UNIVERSITY FOR DEVELOPMENT STUDIES

UTILIZATION OF ESSENTIAL HEALTHCARE SERVICES DURING PREGNANCY AND BIRTH OUTCOMES IN THE TAMALE METROPOLIS

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BY

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JUNE, 2024

DECLARATION

Student

I hereby declare that this dissertation/thesis is the result of my original work and that no part of it has been presented for another degree in this University or elsewhere:

Candidate:

Signature…  …… Date ……26/07/2024……...

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Supervisor

I hereby declare that the preparation and presentation of the dissertation/thesis was supervised following the guidelines on supervision of dissertation/thesis, laid down by the University for Development Studies.

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ABSTRACT

The World Health Organization envisions that all expectant mothers and newborns should have access to quality healthcare during pregnancy, delivery, and the postpartum period. However, despite global improvements in maternal and child health services, low- and middle-income countries (LMICs), including Ghana, continue to experience high rates of poor birth outcomes. A significant factor contributing to this challenge is the inadequate utilization of essential healthcare services (UEHCS) during pregnancy. This study addresses a key gap in knowledge by examining the relationship between UEHCS utilization and birth outcomes in the Tamale Metropolis, where limited research has been conducted on this issue. A cross-sectional analytical study design was used to collect data from 206 eligible women who had given birth within the past year. A semi-structured questionnaire gathered information on sociodemographic characteristics, maternal and obstetric factors, birth outcomes, and UEHCS utilization, including antenatal and postnatal care. Data analysis was conducted using bivariate and multivariate logistic regression, with significance set at $p \leq 0.05$. The findings revealed that 63.6% mothers effectively utilized both antenatal and postnatal care services, while all 206 respondents utilized postnatal care services. Among the participants, 9.7% delivered low-birth-weight (LBW) babies, and 10.7% experienced preterm births. Mothers aged 20 years and older had a significantly lower likelihood of delivering preterm or LBW babies (Adjusted Odds Ratio AOR = 0.13, 95% CI: 0.02–0.67, p = 0.017) compared to mothers under 20 years old (reference group). Conversely, mothers diagnosed with anemia were at a higher risk of delivering LBW babies (AOR = 5.27, 95% CI: 1.01–27.39, p = 0.048) compared to non-anemic mothers (reference group). However, no statistically significant association was found between UEHCS utilization and adverse birth outcomes in this study. To improve UEHCS utilization, both government and non-governmental organizations (NGOs) should implement community-based outreach programs, mobile health (mHealth) initiatives, and financial incentives for maternal healthcare seekers. These strategies can help increase accessibility, awareness, and affordability of essential services. Although the majority of participants utilized postnatal and antenatal care services, UEHCS did not show a significant association with birth outcomes in this study. However, factors such as maternal age and anemia status played a crucial role in birth outcomes. The findings suggest that policymakers should prioritize maternal nutrition, early anemia screening, and youth-centered pregnancy interventions to improve birth outcomes.

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ACRONYMS

AIDS	Acquired Immuno-Deficiency Syndrome
ANC	Antenatal Care
ATR	African Traditional Religion
AOR	Adjusted Odds Ratio
CHIPS	Community-Based Health Planning and Services
CI	Confidence Interval
HCW	Healthcare Workers
LBW	Low birth Weight
LMICs	Low- and Middle-income Countries
MUAC	Mid-Upper Arm Circumference
NGOs	Non-Government Organizations
PNC	Post-Natal Care
PTB	Pre-Term Birth
QoL	Quality of Life
SPSS	Statistical Package for Social Sciences
TTH	Tamale Teaching Hospital
TOL	Tolerance Value
UN-SDG	United Nations Sustainable Development Goal
VIF	Variance Inflation Factor
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Globally, maternal and neonatal mortality remain critical public health challenges, with approximately 810 women dying daily from preventable pregnancy-related causes in 2020, and 94% of these deaths occurring in low- and middle-income countries (LMICs) such as Ghana (WHO, 2023). Sub-Saharan Africa alone accounts for two-thirds of global maternal deaths, with Ghana's maternal mortality ratio (MMR) standing at 308 deaths per 100,000 live births (GSS et al., 2018). Antenatal care (ANC) is widely recognized as a cornerstone of maternal health, reducing risks such as preterm birth, low birth weight (LBW), and stillbirths by enabling early detection and management of complications like anemia, hypertension, and placental abnormalities (WHO, 2016).

In Tamale Metropolis, Northern Ghana, poor birth outcomes persist despite national progress in maternal healthcare. For instance, two tertiary hospitals in the region reported stillbirth rates of 5.9% and 10.6% in 2019, far exceeding the global target of 10 stillbirths per 1,000 births by 2035 (Adu-Bonsaffoh et al., 2019; WHO, 2014). While Ghana's national postnatal care (PNC) utilization rate is 74%, Tamale Metropolis lags at 75%, trailing behind regions like Upper East (91.4%) (UNICEF, 2019). This disparity underscores systemic barriers to healthcare access, such as distance to facilities, socioeconomic inequities, and cultural norms that prioritize male involvement over maternal care (Owusu, 2021).

Previous studies link adverse birth outcomes to factors such as abruption placentae, breech delivery, and preterm birth (Dassah et al., 2014). However, these complications are often exacerbated by inadequate ANC utilization. For example, ANC attendance reduces preterm birth

risks by addressing modifiable factors like anemia (Carmo et al., 2019) and detecting placental issues early. Despite this evidence, no studies in Tamale Metropolis have explicitly examined the relationship between ANC utilization and birth outcomes, creating a critical research gap. Aim of study was to contribute to the examination of ANC attendance on these unfavorable pregnancy outcomes in northern Ghana. Aim of study was to fill the gap by determining the relationship between birth outcome and maternal UEHCS during pregnancy in Tamale metropolis, Ghana.

1.2 Problem statement

Maternal and neonatal mortality remain urgent public health challenges in Ghana, particularly in the Tamale Metropolis of Northern Ghana. Despite global efforts to reduce preventable pregnancy-related deaths, Ghana's maternal mortality ratio (MMR) stands at 308 per 100,000 live births (GSS et al., 2018), far exceeding the Sustainable Development Goal (SDG) target of 70 per 100,000 by 2030. In Tamale Metropolis, poor birth outcomes persist, with tertiary hospitals reporting stillbirth rates of 5.9%–10.6% (Adu-Bonsaffoh et al., 2019), surpassing the World Health Organization's (WHO) global target of 10 stillbirths per 1,000 births by 2035. These figures highlight a critical gap in maternal healthcare delivery, particularly in addressing adverse birth outcomes such as preterm birth, low birth weight (LBW), and stillbirths.

Compounding this issue, antenatal care (ANC) utilization in Tamale Metropolis lags behind national and regional averages. While Ghana's national postnatal care (PNC) utilization rate is 74%, Tamale Metropolis records a 75% ANC utilization rate, trailing regions like Upper East, where PNC utilization reaches 91.4% (UNICEF, 2019). This disparity underscores systemic barriers to healthcare access, including socioeconomic inequities, cultural norms, and geographic challenges. For instance, late ANC attendance delays the early detection of complications such as placental abnormalities, anemia, and hypertension, which are linked to adverse outcomes like abruption placentae and breech delivery (Dassah et al., 2014).

Furthermore, postnatal care (PNC) utilization in Northern Ghana remains critically low at 59.3% (Owusu, 2021), limiting opportunities for post-delivery interventions to mitigate risks such as neonatal infections or birth trauma. While prior studies identify factors such as male fetal sex, preterm birth, and breech presentation as contributors to stillbirths, they fail to contextualize how maternal healthcare utilization in Tamale Metropolis influences these risks. For example, inadequate ANC attendance exacerbates modifiable risk factors like anemia, which increases the likelihood of preterm birth (Carmo et al., 2019). Despite this evidence, no studies have explicitly examined the relationship between ANC utilization and birth outcomes in Tamale Metropolis, creating a critical research gap.

The lack of localized evidence impedes the design of targeted interventions to improve maternal and neonatal health in this setting. Without understanding how ANC utilization mitigates adverse outcomes in Tamale—where cultural practices, resource constraints, and systemic inequities intersect—policies cannot effectively address barriers to care. This study seeks to fill this gap by investigating how ANC utilization influences birth outcomes in Tamale Metropolis, providing actionable insights for policymakers and healthcare providers to reduce maternal and neonatal morbidity and mortality.

1.3 Study questions

1. What is the level of utilization of essential healthcare services (UEHCS) among mothers in the Tamale metropolis?
2. What is the prevalence of preterm birth, LBW, and caesarean section among selected hospitals in the Tamale metropolis?
3. How does the utilization of essential healthcare services during pregnancy influence birth outcomes in the Tamale metropolis?

1.4 Study objectives

1.4.1 Main objective

To examine the utilization of essential healthcare services during pregnancy and birth outcomes among mothers in Tamale metropolis, Ghana

1.4.2 Specific objectives

1. To determine level of UEHCS among mothers in Tamale metropolis.
2. To determine prevalence of LBW , preterm birth, stillbirth and caesarean section among selected hospitals in Tamale metropolis.
3. To examine association between UEHCS and birth outcomes in Tamale metropolis.

1.5 Study Significance

Prevalence of preterm birth, LBW , and caesarean section in the district was determined. The findings of this study may also assist policymakers in developing strategies that effectively address maternal morbidity and other health issues in the district, as well as adverse birth outcomes. Furthermore, the outcomes may support community policymakers in their planning of health services. This study adds to body of knowledge and provide foundation for future investigations into the district's maternal use of important healthcare services.

1.6 Conceptual framework

In this study, a modified framework adopted from the WHO was implemented (Lattof et al., 2020). According to the WHO, the level at which healthcare services are given to patients and individuals improve desired health outcomes constitutes quality of care, based on multiple definitions found in the literature (Tunçalp et al., 2015). Healthcare must be equitable, people-centered, timely, safe, and effective in order to accomplish this. This means that, quality of care given to newborns and women is determined by how well newborn and maternal health services (for both populations and

individuals) raise the possibility of prompt, appropriate care in order to achieve desired findings that are both in line with the state of the art, taking into consideration aspirations and preferences of particular women and their families (Tunçalp et al., 2015). This definition considers attributes of high-quality care and two crucial elements of care: the quality of care as it is provided and the quality of care as it is experienced by mothers, infants, and their families.

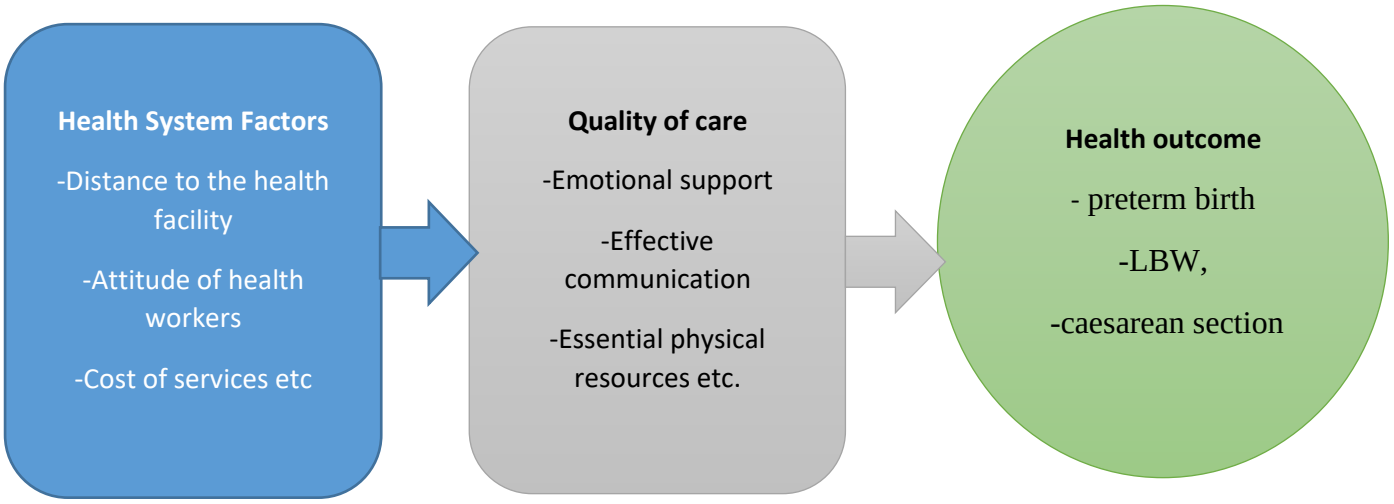

Figure 1: Conceptual framework for utilization of essential healthcare services during pregnancy and birth outcomes.

There are eight quality of care domains in the framework that pertain to the entire health system. While concentrating on care given in institutions, it also acknowledges vital role that communities and service users play in determining their preferences and needs as well as in taking charge of their own health. In addition to influencing the decision regarding care seeking, the opinions of women, their communities and families regarding the calibre of maternity care services play a crucial role in generating demand for and facilitating access to superior newborn and maternity services (Bohren et al., 2014). Thus, community involvement should be taken into account in addition to medical facilities and be a crucial part of raising the standard of care for expectant mothers and their children. Quality of care in different areas of the health system can be evaluated using this framework, which can be used by managers, service providers, and consumers to

evaluate various aspects of care. Six key areas of focus were identified for work to maximize quality of care for newborns and mothers based on this framework and the organisational mandate.

1.7 Theoretical framework

The research is guided by the Health Belief Model to effectively address and rationally conclude the subjects covered in this project, which emphasizes individuals practices and medical procedures. According to the theory, which combines psychological theories of social learning, goal-setting, and decision-making, a person's decision to seek treatment is impacted by how much of a threat they believe a health issue poses and how much weight they place on accepting that threat (Hakim, 2018).

