal care?	Less than 1 km Between 1km- 5km More than 5km	1 2 3

31.	Number of antenatal clinic visits	1 2-3 ≥ 4	1 2 3
32.	Long waiting time	Yes No	1 2
SECTION D: CULTURAL PRACTICES, BELIEFS AND OBSTETRIC FACTORS			
33.	Believe that pregnancy is a natural process that does not require medical attention unless complications arise?	Yes [] No [] Not sure []	1 0 8
34.	Are there specific foods, medicines, or herbs recommended in your culture instead of medical prenatal care?	Yes [] No []	1 0
35.	Is ANC perceived as necessary for all pregnant women in your community?	Yes [] No []	1 0
36.	Traditional beliefs in your community discourage pregnant women from seeking prenatal care.	Yes [] No []	1 0
37.	Do traditional birth attendants or elders in your community influence your decision to attend prenatal care?	Yes [] No []	1 0
38.	Are there any cultural taboos or fears associated with hospital visits during pregnancy	Yes [] No []	1 0
SECTION E: OBSTETRIC FACTORS			No
39.	Number of ANC visits		
40.	Were you expecting pregnancy?	Yes No	1 0
41.	Gestation age at booking first ANC	First trimester Second trimester Third trimester	1 2 3
42.	Gravida:	_____	

43.	Parity	_____	
44.	Was your pregnancy planned?	☐ Yes ☐ NO	1 0
45.	Have you had any abortion?	Yes ☐ No ☐	1 0
46.	Have you had any miscarriage prior to this pregnancy?	Yes ☐ No ☐	1 0
47.	Have you had any miscarriages (if any specify)	Yes ☐ No ☐ If any specify [.....]	1 0
48.	Have you had any complications during previous pregnancies or deliveries? (Check all that apply)	Yes ☐ No ☐ If any specify [.....] Cannot recall	1 0 10
49.	Did you receive any special medical care or interventions during previous pregnancies or deliveries? (Check all that apply)	C-section ☐ Induction of labor ☐ Epidural or spinal anesthesia ☐ Vacuum or forceps delivery ☐ Episiotomy ☐	1 2 3 4 5
50.	During last pregnancy, were you diagnosed of Gestational Hypertension?	☐ Yes ☐ No	1 0
51.	Have you had multiples pregnancies before?	☐ Yes ☐ No	1 0



APPENDIX II

PARTICIPANT INFORMATION SHEET

Study Title: Determinants of Prenatal Care Utilization in the Shai-Osu Doku District in the Greater Accra Region.

Introduction: I am Jennifer Illeme Adibo, a Master of Science candidate at the University of Ghana, Legon's School of Public Health. "Determinants of Prenatal Care Utilization in the ShaiOsu Doku District in the Greater Accra Region" is the subject of my research project.

We appreciate your interest in taking part in the study "Determinants of Prenatal Care Utilization in the Shai-Osu Doku District in the Greater Accra Region." I want to give you some vital facts about the study before you choose to participate or not. Kindly review this material thoroughly, and don't hesitate to ask any questions you may have.

Purpose of the Study: Understanding the different factors influencing the use of prenatal care in the Shai Osu-Doku District is the aim of this research project. By taking part in this study, you will be able to further our understanding of maternal healthcare practices and maybe enhance the quality of healthcare that the area provides to expectant mothers.

Study Procedures: In the event that you choose to take part in the research, you will be required to:

1. Fill out a demographic survey regarding your age, level of education, marital status, and

socioeconomic status.

2. Information about your prenatal care experiences, opinions, and views is also included in the questionnaire. It will take about twenty-five (25) minutes to complete this interview.

3. You voluntarily choose to participate or not. You are free to leave the study at any time without giving a reason, or not to respond to any particular question.

Risks and Benefits: The hazards of participating in this study are negligible. You can decide not to respond to any questions that make you feel uncomfortable, even though you might feel awkward talking about some parts of your experiences. Enhancing knowledge of prenatal care practices is one of the study's advantages; this could eventually lead to better healthcare services for expectant mothers in the area.

Confidentiality: Both your participation and the data you supply will be treated in the strictest confidence. Your identity won't be connected to any of the data because it will all be anonymized. The data will be safely preserved and only the research team will have access to it. The Ghana Health Service Ethics Review Committee may be able to obtain study information as part of their oversight responsibilities.

Conflict of Interest: Integrity and transparency will be maintained throughout the study process, and any conflicts of interest will be appropriately managed and disclosed to relevant stakeholders and participants.

Voluntary Participation: Entire voluntary participation in this investigation is expected. If you choose to take part, you can stop at any moment and there won't be any repercussions. Your choice to participate or not will not have an impact on the medical services or care you receive now or in

the future.