The model clarifies why some young people would seek ANC services while others would not. The Health Belief Model, is broken down into three primary sections to explain the behaviours of mothers concerning child and maternal services. The notion that each mother's socio-demographic and environmental factors are influenced by their health views forms the basis of this concept. The frequency of ANC visits among respondents may be affected by changing factors including gender, age, marital status, youth parity, and education level. It is also important to keep in mind that mothers who are educated may decide to engage in regular ANC visits. Educated women would most likely abstain from indulging in bad maternal and child health practices since they are aware of the benefits and consequence associated with it. Similarly, perceived obstacles including the unfavorable attitudes of the health personnel, a lack of accessibility, acceptability, and availability, as well as the distance to service centers, may affect the choice of the youth in terms of ANC (Barmao-Kiptanui et al., 2015). The fact that this model tries to describe how people behave when they seek assistance is what made it appropriate for this investigation.

1.8 Organization of the thesis

The thesis is structured into six distinct sections, the first chapter comprises introduction, information on problem statement, research questions designed to address the problem, the objectives that direct the investigation, and importance of the study.

In chapter two, in-depth review of literature on birth outcomes and maternal health services both nationally and internationally is provided. Additionally, research gaps and important findings regarding low birth weight, caesarean section, and preterm birth trends and related factors is presented.

The research approach implemented to achieve the objectives of the research is spelt-out in chapter three. The study area, sample size calculation, study design, sampling procedures, and the instruments that was used for data collection (in no particular order) are all covered in chapter three. The section also include statistical analysis.

The study's findings or findings are presented in both written and tabular form in chapter four. However, some portions of the findings are displayed graphically for easy understanding and comprehension.

The discussion of study's findings and their comparison to existing literature presented in chapter five of this document. Both contradictory and findings that are consistent with current findings are presented.

The study's conclusion and recommendations are covered in detail in the last chapter (chapter six). This section provides a summary of the study's findings based on its goal and objectives. Recommendations are made based on findings of study for health systems, legislators, and other related bodies (such as NGOs) in the Tamale metropolis. Lastly, this chapter also present the study's shortcomings.

CHAPTER TWO

LITERATURE REVIEW

2.1 Utilization of Essential Healthcare Services during Pregnancy

Effective healthcare utilization during pregnancy constitutes one of important agenda governments across the globe attach great importance in attempt to protecting both child and maternal health (Gao et al., 2023). United Nations Sustainable Development Goal (UN-SDG) target 3.1 aim to decrease maternal mortality ratio to 70 per 100,000 live births in 2030 across the world (WHO, 2024). WHO 2024 report indicates that, eighty-six percent of deliveries across the wold were assisted by trained health professionals in the year 2022, and about 95% of maternal mortality recorded in the year 2020 happened in LMICs. The report further reiterates that, almost eight-hundred women died from preventable factors related to childbirth and pregnancy every day in the year 2020.

WHO defined ANC as care given by health-care professionals to pregnant adolescent girls and women to ensure the best health conditions for both baby and mother during pregnancy. The components of ANC include; prevention of concurrent or pregnancy-related morbidities; risk identification; health promotion and health education (WHO, 2016). ANC is caregiven to pregnant women by qualified health professionals for the purpose of assessing general health status providing cure for diseases, and providing continuous care. The aim of ANC is to prevent complications and death associated with pregnancy (Muhwava et al., 2016). Prevalence of antenatal care utilization refers to proportion of pregnant women who receive antenatal services from a professional health staff. Prevalence of antenatal care differ among regions across the globe.

Worldwide, during the period 2007–2014, sixty-four percent of women who were pregnant achieved WHO-recommended minimum four contacts for ANC, and forty-eight percent of women in Africa suggesting more work is needed to address ANC quality and utilization. There were regional variations with Bahrain, Belarus and Cuba recording 100% pregnant women receiving at least four ANC visits. Whereas Angola, Denmark, Burundi, Chad, Burkina Faso, Bangladesh and Afghanistan recording antenatal care utilization of less than four visits (WHO, 2015b).

In LMICs, ANC utilization has improved with the introduction of WHO basic ANC, or focused ANC (FANC), a goal orientated approach to ensure evidence-based interventions carried out at four critical periods during pregnancy (WHO, 2018). Community-based cross sectional study reports that, it was discovered that, 100% of women who were pregnant utilized ANC in a rural community of south east Nigeria (Agunwa et al., 2017). Research in Ethiopian district showed 70% pregnant women used ANC services during their last pregnancy. This study employed both quantitative and qualitative techniques (Aregay et al., 2014). Also, in a prospective birth cohort study in district of South Africa, 7 in 10 pregnant women attended ANC at least four times (Fahey et al., 2019).

In Ghana, an appreciable number of pregnant women utilizes ANC services. A nationally representative data reports 87% pregnant women have received at least four ANC attendance in latest demographic and health survey. Multiple indicator cluster survey recorded similar prevalence of 85% pregnant women who attended ANC of at least four times (GSS, 2018). These surveys used household sample. The Ghana maternal health survey also reported higher prevalence as nine in ten women reported to have received at least four antenatal care services. (GSS; GHS; ICF International, 2015; GSS et al., 2017; MICS, 2019).

Northern Ghana however records antenatal prevalence below the national average. From the multiple indicator cluster survey, eight in ten pregnant women had utilized at least four antenatal care service an improvement from 67 % recorded in 2012 (Arthur, 2012; GSS, 2018)

However, with regard the WHO 2016 ANC model which recommends antenatal contacts of at least eight to ensure positive pregnancy experience, a sharp prevalence is recorded in most African countries. Fifty-four nations with current Demographic and Health Survey (DHS) and MICS data reports only 11.3% of received at least 8 ANC contacts, with the Caribbean and Latin America recording the highest ANC8+ of 54% and sub-Sahara Africa recording the lowest with Rwanda recording zero antenatal care visit of at least 8 times (Jiwani et al., 2020). Also, in 36 SSA countries, recent demographic and health survey reported pooled magnitude of 6.8% antenatal care of at least 8 contacts (Tessema et al., 2022)

In a nationally representative cross-sectional data, it was observed that minimal (20%) proportion of pregnant women could meet or comply with the WHO minimum of eight ANC attendance in Nigeria. Data was derived from the 2018 DHS of 2018 in Nigeria (Fagbamigbe et al., 2021). In Ghana, prevalence of eight or more ANC contacts was reported as 41.9% with data from Ghana malaria indicator survey of 2019 (Ekholuenetale et al., 2021),

World Health Organization Maternal Health and Safe Motherhood Program (1994) initiated Mother to Baby Package (MBP) involving safe motherhood implementation across nations. This program is founded on four pillars of Safe Motherhood Initiative including; ANC, safe/clean delivery, family planning, and essential obstetric care. MBP was not expected to function independently, but integrated into already existing health systems, with ANC model used as risk based approach under traditional ANC model (WHO, 1996). In early 1900s, traditional ANC service model was developed. The model assumed frequent ANC attendance by pregnant women,

and classifying these women into high and low risk was best way to care for pregnant woman and her developing fetus (Haruna et al., 2019). The traditional model need regular clinical assessment and attendance of ANC, consuming larger time and resources. Furthermore, traditional model focused on the number of care rather than quality care (WHO, 2015b).

Antenatal healthcare is known as important pillar of child and maternal healthcare programs targeted at reducing and preventing maternal morbidity and mortality (Adegboyega, 2018). According to WHO/UNICEF (2003), ANC refers to the care women receive at the period of pregnancy, ensuring healthy birth outcomes for both newborns and mothers. ANC provides major entry point for pregnant women to receive preventive health and promotion servicessuch as; treatment and prevention of anemia; nutritional support, prevention, treatment and detection of tuberculosis, sexually transmitted diseases and malaria, and tetanus toxoid immunization (USAID, 2005).

In previous years, WHO recommended pregnant women without pregnancy complications receive four antenatal visits. However, in recent years, the World Health Organization recommends pregnant women who do not have pregnancy-related complications to attend eight (8) antenatal care in order to improve maternal health and birth outcomes (WHO, 2016; 2003). Studies by Tekelab et al. (2019) reports that, the prevalence ANC service attendance among Ethiopian pregnant women is 63.77%. In contrast, another study conducted in the previous year in the same country reported 15.5% of pregnant women received ANC (Wolderufael, 2018). Another study conducted in Ghana shows that, majority (77.1%) of pregnant women initiated ANC first trimester and 87% visited ANC clinics at least once in their previous pregnancy of which approximately 96% had four visits or more (Owusu, 2021).

The traditional model of ANC was that, pregnant women receive ANC once per month till the thirty-second weeks of gestation, twice per month till thirty-sixth weeks gestation, and continues weekly unttill delivery. Pregnant woman was expected to attend ANC fourteen times before delivery. The interest was on the number of visit rather than quality of visit (T. et al., 2018). Routine risk indicators involving maternal weight and height were utilized to diagnose risk of complications at the period of delivery and there seems to be little variance in outcome of care between focused antenatal visit and frequent antenatal visit.The traditional model assumed increased number of ANC visits determine favorable birth outcome, expecting pregnant women to attend ANC 16 times regardless of their risk status. The model is based on routine risk indicators, such as weight of mothers lesser than 50kg, height lesser than 150cm, Mal-presentations before 36 weeks gestation and presence of edema of the legs (T. et al., 2018). Fast forward, the aim of FANC was instituted by WHO in 2002 as an attempt to overcome the challenges posed by traditional antenatal model of care such as classifying pregnant women into low risk or high risk group based on pre-identified criteria, and possibility of low risk group developing complications at the period of delivery (Kearns et al., 2014).

This FANC model is intended exclusivly for management of pregnant women without evidence of medical complications, pregnancy related complications, or major health related risk factors. For women esperiencing such conditions, health professionals are advised to follow the established procedures. According to WHO (2002) regarding FANC, pregnant women are evaluated during first ANC visit to identify existing medical conditions for special care. Those without risk factors were eligible for basic component of the focused ANC model (WHO, 2002). Activities in the basic component of FANC model included: screening for socio-economic and health risks, therapeutic

intervention, and educating and alerting pregnant women about planning for safe birth, emergencies during pregnancy and instructing women for appropriate responses (WHO, 2002).

FANC assumes that all pregnant women are at risk of developing complications hence care is focused on early identification of complication as they arise, individualized and targeted care, and use of evidenced-based practice in developing care (Assegid et al., 2017). Furthermore, FANC makes pregnancy family responsibility, whereby both woman and partner are fully informed about birth preparedness, potential complications, postnatal care, future planning, and birth spacing. Fundamentally, ANC is a goal orientated approach, and evidence-based intervention carried out at four critical periods of pregnancy. Ideally, first ANC visit should occur during first trimester preferably beforethe twelfth week of pregnancy. Emphasis is on determining obstetric and medical history of woman, with aim to collect evidence of eligibility to follow basic component of FANC model. Second ANC visit is scheduled close to the twenty-sixth week of pregnancy. Test and examination are restricted on uterine height and blood pressure measurement, as well as performing multiple dipstick test for bacteriuria. Furthermore, test for proteinuria should be conducted for nulliparous and women with increased blood pressure. Blood test is done to determine haemoglobin. Medical history, personal history, obstetric history, present pregnancy and assessment for referral are all made during the course of the visit.

The third visit happen in or around the thirty-second week of pregnancy, This visit should include all activities of the second visit if pregnant woman missed the second visit. Examination and test regarding measuring uterine height and blood pressure are restricted at this level, and performing multiple dipstick test for haemoglobin and bacteriuria for all. Furthermore, test for proteinuria should be conducted for nulliparous women, and those with preeclampsia, high blood pressure, and eclampsia. Referrals are based on findings and symptoms which need special interventions.

Nevertheless, some women go into labor and deliver before their next scheduled visit. Therefore, extra attention is required in the course of providing advice and instructions in the situation labor start and to ensure these women have skilled attendant for the birth. The woman should be encouraged to discuss contraceptive options and birth spacing with her partner, and be encouraged to leave ANC clinic with preferred method of choice.

The fourth visit is regarded final visit of the basic component and should take place between the weeks of thirty-six and thirty-eight. During this time, it is extremely important that women with fetuses in breech presentation are discovered and referred for external cephalic version and obstetric evaluation. Furthermore, during the visit, women who have not delivered by end of week forty-one should be advised to go directly to the health facility for evaluation and possible induction of labor by the best method available. During the visit, women should also be reminded of benefits derived from contraception and lactation, as well as availability of contraceptive methods at the postpartum clinic.

In recent time, evidence suggests FANC model is associated with increased perinatal mortalities compared to ANC models comprising eight contacts or more between female adolescent or pregnant woman and healthcare proffessional. Secondary analysis by WHO ANC trial reports that, increase in the rate of perinatal deaths is more likely to be as result of high occurrence of stillbirths. The evidence influenced the development of 2016 ANC recommendations by WHO (Baffour-Awuah et al., 2015; WHO, 2016). A new ANC model aimed at attaining eight ANC visits or more recommended by WHO was based on recent evidence indicating increase in health outcomes at the period of receiving effective maternal health interventions under the new ANC model in contrast to four focus ANC model. It is believed the recommendation will help decrease perinatal deaths and improve experience of care by women (Raïssa Kourouma et al., 2021; WHO, 2016).

The recommendations involves context-specific and universal interventions. Recommended interventions give arise to five categories namel; maternal and fetal assessment, routine antenatal nutrition, preventive measures, health system-level interventions, and interventions for management of common physiologic symptoms in pregnancy to improve the utilization and quality of ANC (WHO, 2016). The aim of WHO (2016) ANC model is to provide pregnant women with individualized, respectful, person-centered care at every contact and to ensure each contact delivers integrated and effective clinical practices, provides timely and relevant information, and gives emotional and psychosocial support by practitioners with good interpersonal and clinical skills working in a well-functioning health system (WHO, 2016).

Haruna et.al., (2019) reports that, the potential of FANC is huge. However, the impact of FANC on reducing maternal bortalities and its contribution to improved healthcare utilization and access is contentious. Even though several literature suggess FANC help improve child and maternal health outcomes in SSA, limited qualitative evidence regarding this issue exist. FANC model recommends eight or more ANC visits, with first contact scheduled to occur during first trimester, two visits scheduled during second trimester, and five visits scheduled in the last trimester before delivery. The word “contact” has been used instead of “visit” within the model implyng active connection between a health-care provider and a pregnant woman (WHO, 2016, 2018). Differ from Focused ANC model, additional contact is currently recommended at twenty weeks of pregnancy, and additional three contacts are recommended in the third trimester, since this represents the period of greatest antenatal risk for mother and baby.

During third-trimester contacts, ANC health providers should strive to reduce preventable diseases and deaths via systematic monitoring of fetal and maternal well-being, especially in relation to

hypertensive disorders and other complications that may be asymptomatic but detectable. If the quality of ANC is poor and the experience of the woman is negative, the evidence shows that women will not attend ANC, regardless of number of recommended contacts in the ANC model. Studies by Kourouma et al., (2021) indicated WHO ANC model (2016) has been adopted in some African nations, notably in Burkina Faso, Nigeria, Rwanda and Ghana. Nevertheless, most of the developing country where the use of ANC services remains poor have not shifted to the 2016 WHO ANC model yet; and have their guidelines for ANC still based on the FANC.

Literature shows that, several factors (determinants) prevent or inhibit ANC attendance among pregnant women. Findings of Adegboyega (2018) and Damayanti et al. (2023) reveals that, knowledge of antenatal care services, level of health resources, attitudes of health workers and religion are factors which determine the use of antenatal healthcare services among women who are pregnant. Another study on factors affecting antenatal care utilization among pregnant women reports factors like number of living children, maternal age, education, place of residence, occupation, religion and ethnicity as associated determinants of the use of ANC services (Ali et al., 2018).

Skilled birth attendance refers to accredited health professional who has been trained and educated to proficiency in the skills required to manage childbirth, normal pregnancies, and immediate postnatal period and in the management, identification, and referral of complications in women and newborns (WHO, 2004). Prevalence of skilled birth attendance refers to the proportion of births attended by a skilled health worker which represents the percentage of all births attended by a skilled health worker (WHO, 2008). Global skilled birth attendance coverage showed improvement from 2000 to date. Important inequalities however remain between countries and within regions with South Asia and Sub Sahara Africa achieving less and so the need to put more

efforts (Joseph et al., 2016). A clear disparity could be seen in WHO (2008) report in which Europe reported 99.5%, Latin America 88.5%, Asia 65.4% and Africa 46.5% prevalence of skilled delivery at birth.

In eighty developing countries, Joseph et al., (2016) reported that proportion of institutional SBA deliveries was above ninety-percent in twenty-five of the eighty countries, and below 40 % in 11 countries. In all, 74% births were assisted by SBAs and 71% of births inside health institutions. Also, in twenty-nine SSA countries, it was reported that the average prevalence of young women who had skilled assistance during delivery in the twenty-nine SSA countries was approximately 75% and this ranged from about 38% in Chad to 94% in Rwanda (Bubu et al., 2021). This study used a rather smaller sample of women in a narrow age group of 20-24 years. Both studies used DHS data for assessment on the prevalence of skilled delivery at birth.

In a different study, it was reported that an overall prevalence of skilled birth attendance as 63.0%, with the lowest prevalence in Tanzania (13.8%) and highest in Rwanda (91.2%). This study made up of 29 SSA countries (Dickson et al., 2021). The prevalence of mothers who received SBA at delivery in Gabon, Malawi, Rwanda and Sierra Leone were encouraging at 90.3%, 90.4%, 91.2% and 91.0% respectively (Dickson et al., 2021). Costa Rica and Georgia reported high level of skilled delivery at birth at 94.3% and 92.4% respectively as well as France (99%), Finland (99.9%), Cuba (99.9%), Croatia (99.9%), China (97.8%), Columbia (96.4%), Botswana (98.5%), and Brazil (96.8%) (WHO, 2008).

Rwanda and Sierra Leone seems to be doing well with regards to skilled birth attendance. A national representative data in Sierra Leone showed that a majority (88.3%) of mothers aged 15-49 years had utilized skilled delivery at birth (Sserwanja et al., 2022). Prevalence of other countries in Africa fluctuates performing less in some studies and better in other studies with

respect to skilled delivery at birth. Community-based cross-sectional study conducted in Ethiopia Aregay et al., (2014), recorded 38% as the prevalence of skilled delivery at birth. Ameyaw &Dickson (2020), also reported that a pooled data of demographic and health surveys of three countries showed three African countries have skilled delivery prevalence of less than 50%. Sierra Leone, Niger and Mali recorded a skilled delivery prevalence of 45%, 33% and 40% respectively. Ghana has strived in improving maternal health services including skilled delivery at birth. In the most recent report of MICS in Ghana, 79% of women 15-49 years of the national representative sample was reported to have utilized skilled delivery at birth. Out of this, 90% of these women hailed from urban areas whereas 71% reported to have come from rural areas of Ghana. Northern region however recorded the least prevalence of 60% with regard to skilled birth attendance (GSS, 2018). Available data in Ghana shows that the prevalence of skilled birth attendant has slightly increased from 74% in 2014 to 79% in 2018 (GSS; GHS; ICF International, 2015; GSS et al., 2017).

Postnatal care refers to care mothers receive for a period of six weeks from the time of delivery. Postpartum period refers to the period that starts from one hour after the delivery of placenta and up to ends of six weeks after delivery. It is critical phase in the lives of newborn babies and mothers as most maternal and infant mortalities occur during this time. WHO recommends four postnatal care contacts that a mother is supposed to receive. For uncomplicated vaginal birth in health facility, healthy newborns and mothers should receive care in the facility for at least 24 hours after birth whereas if birth occured at home, the first postnatal contact should be within 24 hours of birth. The subsequent three care contacts should be received on the third day (48–72 hours), between seven to fourteen days after birth, and six weeks after birth (WHO, 2014). The period following delivery is a crucial period in the lives of newborns and mothers since high rate of

maternal and infant mortality occur during this stage (WHO & UNICEF, 2015). The postnatal period refers to the stage from the end of the third stage of labor until most of the organs have returned to their pre-pregnant state (Appiah et al., 2021). By convention, the period of postnatal care begins immediately after childbirth until the sixth week (42 days) after birth.

A UNICEF report indicates that, there is great disparity between rural and urban postnatal healthcare services. About 90.2% of mothers who live in urban communities received postnatal care services within two days of delivery compared to 73.9% among mothers who lives in rural communities (UNICEF, 2019). In the same report, 29% of newborns who resided in richest households received postnatal care services within two days after birth, wheras on 25% among children from poorest households received postnatal care services, a clear indication of wealth as determinant of postnatal care. Nevertheless, Northern region of Ghana recorded the lowest rate of maternal utilization of postnatal care services of 59.3% against 91.4% reported in Upper East region (UNICEF, 2019). Poor postnatal care services have been associated with poor health among both mother and child (Owusu, 2021).

Prevalence of postnatal care refers to proportion of mothers who receive care from a skilled health worker immediately after delivery to 6 weeks postpartum. By the end of the Millennium Development Goal (MDG) in 2015 the global coverage of postnatal care for newborns was merely 28% (Yeji et al., 2015). In 36 sub-Saharan Africa countries, an estimated pooled magnitude of postnatal care utilization was 52%, but the sub-regional analysis showed a highest postnatal care prevalence of 82% and 81% in South Africa and Lesotho in southern Africa respectively, 86% and 81% in Cameroon and Gabon in central Africa respectively. In east Africa, Zimbabwe recorded the highest prevalence of postnatal care with 84%. Burkina Faso of west Africa recorded postnatal care prevalence of 82%. This study used nationally representative DHS dataset obtained from 36

Africa countries with the same variables, hence comparable across all countries (Tessema et al., 2020). Other countries however recorded very low prevalence in the same study including Chad (48%), Ethiopia (8.3%), Swaziland (20.4%) and Benin (19.1%) as reported by Tessema et.al., (20202). This study assessed attendance of postnatal care checks by a health professional within 42 days of birth. High disparities could be observed among regions of the Africa continent.

In a cross-sectional study in Ethiopia, a postnatal care utilization prevalence of 49.7% was reported in Enderta District which is an improvement in the previous study (Aregay et al., 2014). This study employed both quantitative and qualitative techniques to collect data from married women 15-49 years. This study however did not clearly define postnatal care in terms of timing, period and frequency of attendance. Analysis of 2018 Multiple Indicators Cluster Survey of Gambia revealed that 22.4% of women received postnatal care within a certain period. Also the timing and frequency of postnatal care was not clearly define (Barrow & Jobe, 2020).

In an institution based cross-sectional study conducted in ten randomly selected government health centers in Addis Ababa, the prevalence of postnatal care service utilization was relatively good at 65.6% (Berhanu Sr et al., 2016). An Analysis of 2017 Indonesian DHS Data reported 84% of mothers utilized any postnatal care service from a health staff, while 78.5% received postnatal care in the first 2 days after birth but only 10.3% utilized PNC more than 2 days after birth. This indicates that, the prevalence of postnatal care utilization decreased as the number of days after birth increases (Sebayang et al., 2022). Another population-based study aimed to examine the gap across the region in Indonesia for postnatal care services reported high prevalence of 70.9% among 15–49 years old using the 2017 Indonesia demographic health survey data sets (M. N. Cahyono et al., 2021). Also, in a Ugandan a national representative data indicated 50% of mothers utilized postnatal care in the first 2 days after birth (Ndugga et al., 2020).

Sserwanja et al., (2022) used 2019 demographic health survey of Sierra Leone to assess utilization of postnatal care services. Finding showed that 90.7% of women had postnatal check after childbirth.

In Ghana, analysis of the latest DHS showed that 74% of the rural women had postnatal care. This was a national representative data drawn from the 2014 demographic and health survey (Appiah et al., 2021). An analysis of the same 2014 DHS by Yaya et al., (2019) showed maternal postnatal prevalence of 84% and child postnatal care of 72%.

The Ghana demographic and health survey of 2014 reported a postnatal care prevalence of 79.8% indicating an improvement in maternal healthcare (GSS; GHS; ICF International, 2015). The sixth multiple indicator cluster survey in its latest survey of 2017 in Ghana also reported a prevalence of 85% for mothers who receive postnatal care services within 48 hours after delivery for Ghana but northern region recorded a postnatal care prevalence of 75% 48 hours after delivery which is an improvement from the 2014 DHS prevalence (GSS, 2018; GSS et al., 2017). Haruna et al., (2019) in a qualitative study reported postnatal care prevalence of 96.4% for mothers in rural Ghana.

2.2 Prevalence of adverse birth outcomes

Even though pregnancy is regarded happy moment for most women and families, the condition also give rise to concern and anxiety. Birth outcome is regarded important indicator of health of populations, which indicates a country's quality of healthcare services (QoHCS) for both children and mothers (Buitendijk et al., 2003). Adverse birth outcomes such as preterm birth constitutes common health challenges especially in developing countries, and potentially bring about significant consequences on infants, and economic costs and emotional stress on communities and

families all over the world, especially in LMICs where health system and services are weak (Kassahun et al., 2019).

Globally, more than two-hundred and thirteen million pregnancies occur every year, and approximately 89% of these pregnancies happen in LMICs where risk of poor birth outcome is highest (Mcdonald et al., 2020). The three leading determinants of disease among child-bearing women include AIDS, pregnancy complications, and childbirth (UNFPA, 2015). World Health Organization (WHO) report (2024) indicates that, global mortality rates of children under-five years have declined from ninety-three deaths out of one-thousand live births in the year 1990 to thirty-eight deaths per 1000 live births in the year 2021, with significant decline in neonatal deaths which ranged from 5.2 million in 1990 to 2.3 million in 2021. In South Asia and Africa, childbirth and pregnancy complications are leading causes of maternal diseases for women of reproductive age, and result in more than one million children losing their mothers every year (UNFPA, 2015).

Ensuring optimal growth and delivery of a healthy baby, mothers require good rest and nutrition as well as clean environment and adequate antenatal care (UNICEF & WHO, 2015). Low birthweight (LBW) is one of poor birth outcomes which affect populations. WHO defines LBW as birthweight below 2.5Kg (UNICEF & WHO, 2004). The birthweight of newborns is regarded important marker of fetal and maternal nutrition and health (WHO, 2019). Epidemiological studies suggests that infants with birthweight less than 2,500g are about twenty times at risk to die than babies born with healthier weight (UNICEF & WHO, 2004). Predominant in developing nations than developed nations, birthweight below 2.5Kg accounts for poor health outcomes. According to WHO (2023) report, estimated 19.8 million (14.7%) of the world's newborns were assessed to be LBW in the year 2020 which increased their risk of neonatal mortality. A 2015 WHO/UNICEF

joint report on prevalence of LBW indicates that, there is variation across the globe. That is, in Southern Asia, prevalence of low (26.4%) is five times higher in Eastern Asia (5.1%) (UNICEF & WHO, 2015). Furthermore, Africa reported about one quarter of all LBW newborns, of which majority occurred in Eastern and Western Africa (UNICEF & WHO, 2015). A study by Abubakari et al. (2015) reports that, there is high prevalence of LBW in Northern region of Ghana (29.6%).

Preterm birth, also known as PTB refers to a type of birth outcome which happen between twenty weeks of pregnancy and thirty-seven weeks of pregnancy (Laelago et al., 2020). Preterm birth is a public health worry because babies born too early may be underdeveloped which usually result in challenges such as cerebral palsy and learning disabilities among others (Laelago et al., 2020; UNFPA, 2015). Globally, preterm birth occurs more than one in 10 births (Laelago et al., 2020). SSA and South Asia account for fifty percent of world's births, and greater than sixty percent of preterm babies in the world, and more than eighty percent of the world's 1.1 million mortalities due to preterm birth complications (Mcdonald et al., 2020). Recent study by Adjei-gyamfi et al. (2023) indicates that, prevalence of preterm birth in Northern Ghana is 19.4%.