Data Storage: Every piece of data gathered for this research will be kept private and safely archived. To maintain your anonymity, your answers will be given a special identification number instead of your name. Encrypted digital storage and PCs secured with passwords will be used to store data. The data will only be accessible to authorized researchers.

Confidentiality: All data gathered for this study will be securely preserved and kept private. To guarantee your anonymity, your comments will be given a unique identity instead of your name.

Compensation: There is no incentives as direct benefit to participants for their time and contribution.

Cost: There are no fees to take part in this research. The research fund will pay for all study-related costs, such as questionnaires, interviews, and data analysis.

Feedback to participants: Following the study, participants will get feedback through the dissemination of research findings. The Shai Osu-Doku district would be the site of a handy durbar ground where the community would be engaged to discuss the study's relevance, findings, and impact. For archival purposes, a copy of the study will be retained at the District Health Directorate.

Contact Information: If you have any questions about the study, please feel free to contact the principal investigator, Jennifer Illeme Adibo at jiadibo@st.ug.edu.gh or 0541959990. If you have any concerns about your rights as a research participant, you can contact the Ghana Health Service Ethics Review Committee's Administrator, Nana Abena Apatu on 0503559896 @ ethics.research@ghs.gov.gh



APPENDIX III

CONSENT FORM

STUDY TITLE: Determinants of Prenatal Care Utilization in the Shai-Osu Doku District in the Greater Accra Region.

PARTICIPANTS' STATEMENT

I acknowledge that I have read or have had the purpose and contents of the Participants' Information Sheet read and all questions satisfactorily explained to me in a language I understand (Twi, Ga and Ewe language). I fully understand the contents and any potential implications as well as my right to change my mind (withdraw from the research) even after I have signed this form. I voluntarily agree to be part of this research.

Name of Participant.....

Participants' SignatureOR Thumb Print.....

Date:

INTERPRETERS' STATEMENT

I interpreted the purpose and contents of the Participants' Information Sheet to the afore-named participant to the best of my ability in the (Twi, Ga and Ewe) language to his proper understanding. All questions, appropriate clarifications sorted by the participant and answers were also duly interpreted to his/her satisfaction.

Name of Interpreter.....

Signature of Interpreter..... OR Thumb Print

Date:

STATEMENT OF WITNESS

I was present when the purpose and contents of the Participant Information Sheet was read and explained satisfactorily to the participant in the language, he/she understood (Twi, Ga and Ewe language) I confirm that he/she was given the opportunity to ask questions/seek clarifications and same were duly answered to his/her satisfaction before voluntarily agreeing to be part of the research.

Name:.....

Signature..... OR Thumb Print

Date:.....

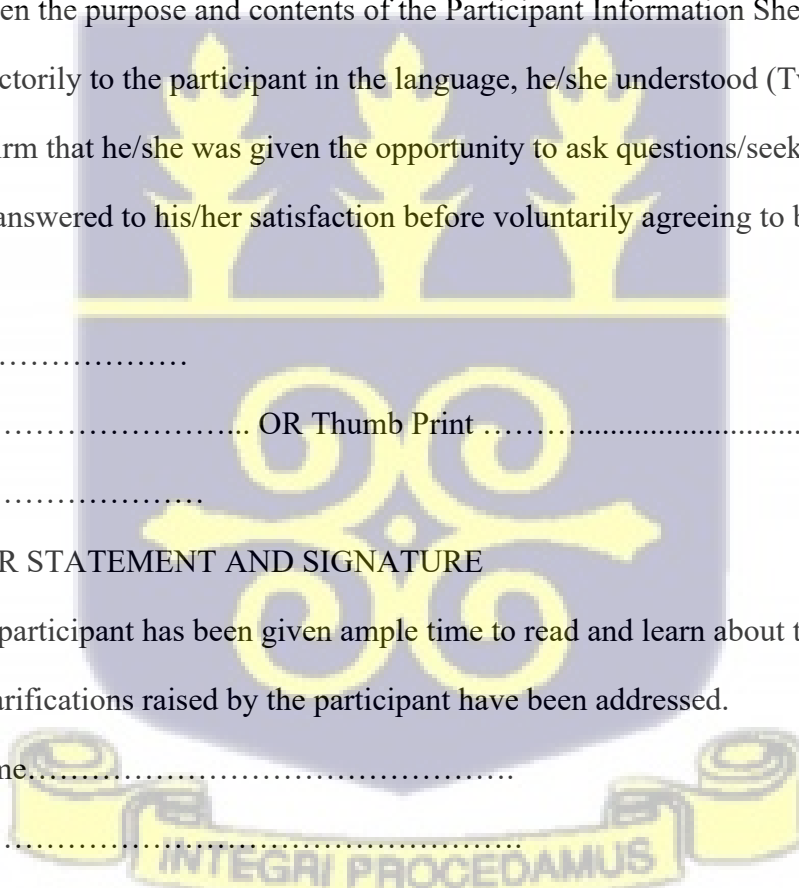
INVESTIGATOR STATEMENT AND SIGNATURE

I certify that the participant has been given ample time to read and learn about the study. All questions and clarifications raised by the participant have been addressed.