Stillbirth refers to a situation when a baby in a womb dies after 28 weeks of pregnancy but during or before birth (Mihretie & Habitamu, 2022). The tragedy of stillbirth is worse in developing countries. Statistics on birth outcome in Ghana indicates that, 76% of all pregnancies in the country resulted in a live birth, 10% induced abortion, 12% miscarriage, and 2% stillbirth (GSS et al., 2018).

Several factors in literature has been identified as determinant of birth outcome among populations. That is determinants of birth outcome are grouped into categories namely: socio demographic, medical, reproductive health, obstetric, nutritional and behavioral related (Laelago et al., 2020). Study by Mihretie et al. (2022) on pregnancy outcomes among mothers who delivered at health

institutions reported that, prevalence of maternal and fetal negative birth outcomes were approximately 27% and 12% respectively. This statistics on birth outcome was associated with maternal history of premature rupture of hyperemesis and membrane, abortion, ANC follow-up, cesarean birth, meconium-stained amniotic fluid and obstructed labor and. Another research by Kassahun et al. (2019) and Fekene et al., (2021) identified living in rural area, maternal age ≥ 34 years, greater than 23cm mid-upper-arm circumference (MUAC), having multiple fetus (multigravida), lack of antenatal care visit, lack of family support, less than four ANC visit and complications during pregnancy as statistically associated with poor birth outcomes.

Several evidences indicate that, sub-Saharan Africa is at greater risk of poor birth outcome. For instance, an investigation by Tamirat et al. (2021) on determinants of poor birth outcome in the region revealed that, maternal education level, intimate-partner physical violence, socio-economic status, insufficient antenatal care follow-ups, lack of involvement of women in healthcare decision-making process and multiparity are few among many prevailing against good birth outcome.

WHO defines health as state of complete social wellbeing, mentalweleing, and physical wellbeing not simply the absence of infirmity or disease (World Health Organization, 2012). Ensuring all citizens have access to equitable and equal healthcare constitutes one of most daunting challenges for governments in African (Chirwa, 2016). Access to quality healthcare services during the period of pregnancy and after delivery is very essential. Health-care system comprises of a structure of production units which focuses on improving health status of individuals in a population (Babalola & Moodley, 2020). That is, primary healthcare and its associated facilities are considered gateway to higher levels of care.

However, Africa is plunged with high prevalence of child and maternal mortality, and accounts for 50% of global deaths from communicable diseases (African Development Bank, 2022). The prevalence of poor health in the African continent is reflection of lack of access to quality health services, especially among pregnant women. African Development Bank (2022) reports that, one-third of population in the African continent live far (more than two hours) from health services, coupled with severe shortages in medical equipment, hospital beds and drugs. Thus, the economic costs of health challenges are severe in this part of the world.

A systematic review by Babalola & Moodley (2020) on efficacy of healthcare facilities in SSA reveals that, the region is marked with high degree of inefficiency across healthcare facilities. This result transcends to the reason there is high prevalence of poor birth outcome in the region (Mihretie et al. 2022). The situation of poor health systems and services in the Sub-African region is no different from the happenings in Ghana. In Ghana, almost 98% women of childbearing age (i.e 15-49 years) who experienced stillbirth or live birth received ANC from trained health professionals (midwife, nurse, community health officer, doctor, etc.) (GSS et al., 2018). However, among these women, approximately eighty-six percent attended their first ANC for a checkup and fourteen percent attended ANC due to a problem. Furthermore, 12% of pregnancies in the country resulted in miscarriage, 10% induced abortion, and 2% stillbirth (GSS et al., 2018). Figure 2.5 is a depiction of factors which fight against quality healthcare services among pregnant women in Ghana. Some pregnant women in Ghana live in delocalized communities which requires traveling miles to get access to health services. Unavailability of healthcare facilities and health professionals in close proximity to these pregnant women poses great challenge since these women have to bear financial cost in transporting themselves to long distant facilities. Notwithstanding,

pregnant women also bear some level of cost in healthcare provision. In situation pregnant women cannot afford these costs, they do not attend ANC which consequently influence birth outcomes.

Birth outcomes that are unfavorable may be influenced by maternal socioeconomic and demographic background, including her age, income, place of residence, marital status, and level of education (Boafor et al., 2016). Risk of preterm birth, stillbirth, and LBW is higher in pregnancies carried by teenagers (under 20 years old) and women who are past the prime of pregnancy (over 35 years old) (Ahinkorah et al., 2021). In a Taiwanese study, it was discovered that ABO (abnormal birth outcomes) blood peaked at the age of 14, fell to the age of 27, and then gradually grew until the age of 44. The study also found that the chance of stillbirth increased consistently between the ages of 14 and 44, then decreased between 22 and 29 years of age. According to the study, PB (Preterm birth) risk peaked at around 14 years old. Those under 14 years old were most at risk for LBW. Compared to those aged 28 to 31, those aged 27 years or >32 years were at a higher risk (Boafor et al., 2016). SB risk is higher among first-time pregnant women before age 15 years or after age 39 years. Risk of miscarriage and stillbirth is increased with older maternal age (>35 years). Preterm births are linked to multiple pregnancies, which are more prevalent in older mothers (Agbozo et al., 2016a).

Young maternal age is more than just a sign of incomplete maternal growth; it also points to one or more additional maternal risk factors linked to ABO. Teenage women are more likely than older mothers to experience lower levels of education, to be single, to miss more than four prenatal appointments, and to not attend the clinic early (Agbozo et al., 2016a). In the past, studies have suggested that a young gynecological age (conception within two years of menarche) and the impact of a teen being pregnant before her own growth has ceased may be linked to a higher risk of ABO in teenage pregnancy. ABO risk is increased by teenage pregnancy, independent of any

known factors, according to a 2007 study done in the USA. This data calls into question conventional wisdom that inadequate prenatal care, low socioeconomic position, and inadequate weight growth during pregnancy are to blame for the ABO linked with teenage pregnancy (Agbozo et al., 2016a).

The percentage of first time mothers in their later age has increased over the past 20 years, and as a result, subsequent pregnancies are also occurring at later ages. According to a study done in Australia, mothers who are more than 35 years are at high risk to report stillbirths (Uwitonze et al., 2018). These findings were consistent with research condicted in US by Haas et al. (2019). Numerous hospital and demographic studies have found the mother's age risk factor for low birth weight. Mothers under 20 years old gave birth to the tiniest newborns, according to a cross-sectional analytic study that examined the 2010 MoH data. In the same study, moms 35 years of age and older had kids with greater LBW s than mothers 20 to 34 years of age. Similar to maternal age, the distribution of LBW by birth order appeared to follow a trend (Uwitonze et al., 2018).

One significant factor influencing disparities in maternal and fetal health is maternal socioeconomic status (SES) (Uwitonze et al., 2018). Unlike women with no education or less education, those with higher education (from secondary level) are at lower risk to experience LBW (primary school). Although some studies associate higher maternal education attainment with increased prevalence of ABO, including preterm delivery. It is generally accepted that high maternal education attainment improves birth outcomes by enhancing the status of women and access to maternal information and resources. It is also possible socio-demographic characteristics, such maternal education, could have an indirect impact on the findings of births by way of the intermediary factor (Andreoli et al., 2023).

In an Ecuadorian study including 1016 pregnant women, it was discovered that low-socioeconomic-status women had low levels of education and little knowledge of the signs of good prenatal care, putting them at risk for unwittingly obtaining insufficient treatment (Uwitonze et al., 2018).

Andreoli et al. (2023) report that, mothers without formal education were at high risk (4-times likely) to deliver LBW compared to mothers who attained formal education. In a related study carried out in Kenya, it was discovered that mothers with lower levels of education (non-completion of secondary school) were more likely to experience LBW than those who completed post-primary education (Fischer et al., 2019). According to MoH 2014, 69% of women with higher education (post primary) attended 4 antenatal clinic appointments in contrast to those with lower education (Primary and or no formal education), where only 44% did so, which led to increased chances of ABO (Ahinkorah et al., 2021). According to a Canadian study, mothers with less years of education had greater stillbirth rates during the whole gestation period than mothers with more years of education (Andreoli et al., 2023).

In a different study, moms who had had no formal education, or had given birth to a male infant were more likely to have LBW babies (Bonell et al., 2023). In Ethiopia, the reason why there are fewer ABO in urban women than in rural ones is because of the low levels of education in rural areas (Fischer et al., 2019).

Depending on your marital status, you could be single, married, widowed, divorced, or separated. According to a Canadian study, single women reported higher risk of LBW and PB than married women (Starling et al., 2014). Being single and having no confirmed paternity are strongly connected with and may be substantial risk factors for LBW and PB births. Health professionals should be aware of the possible roles that maternal marital status and the presence of a father may

have in relation to preterm deliveries and LBW (Starling et al., 2014). Unmarried status is regarded major risk factor of LBW and PB, however the presence of a father may offer some protection. A proxy standard for paternal support may include paternity in addition to marriage. Marriage has been observed to have a protective impact, despite the fact that there is no biological link between marital status and birth outcomes. Unmarried people are more likely than married people to experience LBW and PTB, according to a study in USA (Fischer et al., 2019). Unmarried people in Kenya were shown to have higher risk of LBW in a different study. In a related study, it was discovered that unmarried moms were more likely to deliver LBW babies than their married counterparts (Ahinkorah et al., 2021). Births from single women are more likely to result in SB than births from married women, according to a cohort study conducted in the USA (Nguyen et al., 2021).

The consumption of healthcare services in rural locations is found to be negatively correlated with birth outcomes due to poor health infrastructure, a lack of qualified medical workers, and high levels of illiteracy (Ahinkorah et al., 2021). In Ethiopia, mothers who live within cities have lower chance to experience negative delivery outcomes than mothers who dwell in rural areas. This resulted from a number of circumstances, including the inaccessibility of healthcare facilities in rural areas, poor income and education levels in those areas, as well as cultural attitudes (Starling et al., 2014). ABO such as LBW , preterm is more likely to occur in urban women because, in contrast to their rural counterparts, 68% of urban women attended at least 4 prenatal checkups in 2014.

Most importantly, significant 2-times increase in rates of life-threatening conditions such as; obstetric embolism, uterine dehiscence or rupture and eclampsia among women living in rural areas was identified in previous study by Jaacks et al. (2019) and Odibo et al., (2014). The study

found significant relationship between living in rural areas and severe ABO. The disparity between the findings of different research may be explained by the fact that, mothers in rural communities reported increased rate of prenatal care access, and medical insurance, significant predictors of health concerns generally (Kwesiga et al., 2021; Hauspurg et al., 2018; Boafor et al., 2016).

Risk of preterm birth was higher for rural mothers. This has previously been covered by another study. According to Kwesiga et al. (2021), disparities in socioeconomic status at the individual level are thought to be the cause of observed differences in gestational age at birth by residential domicile. Various indicators of socioeconomic standing at the individual level, such as the mother income, marital and job status, level of education and type of health insurance, all show consistent social gradient in the risk of premature delivery. Numerous negative health outcomes also place a heavier burden on people with lower socioeconomic standing (Boafor et al., 2016). The relationship between preterm birth and living residence persisted even after adjusting for demographic characteristics. This suggests that other variables, such anemia, may be affecting preterm delivery in rural moms. Pregnancy-related maternal anemia might be regarded as risk factor for preterm delivery (Hauspurg et al., 2018; Boafor et al., 2016).

2.3 Association between Utilization of Essential Healthcare Services and Birth Outcomes

The relationship between the utilization of essential healthcare services (UEHCS) and adverse birth outcomes, such as preterm birth (PTB) and low birth weight (LBW), has been a focal point of global public health research. Globally, the World Health Organization (WHO) emphasizes the importance of antenatal care (ANC), skilled birth attendance (SBA), and postnatal care (PNC) in mitigating risks associated with pregnancy and childbirth. Despite progress, significant disparities persist, particularly in low- and middle-income countries (LMICs), where maternal and neonatal mortality rates remain disproportionately high. For instance, studies such as Carmo et al. (2019)

in Angola highlight that inadequate ANC attendance (fewer than four visits) is associated with a nearly twofold increase in stillbirths and abortions, underscoring the critical role of timely and consistent care. Similarly, research in Bangladesh by Mousumi (2015) found that early ANC initiation (before 12 weeks) reduced LBW incidence by 30%, linking early engagement with healthcare providers to improved fetal growth. However, these findings contrast with a study in Tamale Metropolis, Ghana, where no significant association between ANC utilization and birth outcomes was observed, likely due to a small sample size and low statistical power (Adu-Bonsaffoh et al., 2019). Such inconsistencies highlight the need for context-specific analyses to account for localized barriers and healthcare system capacities.

In Sub-Saharan Africa (SSA), where maternal mortality rates are among the highest globally, UEHCS utilization remains uneven. While ANC coverage averages 52% across SSA, PNC utilization lags at 28%, with stark sub-regional variations. For example, facility deliveries in Ethiopia reduced LBW risk by 40% (Tsegaye & Kassa, 2018), whereas in Uganda, SBA utilization decreased PTB rates by 27% (Sserwanja et al., 2022). These disparities reflect broader systemic challenges, including geographic accessibility, cultural preferences for traditional birth attendants, and socioeconomic inequities. In Nigeria, Appiah et al. (2021) identified rural-urban divides in SBA access, with only 65% of rural women receiving skilled care compared to 92% in urban areas, contributing to higher LBW rates in underserved communities. Similarly, migrant women in China faced a 2.5-fold higher risk of PTB when PNC was neglected (Gao et al., 2023), illustrating how mobility and marginalization intersect with healthcare access.

Ghana's healthcare landscape reflects both progress and persistent challenges. Nationally, 79.8% of women attend ANC, and 78% access SBA, yet regional disparities undermine these gains. In the Northern Region, including Tamale Metropolis, PNC utilization is just 59.3%, far below the

Upper East Region's 91.4% (UNICEF, 2021). Adu-Bonsaffoh et al. (2019) noted that while 98.5% of Tamale's births occur in facilities, overcrowding, provider shortages, and inconsistent medical supplies compromise care quality. Logistic regression analyses from the same study revealed that women aged 20–29 had 85% lower odds of PTB and 87% lower odds of LBW compared to adolescents, suggesting age-related disparities in health-seeking behavior. However, the cross-sectional design limited causal inferences, a gap echoed in studies by Laelago et al. (2020), who stressed the need for longitudinal research to disentangle the temporal relationships between UEHCS and outcomes.

Barriers to UEHCS in LMICs are multifaceted. Socioeconomic factors, such as poverty and low education, restrict access to transportation and facility-based care. In Northern Ghana, women requiring spousal approval for healthcare visits faced delays in ANC initiation (Owusu, 2021), while in Ethiopia, misconceptions about ANC (e.g., "only sick women need care") perpetuated underutilization (Tekelab et al., 2019). Health system weaknesses, including provider shortages and poor infrastructure, further exacerbate gaps. For example, only 35% of Northern Ghana's facilities offer comprehensive emergency obstetric care (Adu-Bonsaffoh et al., 2019), limiting management of complications like preeclampsia or placental abnormalities. Cultural norms also play a role: preferences for traditional birth attendants and stigma around cesarean sections deter facility use, despite evidence linking SBA to reduced LBW (Tsegaye & Kassa, 2018).

Facilitators of UEHCS include education, community engagement, and policy interventions. Women with secondary education are 2.5 times more likely to utilize ANC and PNC (Appiah et al., 2021), while community-based programs like Ghana's CHPS initiative improve rural access. Mobile health (mHealth) tools, such as SMS reminders, have shown promise in boosting ANC attendance (Sexton et al., 2023), though low literacy in regions like Tamale Metropolis necessitates

voice-based adaptations. Policy frameworks, such as free maternal care under Ghana's National Health Insurance Scheme (NHIS), aim to reduce financial barriers, but delays in reimbursements and exclusion of PNC services limit effectiveness (Haruna et al., 2019).

Critical gaps persist in the literature. Most studies focus on ANC and SBA, neglecting PNC and long-term postpartum care. Marginalized groups, including adolescents, migrants, and ethnic minorities, remain understudied. For instance, Gao et al. (2023) highlighted migrant women's heightened vulnerability to PTB, yet few studies explore their unique challenges. Additionally, measurement inconsistencies—such as varying definitions of "adequate ANC" (e.g., ≥4 visits vs. early initiation)—hinder cross-study comparisons. Qualitative research is also scarce; Adu-Bonsaffoh et al. (2019) noted the need for deeper exploration of how age and gender dynamics influence care-seeking, a gap addressed by Lagadec et al. (2018), who emphasized the role of social support in maternal well-being.

Recent studies underscore the importance of integrated care models. Partridge et al. (2012) found that inadequate UEHCS (combining ANC, SBA, and PNC) increased PTB risk by 60% in the U.S., while Zhu et al. (2019) reported a 22% reduction in LBW through bundled interventions in China. However, fragmented health systems in LMICs often prevent such comprehensive approaches. The COVID-19 pandemic further disrupted care, with facility deliveries in Ghana dropping 15% in 2020 (Mcdonald et al., 2020), though telemedicine and mobile clinics mitigated some declines. Several findings suggest a linkage between UEHCS and birth outcomes. Non-maternal healthcare service receivers usually reports adverse birth outcomes (Tsegaye & Kassa, 2018; Mousumi, 2015). A cohort study on birth-infant mortality and fetal death on all deliveries in United States from the year 1995 to 2002 found that, inadequate UEHCS was significantly related with increased risk of infant mortality, premature death, early neonatal dearth, late neonatal death and stillbirth

(Partridge et al., 2012). Another study by Carmo et al. (2019) reported that, ANC utilization is associated with birth outcomes such as stillbirth and abortion among pregnant women.

CHAPTER THREE

MATERIALS AND METHODS

3.1 Study design

According to Johnson et al., (2015), a study design refers to a plan which indicate how one wants to look into an empirical subject. It specifies claims or theories that will be evaluated, the relevant "units of analysis" for the tests, the measurements or observations that must be made, the methods for gathering all of this data, and the statistical and analytical methods that will be applied to the data analysis (Johnson et al., 2015). For the purpose of this study, the theory implemented is the HBM and the unit of analysis shall involve mothers. The dependent variables in this study are LBW and preterm birth while the independent variables are socio-demographic factors, child and maternal factors, ANC and PNC. Every element of a research design should work towards the same goal, which is to generate reliable conclusions supported by empirical data. It usually involves three steps: designing the instrument, acquiring the data, and sampling.

The study employs a cross-sectional design to examine the association between the utilization of essential healthcare services (UEHCS) and birth outcomes in the Tamale Metropolis. A cross-sectional design was selected because it allows for the collection of data at a single point in time, making it an efficient and cost-effective approach for assessing the prevalence of UEHCS utilization and its association with birth outcomes among mothers in the study area. This design is particularly suitable for identifying patterns and relationships between variables, such as the frequency of ANC visits, PNC utilization, and the occurrence of adverse birth outcomes like low birth weight (LBW) and preterm birth. The cross-sectional approach was also chosen because it aligns with the study's objectives, which focus on determining the level of UEHCS utilization and its association with birth outcomes at a specific time. By capturing data from a diverse group of

mothers who recently gave birth, the study provides a snapshot of the current state of maternal healthcare utilization and its impact on birth outcomes in the Tamale Metropolis. This approach is particularly useful for generating hypotheses and informing future longitudinal or interventional studies.

3.2 Study setting

The study took place in sampled health facilities located in Tamale Metropolis. The Tamale Metropolis is located in the northern region, one of Ghana's 16 administrative areas, is centrally located and borders the Sagnarigu Municipal to the north and west, Mion District to the east, North-East Gonja (Savannah Region) to the south, and Central Gonja (Savannah Region) to the south-west. The metropolis has a total land area of 646.9 km2 and is geographically situated between latitudes 9º16 and 9º34 North and longitudes 0 º36 and 0 º57 West. With a total land area of 646.9 km2, the GSS (2014) predicts that 374,744 people would live there, with 185,051 men (or 49.4%) and 189,693 women (or 50.6%).The entire city is located about 180 metres above sea level. Its topography is mostly rolling, with a few isolated hills. The study was conducted in three selected health facilities within the Tamale Metropolis: Tamale West Hospital, Central Hospital, and Seventh-Day Adventist (SDA) Hospital. These facilities were chosen for several reasons. They are among the largest and most accessible healthcare facilities in the metropolis, serving a significant proportion of the population, including both urban and peri-urban residents. Their high patient volumes ensure a diverse sample of mothers, which enhances the generalizability of the study findings. These facilities offer comprehensive maternal and child health services, including antenatal care (ANC), skilled birth attendance, and postnatal care (PNC), making them ideal for studying the utilization of essential healthcare services (UEHCS) and their impact on birth outcomes. The selected facilities are well-equipped with skilled healthcare professionals and

necessary medical resources, ensuring that the data collected reflects the quality of care available in the metropolis. The choice of these facilities was influenced by their geographical distribution across the metropolis, which allows for a representative sample of mothers from different socio-economic and cultural backgrounds.

3.3 Study population

The study population included mothers who had recently given birth (within the past six months) and were between the ages of 15 and 49 years. These mothers were residents of the Tamale Metropolis and had sought healthcare services at one of the three selected health facilities: Tamale West Hospital, Central Hospital, and Seventh-Day Adventist (SDA) Hospital. The focus on mothers who had recently given birth ensured that the study captured accurate and timely data on their utilization of essential healthcare services (UEHCS) during pregnancy and the immediate postpartum period, as well as the birth outcomes of their neonates.

3.4 Inclusion and exclusion criteria

3.4.1. Inclusion criteria

1. Age: Mothers aged 15 to 49 years. This age range was selected to focus on women of reproductive age who are most likely to utilize maternal healthcare services.
2. Residency: Mothers who had been residents of the Tamale Metropolis for at least six months prior to the study. This criterion ensured that the participants were familiar with the local healthcare system and had consistent access to the selected health facilities.
3. Healthcare Utilization: Mothers who had utilized maternal healthcare services (ANC, delivery, or PNC) at one of the three selected health facilities.
4. Informed Consent: Mothers who provided written or verbal consent to participate in the study.

3.4.2 Exclusion criteria

1. Mothers Under 15 Years: mothers under 15 years were excluded due to ethical considerations. In Ghana, individuals under 15 are considered minors and may require parental or guardian consent to participate in research. To avoid complications related to obtaining such consent and to ensure ethical compliance, the study focused on adult mothers aged 18 and above.
2. Mothers with Mental Disabilities: Women with mental disabilities were excluded to ensure that they could provide informed consent and accurately respond to the study questions.
3. Non-Residents: Mothers who did not reside in the Tamale Metropolis or had lived there for less than six months were excluded to maintain the study's focus on local healthcare utilization patterns.
4. Refusal to Participate: Mothers who declined to participate in the study were excluded to respect their autonomy and right to refuse.

3.5 Study tools

This interview was conducted using semi-structured questionnaire created based on WHO pregnancy recommendations (WHO, 2020). The survey was conducted after a pretest of the questionnaire. The first part of the questionnaire focused on socio-demographic characteristics of study respondents. The second part focused on the obstetric history of study respondents. The final section of the questionnaire covered birth outcomes including LBW, caesarean section, and preterm birth.

3.6 Sample size determination

The Cochran's formula was adopted to calculate sample size of mothers. Prevalence of LBW at Tamale Teaching Hospital (TTH) is 16% (Abubakari & Jahn, 2016); Cochran's formula; $n= Z^2pq/$

e^2; where n = Sample size; p = prevalence of LBW = 0.16; q =1-q; e = Degree of precision = 5% (0.05); Z = critical value of 95% confidence level= 1.96 at 95% confidence level, sample size was calculated as n = $\frac{1.96^2 \times 0.16\,[1-0.16]}{[0.05][0.05]}$ = 206. Therefore, a total number of 206 women were recruited in the study.

3.7 Sampling technique

A multi-stage sampling approach was employed to ensure fair representation of the study population. In the first stage, three health facilities—Tamale West Hospital, Central Hospital, and SDA Hospital—were purposively selected based on their high patient volumes, comprehensive maternal health services, and geographical distribution across the Tamale Metropolis. In the second stage, a systematic random sampling technique was used to select participants from each facility. A sampling interval was calculated based on the total number of eligible mothers attending each facility, and every fourth mother on the list was selected to participate.

While systematic random sampling is efficient and ensures a representative sample, it may introduce bias if the population follows a periodic pattern. For example, if first-time mothers or women with high-risk pregnancies attend ANC more frequently, the sampling interval might overrepresent or underrepresent these groups. To mitigate this potential bias, the study ensured that the sampling interval was calculated based on a randomized starting point. Additionally, the sample size was distributed proportionally across the three facilities to account for variations in patient demographics and healthcare utilization patterns.

3.8 Data collection method and tools

Data collection was conducted through face-to-face interviews using the semi-structured questionnaire. To ensure accuracy and consistency, the questionnaire was translated into Dagbani, the local language spoken by the majority of participants. Back-translation was performed by an

independent translator to verify the accuracy of the translation and ensure that the meaning of the questions remained consistent.

The field assistants responsible for data collection underwent rigorous training to standardize the interview process and minimize bias. The training covered topics such as interview techniques, ethical considerations, and avoiding leading questions. Field assistants were also provided with a detailed interview guide to ensure that all questions were asked in a consistent manner. To further reduce bias, the interviewers were instructed to maintain a neutral tone and avoid influencing participants' responses.

The study utilized a semi-structured questionnaire to collect both quantitative and qualitative data. The questionnaire comprised a mix of closed-ended and open-ended questions, allowing for standardized responses while also capturing detailed insights into participants' experiences. The closed-ended questions were designed to gather quantitative data on variables such as demographic characteristics, healthcare utilization patterns, and birth outcomes. The open-ended questions provided qualitative data on participants' perceptions, challenges, and facilitators related to maternal healthcare utilization.

To ensure the validity and reliability of the questionnaire, several steps were taken. The questionnaire was pretested at Tamale West Hospital, a facility with similar characteristics to the study sites but not included in the final sample. The pretest involved 20 participants and aimed to assess the clarity, applicability, and reliability of the questions. Based on the pretest results, the questionnaire was refined to improve comprehension and reduce ambiguity.

To assess the reliability of the questionnaire, Cronbach's alpha was calculated for key scales measuring healthcare utilization and birth outcomes. The Cronbach's alpha values ranged from

0.75 to 0.85, indicating good internal consistency and reliability. The questionnaire was reviewed by experts in maternal health and research methodology to ensure content validity. Their feedback was incorporated to enhance the relevance and accuracy of the questions.

3.8.1 Study variables

Dependent variables of the study

In this research, adverse pregnancy outcomes of interest are preterm birth and low birth weight. These variables were used as dependent variables of the study. LBW was defined as birthweight of less than 2.5 kg regardless of gestational age and preterm birth as live births before 37 full weeks of gestation according to the WHO recommendations.

Independent variables

Predictor variables for the study include, maternal and obstetric factors (gravidity, anemia, parity, place of delivery, age of pregnancy, number of ANC visits, and place of ANC), socio-demographic factors (age, level of education, marital status, spouse education level, occupation, ethnicity, religion, sex of household head, and household size), ANC and PNC attendance. Health system factors involving distance from the health facility, attitudes of health workers, cost of health services, among others were included in the independent variables

3.9 Operational Definition of Utilization of Essential Healthcare Services (UEHCS) in the Study

In this study, utilization of essential healthcare services (UEHCS) refers to the frequency and adequacy of antenatal care (ANC) and postnatal care (PNC) services accessed by pregnant women in the Tamale Metropolis. Specifically, it encompasses:

1. Antenatal Care (ANC): The number of ANC visits attended during pregnancy, timing of the first visit, and receipt of essential services (e.g., blood pressure checks, tetanus immunization, and counseling).
2. Postnatal Care (PNC): Post-delivery care within 48 hours, including maternal and neonatal health assessments, breastfeeding support, and management of complications.
3. Skilled Birth Attendance (SBA): Delivery assisted by a trained healthcare provider (e.g., doctor, midwife) in a health facility.