Researcher's name.....

Signature.....

Date.....



GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

*In case of reply the
number and date of this
Letter should be quoted.*



My Ref: GHS/RDD/ERC/Admin/App/23/650
Your Ref. No.

Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Digital Address: GA-050-3303
Mob: +233-50-3539896
Tel: +233-302-681109
Email: ethics.research@ghs.gov.gh
2nd November, 2023

Jennifer Illeme Adibo
C/O E.P Primary School
P.O. Box 50
Ghana

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.

GHS-ERC Number	GHS-ERC: 037/10/23
Study Title	Determinants of Prenatal Care Utilization in the Shai-Osu Doku District in the Greater Accra Region.
Approval Date	2 nd November, 2023
Expiry Date	1 st November, 2024
GHS-ERC Decision	Approved

This approval requires the following from the Principal Investigator

- Submission of a yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

You are kindly advised to adhere to the national guidelines or protocols on the prevention of COVID -19

Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED.....

Mr. Kofi Wellington
(GHS ERC Chairperson)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra

Student's CV

Jennifer Illeme Adibo

ADDRESS: Research & Development Division

Ghana Health Service

P. O. Box MB 190, Accra – Ghana.

Mobile number: +233 203525003 / 541959990 E-mail address: jenniferadibo17@gmail.com

Sex: Female

Date of Birth: 21/05/1991

Nationality: Ghanaian

Passport Number: G2351162

I am young, hardworking, assertive, and problem-solving and highly self-motivated professional who shares a dream of working with a reputable company in a position that challenges my problem-solving skills. I would uphold, irrespective of the establishment, the nobility of work through diligence in responsibility and commitment to acceptable standards.

KEY SKILLS

- Good interpersonal and communication skill
- Good influential and leadership skills
- A very good team worker
- Analyzing and solving workplace challenges
- Computer software (Ms- Word and Excel)
- Very good organizational skills

EDUCATION AND TRAINING

2010 – 2014 BA. Management Studies (3.49 CGPA)

University for Development Studies, Ghana

- Business Development
- Financial & Accounting Management
- Investment Management & Marketing Management

**2006 – 2009 West African Senior Secondary Certificate Examinations
(WASSCE) Kpando Senior High School, Ghana**

- Business Management
- Financial Accounting
- Economics
- Cost Accounting

WORK EXPERIENCE

2018 – DATE Health Research Officer, Research and Development Division

Ghana Health Service

- Monitoring and evaluating clinical trial process.
- Involve in taking minutes for all protocols at review

meetings.

- Put together issues that emerge as comments to be addressed by researchers on the submission they make to the review Committee

- Ensuring that all protocols received go through the requirement processes.

PERSONAL SKILLS

International Language spoken English

Local languages spoken: Ewe, Konkomba, Dagari and Twi

Computer skills Good command of Microsoft Word and Excel

Workshops Attended:

- Quality Assurance Workshop, University for Development Studies, 2012
- Youth Leadership Seminar, Focus Central Ghana

Ltd, Wa, 2012

- Employability Skills and Career Guidance

Seminar, British Council, Wa, 2013

References

- Professor George Emmanuel Armah,
Head of Virology,
Noguchi Memorial Institute for Medical Research

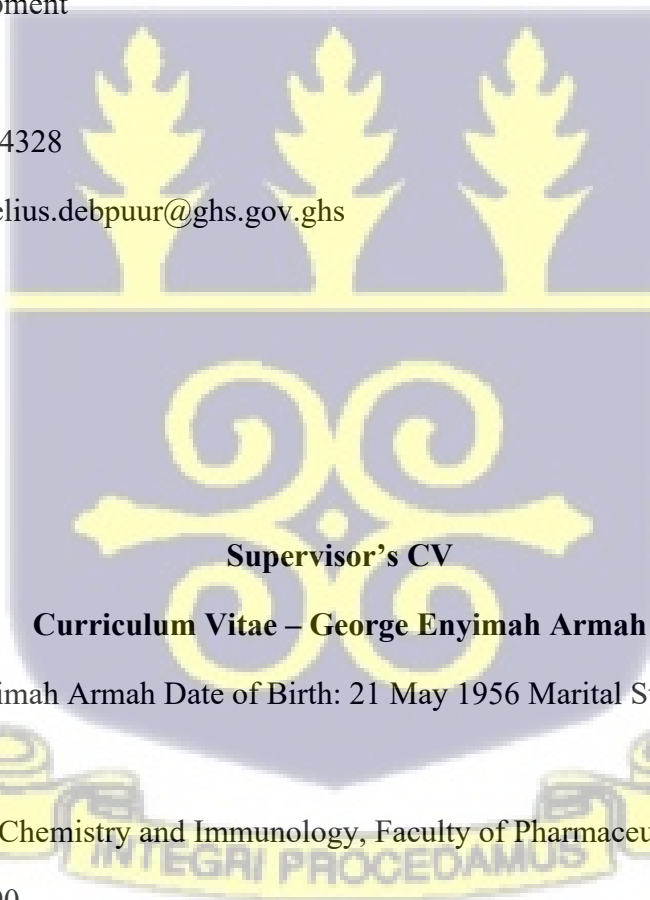
- Mobile: +233 208246513

- E-mail Address: garmah@noguchi.ug.edu.gh

- Dr. Cornelius Debpuur,
Deputy Director of Research,
Research and Development
Division.

- Mobile: +233 509914328

E-mail Address: cornelius.debpuur@ghs.gov.gh



Supervisor's CV

Curriculum Vitae – George Enyimah Armah

1. Name: George Enyimah Armah Date of Birth: 21 May 1956 Marital Status: Married

(a) Education:

1. Ph.D., Biophysical Chemistry and Immunology, Faculty of Pharmaceutical Sciences, Osaka University, Japan, 1990.
2. M.Sc. Bio-Physics, University of Ghana, Legon 1985
3. Certificate in Electron Microscopy, Fukushima Medical School, Japan, 1981

4. B.Sc. Hons. Physics, University of Ghana, Legon, 1979

(b) Employment:

1. Teaching Assistant, Dept. of Physics, Univ. of Ghana, Legon (1979 -1980)

2. Demonstrator, Noguchi Memorial Institute for Medical Research, University of Ghana (1981-1983)

3. Junior Research Fellow, Noguchi Memorial Institute for Medical Research, University of Ghana (1983 -1984)

4. Research Fellow, Noguchi Memorial Institute for Medical Research, University of Ghana (1985-1997)

5. Senior Research Fellow and Head of the Electron Microscopy and Histopathology Department, Noguchi Memorial Institute for Medical Research, University of Ghana (1997 to 2003)

6. Professor, EM/Histopathology Department, Noguchi Memorial Institute for Medical Research, University of Ghana (2012 to date)

7. Professor, Epidemiology and Disease Control Department, School of Public Health, University of Ghana. (2018 to date)

8. Head, WHO Regional Rotavirus Reference Laboratory, Noguchi Memorial Institute for Medical Research, University of Ghana. (2010 to date)

9. WHO Temporal Advisor on Diarrhea diseases (Rotaviruses) 2005 to date

10. Visiting Professor and Guest Lecturer, Global Health Programme, Princeton University, Princeton New Jersey, (March 2009)

11. Member of Faculty, African Vaccinology Course, Cape Town, South Africa, (2008 to date)

12. Visiting Scientist Japan Society for the Promotion of Science (JSPS) Senior Research Fellow, Research Institute for Microbial Diseases (BIKEN), Osaka University, Osaka, Japan (October 2000)

– June 2001)

13. Claude Harris Senior Research Fellow, Medical Research Council (MRC)/Diarrhoea Pathogens Research Unit, Medical University of Southern Africa (MEDUNSA), South Africa (on sabbatical leave) 2001-2002

14. Visiting Professor, Protein Research Institute, Osaka University, Osaka, Japan (2003)

15. Associate Professor, EM/Histopathology Department, Noguchi Memorial Institute for Medical Research, University of Ghana (2003 to 2012)

(c) Research Interest:

1. Viral Gastroenteritis.
2. Vaccine Preventable Infectious Diseases
3. Clinical Trials
4. Malaria Immunology and Pathogenesis.

(d) Membership of National and International Committees/Boards

1. Foundation member, African Rotavirus Network
2. Member ROTA Council; Rotavirus Technical Committee of Experts representing the African Regional (2011 to date).
3. Chair, National Immunization Technical Advisory Committee of Ghana (2018 to date)
4. Member, National Planning committee for the introduction of Rotavirus and Pneumococcal vaccines in the Ghana EPI (2012)
5. Member, International Scientific Advisory Committee; Vaccine Impact on Diarrhea in Africa (VIDA) Center for Vaccine Development, University of Maryland, Baltimore (UMB), 2016 – to date