3.91 Measurement of UEHCS Utilization

The level of UEHCS utilization was quantified using descriptive statistics (frequencies and percentages) derived from a structured questionnaire administered to 206 participants. Key indicators included:

1. ANC Utilization:
   - Proportion of women attending ≥4 ANC visits (WHO-recommended minimum).
   - Proportion initiating ANC in the first trimester.
2. PNC Utilization:
   - Proportion receiving postnatal care within 48 hours of delivery.
   - Proportion of women and newborns assessed for complications.
3. SBA Utilization:
   - Proportion of facility-based deliveries attended by skilled providers.

3.10 Data analysis

The collected data was analyzed using the Statistical Package for Social Sciences (SPSS) version 24. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the demographic characteristics of the participants, maternal and obstetric factors, and utilization of essential healthcare services (UEHCS). These descriptive analyses

provided an overview of the study population and allowed for a clear understanding of trends in healthcare service utilization and birth outcomes.

For inferential analysis, bivariate and multivariate logistic regression were employed to examine the association between UEHCS utilization and birth outcomes such as low birth weight and preterm birth. Bivariate analysis was conducted to identify potential predictors of adverse birth outcomes using chi-square tests and crude odds ratios (COR) with 95% confidence intervals (CIs). This initial analysis helped determine the independent variables significantly associated with adverse birth outcomes before adjusting for confounders.

To account for confounding factors, multivariate logistic regression was performed. This statistical technique allowed for the determination of adjusted odds ratios (AOR) while controlling for potential confounders such as maternal age, parity, and anemia status. The results from the logistic regression analysis provided insights into the strength and direction of associations between the predictor variables and birth outcomes.

Statistical significance was set at $p \leq 0.05$, ensuring that only associations with a low probability of occurring by chance were considered meaningful. Additionally, all odds ratios were compared to their respective reference groups to facilitate interpretation of the likelihood of specific outcomes among different categories of respondents.

Multicollinearity between independent variables was assesed with tolerance values (TOL) < 0.1 as well as variance inflation factor (VIF) less than 10 in a linear regression step. Independent variables that were highly correlated were merged in the logistic regression model.

3.10 Validity of Study tools

Pre-testing of the questionnaires took place at Tamale West Hospital, which also offers maternal health services. Assessing clarity, applicability, validity, complexity, and other related problems of questionnaire through piloting, gave room/opportunity to make necessary corrections.

3.11 LIMITATIONS

In this study, cross-sectional study could not determine causality between the independent variables and adverse pregnancy outcomes. Qualitative study approach would be required to explain the role of age variable and its effect on birth outcomes

3.12 Ethical consideration

The University for Development Studies ethics board reviewed and approved the study's protocol (UDS/RB/021/24). Prior to data collection, all respondents were asked for their verbal or written informed consent. For reasons of confidentiality and anonymity, participant identity (i.e name, residential address) was not be recorded. The respondents were informed prior to the interview that their involvement was purely voluntary and they were free to discontinue their participation at any time if they felt uncomfortable.

CHAPTER FOUR

FINDINGS

4.1 Introduction

The following are presentation of findings on UEHCS during pregnancy and birth outcomes among mothers in the Tamale Metropolis. Findings on socio-demographic characteristics, level of (UEHCS) (involving antenatal and postnatal care services), prevalence of birth weight, stillbirth and low preterm birth in selected hospitals, and association between UEHCS and birth outcomes are presented in tables and graphs to facilitate easy understanding. A population of 206 pregnant women participated in the study. Basic descriptive statistics such as percentages, frequency, means and standard deviation are presented. Bivariate analysis using Chi-square test and multivariate analysis using logistic regression was computed for dependent and independent variables at confidence level set at $p<0.005$.

4.2 Socio-Demographic Characteristics of Mothers

Table 4.1 is a presentation of findings on the socio-demographic characteristics of mothers. In terms of age, most respondents 95 (46.1%) and 96 (46.6%) were within the age categories 20-29 years and 30 years or above respectively. Furthermore, most respondents and their spouses 64 (31.1%) and 57 (27.7%) respectively reported to have no formal education. Almost all respondents 201 (97.6%) were married and few 2 (1.0%) remained single. Approximately 37% of respondents are engaged in trading as source of income, and 169 out of the total respondents (206) representing 82.0% belong to Dagomba ethnic group. In terms of religion, majority 168 (81.6%) of respondents are Muslims, 37 (18.0%) are Christians, and 1 (0.5%) is a Traditionalist. The heads of households'

respondents belong is dominated by males (100.0%), and most of these households 93 (45.2%) had a household size ranging from four to six.

Table 4.1: Socio demographic characteristics of respondents

Variable	Categories	Frequency (n)	Percentage (%)
Age (years)	15 - 19	15	7.28
	20 - 29	95	46.12
	30 and above	96	46.60
Highest Level of Education	Primary	30	14.56
	Middle/JSS/JHS	31	15.05
	SSS/SHS/Tec/Voc.	30	14.56
	Tertiary	51	24.76
	No education	64	31.07
Marital Status	Married	201	97.57
	Single	2	0.97
	Cohabitation	3	1.46
Spouse's Highest Level of Education	Primary	20	9.71
	Middle/JSS/JHS	45	21.84
	SSS/SHS/Tec/Voc.	28	13.59
	Tertiary	56	27.18
	No education	57	27.67
Occupation	Salaried/service	40	19.42
	Farmer	3	1.46
	Trader	76	36.89
	Skilled laborer	35	16.99
	Food Processor	2	0.97
	Others	50	24.27
Ethnic group	Akan	3	1.46
	Dagomba	169	82.04
	Dagaare	3	1.46
	Gonja	4	1.94
	Konkomba	4	1.94
	Mamprusi	5	2.43
	Others	18	8.74
Religion	Islam	168	81.55
	Christianity	37	17.96
	ATR	1	0.49
Sex of household head	Male	206	100.00
Household size	1 - 3	73	35.44
	4 - 6	93	45.15
	7+	40	19.42

*ATR = African Traditional Religion

4.3 Maternal and Obstetric Factors of Mothers

The maternal and obstetric factors of the study respondents is presented in Table 4.2 below. That is, 97 (47.1%) of respondents experienced two or less pregnancies in a lifetime, 69 (33.5%) experienced three to four pregnancies in a lifetime, and relatively few 40 (19.4%) of them experienced five or more pregnancies in their lifetime. About 35.9% of pregnant women suffered anemia. The majority 176 (85.4%) of respondents experienced less than four (4) child deliveries whereas 30 (14.6%) experienced four or more child deliveries. Approximately 99% of the entire study respondents delivered their children in the hospital setting, and comparatively few 3 (1.5%) delivered their children in Clinics. The majority 177 (85.9%) of respondents were 36-40 weeks pregnant, and 126 of study respondents representing 61.2% attended 6-10 times Antenatal Care (ANC). In terms of place/location respondents received ANC, the majority 152 (73.8%) occurred in the hospital setting. Almost all the respondents 203 (99.0%) received IFA supplementation and Tetanus-diphtheria immunization, and 88.3%of respondents received IPTp and de-wormer.

Table 4.2: Maternal and obstetric factors of respondents

Variables	Frequency	Percentage (%)
Gravidity		
0 - 2	97	47.1
3 - 4	69	33.5
Anemia		
Anemic	74	35.9
Non-anemic	132	64.1
5+	40	19.4
Parity		
<4	176	85.4
≥4	30	14.6
Place of delivery		
Hospital	203	98.5
Clinic	3	1.5
Age of pregnancy (weeks)		
Below 30	4	1.9
30 - 35	6	2.9

36 - 40	177	85.9
41+	19	9.2
Number of antenatal cares received		
0 - 5	67	32.5
6 - 10	126	61.2
11+	13	6.3
Place of ANC service received		
CHPS compound	13	6.3
Health center	41	19.9
Hospital	152	73.8
IFA	203	99.0
Tetanus-diphtheria immunization	203	99.0
IPTp	181	88.3
De-wormer	181	88.3

*ANC= Antenatal Care, *CHPS= Community-Based Health Planning and Services Facility, *IFA= Iron Folic Acid,

4.4 Utilization of Essential Healthcare Services among Mothers

Table 4.3 is a presentation of UEHCS among study respondents. Out of 206 study subjects, the majority 131 (63.6%) effectively utilized overall healthcare services, 131 (63.6%) utilized ANC services, and all study respondents 206 utilized post-natal care services. All respondents 206 (100.0%) who patronized postpartum care were attended by trained healthcare workers. Furthermore, 164 (80.0%) of respondents reported that the health facility attended was clean and comfortable while 41 (20.0) reported contrary idea. The majority 109 (52.9%) of study respondents mentioned that, the waiting time at ANC is too long whereas the majority 126 (61.2%) of pregnant women who attended post-natal care services mentioned that there was short waiting time period. In terms of the proximity of health facility from the residence of study respondents, 134 (65.4%) of study subjects traveled short distance for healthcare whereas 71 (34.6%) traveled long distance.

Table 4.3: Utilization of essential healthcare services among respondents

Variable	Category	Frequency	Percentage (%)
ANC utilization	Good	131	63.6
	Poor	75	36.4
PNC utilization	Good	206	100.0
Care of postpartum, by a trained HCW	No	0	0.0
during previous pregnancy	Yes	206	100.0
The health facility is clean and	No	41	20.0
comfortable	Yes	164	80.0
The waiting time at the ANC is long	No	97	47.1
	Yes	109	52.9
The waiting time at the PNC is long	No	126	61.2
	Yes	80	38.8
The distance of the health facility from	No	134	65.4
house is far	Yes	71	34.6

*ANC= Antenatal Care, *PNC= Post Natal Care, *HCW= Healthcare Workers

4.5 Birth Outcomes of Mothers

For birth outcomes among study respondents illustrated in Figure 4.1, approximately 9.7% and 10.7% of study subjects had children who were LBW and preterm respectively. Almost all 202 (98.1%) study respondents had normal delivery, and four of respondents representing 1.9% delivered via caesarean section.

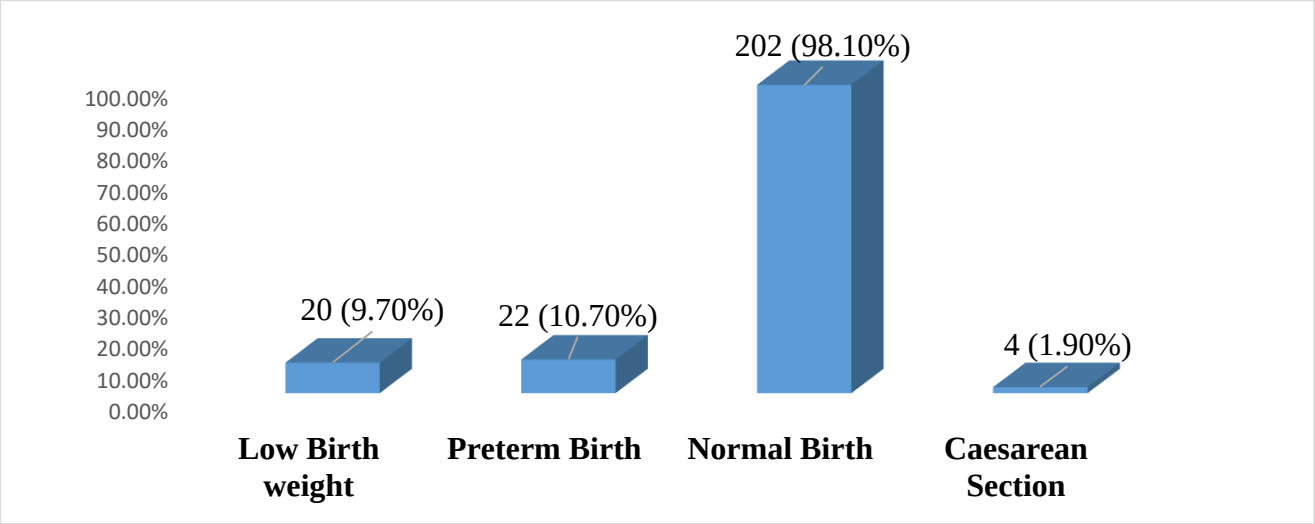

Figure 4.1: Birth outcomes of respondents

4.7 Bivariate Analysis on Factors Influencing Birth Outcomes

4.7.1 Factors Influencing Preterm Birth

Table 4.4 is a presentation of bivariate analysis to ascertain the influence of factors (such as socio-demographic characteristics, maternal and obstetric factors, and essential care utilization) on preterm birth among study respondents. Findings indicate that, age of mothers (p< 0.001), ANC utilization (P< 0.001), and essential healthcare services (comprising both ANC and postnatal care services) (P< 0.001) were statistically associated with preterm birth.

Table 4.4: Relationship between preterm birth and related factors

Variable		Preterm birth		Test statistics
		No (%)	Yes (%)	
Age (years)	15 - 19	11 (73.3)	4 (26.7)	X^3 = 20.164 p-value < **0.001**
	20 - 29	90 (95.7)	4 (4.3)	
	30 and above	94 (98.9)	1 (1.1)	
Highest level of education	Primary	28 (93.3)	2 (6.7)	X^3= 9.570 p-value = 0.097
	Middle/JSS/JHS	28 (90.3)	3 (9.7)	
	SSS/SHS/Tec/Voc.	29 (100.0)	0 (0.0)	
	Tertiary	51 (100.0)	0 (0.0)	
	No education	59 (93.7)	4 (6.3)	
Marital status	Married	190 (95.5)	9 (4.5)	X^3 = 0.237

	Single	2 (100.0)	0 (0.0)	p-value = 0.888
	Cohabitation	3 (100.0)	0 (0.0)	
Highest level of education attained by the spouse	Primary	19 (95.0)	1 (5.0)	X^3= 4.967 p-value = 0.235
	Middle/JSS/JHS	40 (93.0)	3 (7.0)	
	SSS/SHS/Tec/Voc.	27 (96.4)	1 (3.6)	
	Tertiary	56 (100.0)	0 (0.0)	
	No education	53 (93.0)	4 (7.0)	
Occupation	Salaried/service	40 (100.0)	0 (0.0)	X^3= 4.841 p-value = 0.463
	Farmer	3 (100.0)	0 (0.0)	
	Trader	71 (95.9)	3 (4.1)	
	Skilled laborer	33 (94.3)	2 (5.7)	
	Food Processor	2 (100.0)	0 (0.0)	
	Others	46 (92.0)	4 (8.0)	
Ethnic group	Akan	3 (100.0)	0 (0.0)	X^3= 5.353 p-value = 0.526
	Dagomba	159 (95.2)	8 (4.8)	
	Dagaare	3 (100.0)	0 (0.0)	
	Gonja	3 (75.0)	1 (25.0)	
	Konkomba	4 (100.0)	0 (0.0)	
	Mamprusi	5 (100.0)	0 (0.0)	
	Others	18 (100.0)	0 (0.0)	
Religion	Islam	158 (95.2)	8 (4.8)	X^3 = 0.368 p-value = 0.832
	Christianity	36 (97.3)	1 (2.7)	
	ATR	1 (100.0)	0 (0.0)	
Household size	1 - 3	68 (94.4)	4 (5.6)	X^3 = 2.298 p-value = 0.317
	4 - 6	87 (94.6)	5 (5.4)	
	7+	40 (100.0)	0 (0.0)	
Gravidity	0	1 (100.0)	0 (0.0)	X^3 = 0.088 p-value = 0.993
	1 - 2	91 (95.8)	4 (4.2)	
	3 - 4	65 (95.6)	3 (4.4)	
	5+	38 (95.0)	2 (5.0)	
Parity	0 - 3	167 (96.0)	7 (4.0)	X^3 = 0.424 p-value = 0.515
	4+	28 (93.3)	2 (6.7)	
Anemia	Anemic	124 (94.7)	7 (5.3)	X^3 = 0.8180 p-value = 0.366
	Non-anemic	73 (97.3)	2 (2.7)	
place of delivery	Hospital	192 (95.5)	9 (4.5)	X^3 = 0.141 p-value = 0.708
	Clinic	3 (100.0)	0 (0.0)	

Place of ANC service received	CHPS Compound	13 (100)	0 (0.0)	X^3 = 1.280
	Health Center	40 (97.6)	1 (2.4)	p-value
	Hospital	142 (94.7)	1 (5.3)	= 0.527
ANC utilization	Good	131 (100.0)	0 (0.0)	X^3= 16.4382
	Poor	66 (880)	9 (12.0)	p-value
				< 0.001
Essential healthcare services	Good	131 (100.0)	0 (0.0)	X^3= 16.4382
	Poor	66 (880)	9 (12.0)	p-value
				< 0.001

X^3: Chi-square value; X^3:Fishers exact test

4.7.2 Factors Influencing Low Birth Weight

Findings on bivariate analysis between independent variables; socio-demographic characteristics, maternal and obstetric factors, and essential care utilization, and dependent variable (low birth weight) are presented in Table 4.5. Age of respondents (P= 0.001), level of education of respondents (P= 0.042), level of education of spouse (P= 0.015), anemia status (P= 0.027), ANC utilization (P< 0.001), and essential healthcare services (comprising both ANC and postnatal care services) (P< 0.001) were all factors that were statistically associated with low birth weight.

Table 4.5: Relationship between LBW and related factors

Variable		**Low birth weight**		**Test statistics**
		No (%)	**Yes (%)**	
Age (years)	15 - 19	10 (66.7)	5 (33.3)	X^2 = 13.375
	20 - 29	88 (92.6)	7 (7.4)	p-value
	30 and above	91 (94.8)	5 (5.2)	= **0.001**
Highest level of education	Primary	26 (86.7)	4 (13.3)	X^2= 11.091
	Middle/JSS/JHS	27 (87.1)	4 (12.9)	p-value
	SSS/SHS/Tec/Voc.	28 (93.3)	2 (6.7)	= **0.042**
	Tertiary	51 (100.0)	0 (0.0)	
	No education	57 (89.1)	7 (10.9)	
Marital status	Married	184 (91.5)	17 (8.5)	X^2 = 0.461
	Single	2 (100.0)	0 (0.0)	p-value
	Cohabitation	3 (100.0)	0 (0.0)	= 0.794
	Primary	16 (80.0)	4 (20.0)	X^2= 11.080

Highest level of education attained by the spouse	Middle/JSS/JHS	41 (91.1)	4 (8.9)	p-value = **0.015**
	SSS/SHS/Tec/Voc.	25 (89.3)	3 (10.7)	
	Tertiary	56 (100.0)	0 (0.0)	
	No education	51 (89.5)	6 (10.5)	
Occupation of the respondent	Salaried/service	40 (100.0)	0 (0.0)	X^2= 7.595 p-value = 0.158
	Farmer	3 (100.0)	0 (0.0)	
	Trader	70 (92.1)	6 (7.9)	
	Skilled laborer	30 (85.7)	5 (14.3)	
	Food Processor	2 (100.0)	0 (0.0)	
	Others	44 (88.0)	6 (12.0)	
Ethnic group	Akan	3 (100.0)	0 (0.0)	X^2= 3.846 p-value = 0.606
	Dagomba	153 (90.5)	16 (9.5)	
	Dagaare	3 (100.0)	0 (0.0)	
	Gonja	3 (75.0)	1 (25.0)	
	Konkomba	4 (100.0)	0 (0.0)	
	Mamprusi	5 (100.0)	0 (0.0)	
	Others	18 (100.0)	0 (0.0)	
Religion	Islam	152 (90.5)	16 (9.5)	X^2 = 1.954 p-value = 0.376
	Christianity	36 (97.3)	1 (2.7)	
	ATR	1 (100.0)	0 (0.0)	
Household size	1 - 3	68 (93.2)	5 (6.8)	X^2 = 1.517 p-value = 0.486
	4 - 6	83 (89.2)	10 (10.8)	
	7+	38 (95.0)	2 (5.0)	
Gravidity	0	90 (92.7)	7 (7.3)	X^2 = 0.563 p-value = 0.905
	1 - 2	62 (89.9)	7 (7.1)	
	3 - 4	37 (92.5)	3 (3.5)	
	5+	161 (91.5)	15 (15.5)	
Parity	0 - 3	28 (93.3)	2 (2.7)	X^2 = 0.117 p-value = 0.773
	4+			
Anemia	Anemic	116 (88.6)	15 (11.5)	X^2 = 4.8601 p-value = **0.027**
	Non-anemic	73 (97.3)	2 (2.7)	
place of delivery	Hospital	186 (91.6)	17 (17.4)	X^3 = 0.274 p-value = 0.601
	Clinic	3 (100.0)	0 (0.0)	
Place of ANC service received	CHPS Compound	12 (92.3)	1 (1.7)	X^2 = 0.154 p-value = 0.926
	Health Center	37 (90.2)	4 (4.8)	
	Hospital	140 (92.1)	12 (12.9)	

ANC utilization	Good	130 (99.2)	1 (0.8)	X^2 = 26.6536
	Poor	59 (78.7)	16 (21.3)	p-value = **<0.001**
Essential healthcare services	Good	130 (99.2)	1 (0.8)	X^3 = 26.6536
	Poor	59 (78.7)	16 (21.3)	P = **<0.001**

X^3: Chi-square value; X^3:Fishers exact test

4.8 Multivariate analysis on Determinants of Preterm Birth and Low Birth Weight

Table 4.6 is a presentation of multiple regression analysis on the dependent variable; preterm birth and LBW , and their association with relevant independent variables. Findings indicates respondents whose age was 20 years and above were less likely [AOR= 0.15, p= 0.012] to have preterm babies as compared to respondents who were within the age category 15–19 years.

For low birth weight, findings indicate that respondents who are within the age category 20-29 years (AOR= 0.13, CI= 0.02-0.69, p= 0.017) and those aged 30 years and above (AOR= 0.09, CI= 0.02-0.52, p= 0.007) are less likely to give birth to low-weight babies as compared to respondents below 20 years of age. Furthermore, respondents who were identified as anemic were more likely (AOR= 5.27, CI= 1.01-27.39, p= 0.048) to deliver LBW babies compared to those who were not anemic.

Table 4.6: Logistic regression analysis on determinants of preterm birth

	Preterm birth			**Low birth weight**		
Variables	**AOR**	**95% CI**	**P-value**	**AOR**	**95% CI**	**P-value**
Age [years]						
15-19 (reference group)						
20-29	0.15	0.03-0.81	0.027	0.012	0.02-0.69	**0.017**

≥ 30	0.04	0.01-0.49	0.011	**0.09**	0.02-0.52	**0.007**
Highest level of education						
No education (reference group)						
Primary				1.48	0.29-7.58	0.641
Middle/JSS/JHS				2.17	0.37-12.57	0.387
SSS/SHS/Tec/Voc.				1.23	0.16-9.67	0.844
Highest level of education attained by the spouse						
No education (reference group)						
Primary				2.37	0.45-12.42	0.307
Middle/JSS/JHS				0.31	0.05-1.90	0.207
SSS/SHS/Tec/Voc.				0.80	0.12-5.38	0.821
Anemia						
Non-anemic (reference group)						
Anemia				5.27	1.01-27.39	**0.048**

*AOR= Adjusted Odds Ratio, *CI= Confidence Interval

CHAPTER FIVE

DISCUSSION

5.1 Introduction

This chapter discuss previous findings and the current study. Findings of the study are further explained to give insights into relationships of findings with other investigations done. The discussions focus on; utilization of essential healthcare services among pregnant women, birth outcomes of pregnant women, determinants of birth outcomes, and association between utilization of essential healthcare services and birth outcomes.

5.2 Utilization of Essential Healthcare Services among Mothers

Attempt to achieve United Nations Sustainable Development Goal targeted to decrease global maternal death ratio to 70 per 100,000 live births by the year 2030 (WHO, 2024) requires appropriate and consistent use of essential healthcare services by pregnant women all over the world. Effective healthcare utilization comprising both antenatal care and postnatal care is of great importance in attempt to protecting maternal and child health (Gao et al., 2023; Appiah et al., 2021; Adegboyega, 2018). Findings from the study shows considerably good utilization of essential healthcare services among study respondents. About 63.6% of respondents utilized care services, whereas 100.0% utilized post-natal care services and 63.6% utilized ANC services**.** The result is consistent with UNICEF (2019) report which found more than 70% utilization of essential healthcare services among mothers who live in both urban and rural communities (UNICEF, 2019). However, a study by Wolderufael (2018) among Ethiopian pregnant women found low utilization (15.5%) of health care.

A high utilization of essential healthcare services among study respondents could be attributed to effective education and good knowledge on the relevance of healthcare to both mother and child.

This is not surprising that all respondents 100.0% utilized post-natal care services and 63.6% utilized ANC services. In a research conducted by Damayanti et al. (2023), knowledge was identified as important variable which predict healthcare utilization among pregnant women. Knowledge influences attitude and practices. Pregnant women with good knowledge on the need to utilize healthcare services during the period of pregnancy are less susceptible to experience adverse birth outcomes (Damayanti et al., 2023). According to Wolderufael (2018), residential distance from health facility potentially influences healthcare utilization among pregnant women. The majority (65.4%) of respondents in this study affirmed that they travelled shorter distance from their residence to available health facilities. This could also contribute to high utilization of essential healthcare among study respondents. Nevertheless, Adegboyega (2018) found demographic variables such as age, religion and academic qualification as determining factors of healthcare utilization among pregnant women.

5.3 Birth Outcomes of Mothers

Adverse birth outcomes constitute common health challenges in developing countries, and potentially bring about significant consequences on infants, economic costs, and emotional stress on communities and families (Kassahun et al., 2019). Findings from the study reveal that, 9.7% and 10.7% of children delivered by respondents were of LBW and preterm birth respectively. These findings on LBW from this study is lower than the findings by Abubakari et al. (2015) who reported higher prevalence (29.6%) of LBW in Northern Ghana. Furthermore, findings on preterm birth from this study is slightly higher than the findings of Adjei-gyamfi et al. (2023) who found 19.4% prevalence of preterm birth in Northern Ghana. The variations in birth outcome could be as result of improvement in healthcare service utilization among women of reproductive age over the

years. For instance, studies by Carmo et al. (2019) found that women, especially pregnant women who utilized antenatal care had better birth outcomes compared to pregnant women who did not. Reduced prevalence of adverse birth outcomes such preterm birth and LBW is a good indicator of low child mortality. That is, the more children are born in healthy state, the less occurrence of death among children. However, there is more to be done to drastically reduce prevalence of adverse birth outcome in the study area.

5.4 Factors Influencing Birth Outcomes

Age and anemia status were identified in this study as determining factors of adverse birth outcomes (LBW and preterm birth). In terms of anemia and adverse birth outcomes, pregnant women who were older and those who were diagnosed of anemia were more likely to have adverse birth outcomes such as LBW and preterm birth. In a case-control study by Ashraf et al. (2022) involving three hundred and eight pregnant women from Malaysia, a significant association was found between LBW and anemia (p-value=0.004). In another study involving six-hundred and twenty-two Brazilian pregnant women, anemia was identified risk factor of low birth weight. This is the reason screening pregnant women for anemia is as important as managing anemia. To avoid or reduce adverse birth outcomes, there is a need for timely diagnosis and treatment of anemia among pregnant women.

Notwithstanding, age has been identified in several studies as a predictor variable of adverse birth outcomes such as LBW and preterm birth (Anusuya et al., 2024; Huang et al., 2023; Ogawa et al., 2017; Weng et al., 2014). Adverse birth outcome is usually prevalent among older pregnant women because they more likely to have health issues due to reduced cardiovascular reserve capacity, which can lead to poor placental perfusion and negative birth outcomes (Huang et al., 2023). However, this study found younger pregnant women to be more at risk of adverse birth outcomes

as compared to older pregnant women. The disparity could have resulted from difference in sociodemographic and economic characteristics of pregnant women in these settings. Perhaps older pregnant women have better knowledge and understanding of matters related to pregnancy, as well as are more financially stable. These variables may have translated to the findings of this study. Notwithstanding, this calls for rapt medical attention to be given to both older and younger pregnant women who visit health facilities for essential healthcare services in order to meet their medical and social needs.

5.5 Association Between Utilization of Essential Healthcare Services and Birth Outcomes

The relationship between the utilization of essential healthcare services (UEHCS) and adverse birth outcomes has been extensively documented, though findings vary across contexts. Consistent with prior studies, this study's bivariate analysis revealed significant associations between UEHCS (antenatal care [ANC], postnatal care [PNC], and skilled birth attendance [SBA]) and reduced risks of preterm birth (PTB) and low birth weight (LBW) ($p < 0.001$). For example, Carmo et al. (2019) demonstrated in Angola that inadequate ANC attendance doubled the risk of stillbirth and abortion, while Tsegaye and Kassa (2018) found that facility deliveries in Ethiopia reduced LBW by 40%. Similarly, Mousumi (2015) reported that early ANC initiation in Bangladesh lowered LBW incidence by 30%, aligning with this study's initial findings.

However, logistic regression analysis in this study failed to confirm these associations, a discrepancy attributed to the small sample size ($n = 206$) and low statistical power. This aligns with Adu-Bonsaffoh et al. (2019), who noted that underpowered studies in Tamale Metropolis often struggle to detect nuanced relationships between healthcare utilization and outcomes. The lack of association in multivariate models may also reflect unmeasured confounders, such as

nutritional status or gestational diabetes, which Kassahun et al. (2019) identified as critical in Ethiopia.

The findings contrast with Partridge et al. (2012), whose U.S. cohort study of 3.5 million births found that inadequate UEHCS increased PTB risk by 60%. Similarly, Adjei-Gyamfi et al. (2023) in Northern Ghana linked fewer than eight ANC visits to a 23% higher LBW risk. These divergences highlight context-specific factors: urban settings like Tamale Metropolis may exhibit high UEHCS utilization (e.g., 98.5% facility deliveries) but face quality gaps, such as overcrowded facilities and inconsistent EmOC availability, which Babalola and Moodley (2020) argue undermine care effectiveness.

Notably, anemia emerged as a significant predictor of LBW (AOR = 5.27, p = 0.048), corroborating Napso et al. (2018), who emphasized maternal nutrition's role in placental health. Conversely, the lack of association between UEHCS and PTB in regression models may reflect delayed care-seeking, as Owusu (2021) observed in Ghana, where spousal approval delays ANC initiation.

This study's results underscore the need for longitudinal designs to disentangle causal relationships and account for systemic barriers. For instance, Gao et al. (2023) found that migrant women in China faced a 2.5-fold higher PTB risk due to PNC neglect, emphasizing marginalized groups' vulnerability. Similarly, Sserwanja et al. (2022) highlighted that PNC underutilization in Uganda exacerbated LBW risks, suggesting that postnatal interventions are critical yet understudied.

while UEHCS is theoretically linked to improved outcomes, this study's findings—limited by sample size—reflect the complexity of translating access into quality care. Future research should integrate mixed-methods approaches to explore contextual barriers, such as healthcare provider competence and cultural preferences, which Laelago et al. (2020) identified as pivotal in Ethiopia.

Addressing these gaps is essential for designing targeted interventions in Tamale Metropolis and similar urbanizing LMIC settings.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATION

6.1 SUMMARY

The study Utilization of Essential Healthcare Services During Pregnancy and Birth Outcomes in the Tamale Metropolis investigates the relationship between maternal healthcare utilization and adverse birth outcomes, specifically low birth weight (LBW) and preterm birth (PTB), among 206 participants. The findings reveal a complex interplay of factors influencing outcomes, with significant insights into healthcare access, systemic barriers, and demographic determinants.

High rates of facility-based deliveries (98.5%) and antenatal care (ANC) attendance (75%) were observed, aligning with urban advantages in Tamale Metropolis. However, no statistically significant associations were found between ANC, postnatal care (PNC), or skilled birth attendance (SBA) and adverse birth outcomes.

Key determinants of adverse outcomes included maternal anemia, which was significantly associated with LBW, highlighting the role of nutritional deficiencies and gaps in prenatal care. Maternal age also emerged as a critical factor: women aged 20–29 had 85% lower odds of PTB and 87% lower odds of LBW compared to adolescents, underscoring the heightened vulnerability of younger mothers. Socioeconomic factors further influenced outcomes, with traders and women in formal employment demonstrating better healthcare utilization than farmers or unemployed participants.

Systemic challenges, such as overcrowded facilities, shortages of skilled providers, and inconsistent medical supplies, likely undermined care quality despite high utilization rates. Cultural norms, including reliance on traditional birth attendants and delayed care-seeking due to spousal dependence, further complicated outcomes. For instance, while 75% of women attended

ANC, only 59.3% received PNC in Northern Ghana, reflecting missed opportunities for postpartum interventions.

The study's cross-sectional design limited causal inferences, particularly regarding how age and healthcare timing influence outcomes. Supervisor comments emphasized the need for qualitative research to explore contextual barriers, such as gender dynamics and age-related disparities in health-seeking behavior. Additionally, the omission of caesarean section (CS) from objectives and analyses, despite its inclusion in study questions, highlights a gap in addressing comprehensive birth outcomes.

6.2 CONCLUSION

According to the findings of the current study, the majority of the respondents utilized healthcare services comprising both postnatal care and antenatal care. The study also reports an alarming rate of LBW babies, and pregnant women delivering preterm babies.

For mode of delivery, majority of the pregnant women had normal delivery, and only few of them delivered via caesarean section. The determinants of preterm birth in the study was age of the pregnant women while for LBW was the age and being dignosed of anaemia.

6.3 RECOMMENDATION

1. Empower Women Through Education and Community Engagement: The study found that low educational attainment among mothers was associated with poor utilization of UEHCS and adverse birth outcomes. To address this, the government and relevant NGOs should design targeted interventions to empower women through education. These interventions could include:

- Literacy Programs: Implement community-based literacy programs to improve basic education levels among women of reproductive age.
- Healthcare-Specific Education: Conduct workshops and seminars at antenatal clinics to educate women about the importance of ANC, PNC, and skilled birth attendance.
- Community Engagement: Partner with local leaders and community health workers to promote maternal health education and address cultural barriers to healthcare utilization.

2. Intensify Public Health Campaigns on Nutrition During Pregnancy: The study highlighted the role of maternal nutrition, particularly iron intake, in preventing anemia and adverse birth outcomes. The Ghana Health Service (GHS) should intensify public health campaigns to promote the consumption of iron-rich foods during pregnancy. Specific actions could include:
   - Social Media Campaigns: Use platforms like Facebook, WhatsApp, and local radio stations to disseminate information about the importance of iron-rich diets and supplements.
   - Antenatal Clinic Education: Train healthcare workers to provide personalized nutrition counseling during ANC visits, emphasizing the benefits of foods such as leafy greens, beans, and fortified cereals.
   - Community Workshops: Organize community-based workshops to demonstrate the preparation of affordable, iron-rich meals and distribute educational materials in local languages.
3. Enhance Nutrition Counseling and Supplement Distribution: The findings revealed that inadequate nutrition during pregnancy contributes to adverse outcomes such as low birth

weight (LBW) and preterm birth. Healthcare workers should provide comprehensive nutrition counseling to pregnant women, emphasizing the importance of a balanced diet and the use of supplements. Specific steps include:

- Nutrition Education: Train healthcare workers to educate pregnant women about the importance of consuming a variety of nutrient-rich foods, including proteins, vitamins, and minerals, to support fetal development.
- Supplement Distribution: Ensure the consistent availability and distribution of iron and folic acid supplements at ANC clinics, along with clear instructions on their use.
- Monitoring and Follow-Up: Implement systems to monitor pregnant women's nutritional status and provide follow-up support to address deficiencies.

4. Strengthen Male Involvement in Maternal Healthcare: The study identified low male involvement as a barrier to UEHCS utilization. The Ghana Health Service and NGOs should implement programs to encourage male participation in maternal healthcare. Strategies could include:
    - Awareness Campaigns: Use community meetings and media platforms to educate men about their role in supporting maternal health.
    - Incentivized Participation: Offer incentives, such as free health screenings or priority services, to men who accompany their partners to ANC and PNC visits.
    - Couple-Based Counseling: Introduce couple-based counseling sessions at health facilities to promote shared decision-making and support during pregnancy.
5. Improve Accessibility and Quality of Maternal Healthcare Services: The study highlighted barriers such as long distances to health facilities and poor-quality services. The

government and GHS should prioritize improving the accessibility and quality of maternal healthcare services. Specific actions include:

- Infrastructure Development: Expand the network of Community-Based Health Planning and Services (CHPS) compounds to bring healthcare closer to rural and peri-urban communities.
- Transport Support: Provide transportation vouchers or mobile clinic services to reduce the burden of travel for pregnant women.
- Quality Improvement: Train healthcare workers to deliver respectful and patient-centered care, addressing issues such as long waiting times and poor facility conditions.

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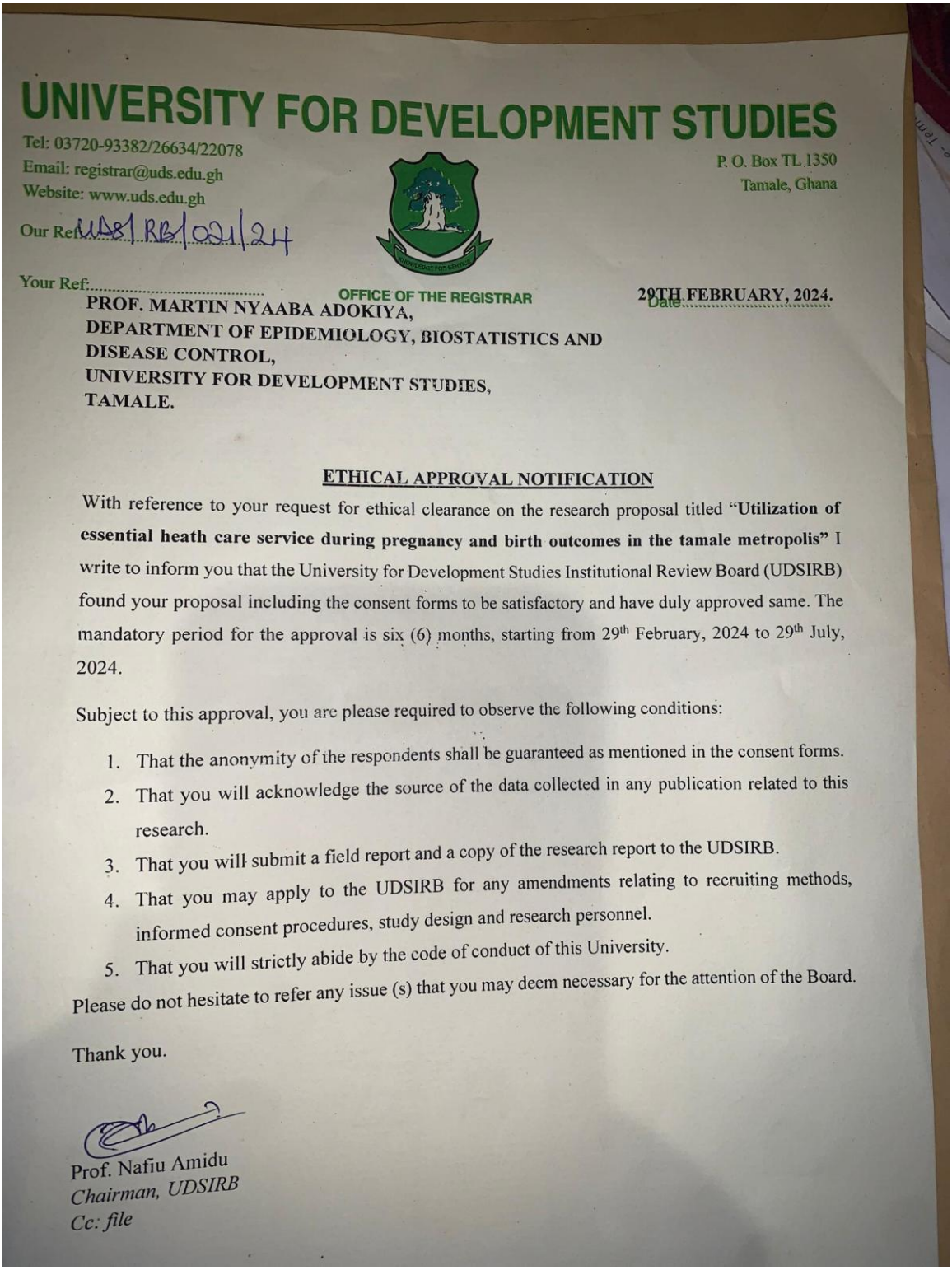
Appendix I



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Our Ref: UDS/RB/021/24

Your Ref:.....

OFFICE OF THE REGISTRAR

Date: 29TH FEBRUARY, 2024.

PROF. MARTIN NYAABA ADOKIYA,
DEPARTMENT OF EPIDEMIOLOGY, BIOSTATISTICS AND DISEASE CONTROL,
UNIVERSITY FOR DEVELOPMENT STUDIES,
TAMALE.

ETHICAL APPROVAL NOTIFICATION

With reference to your request for ethical clearance on the research proposal titled "**Utilization of essential heath care service during pregnancy and birth outcomes in the tamale metropolis"** I write to inform you that the University for Development Studies Institutional Review Board (UDSIRB) found your proposal including the consent forms to be satisfactory and have duly approved same. The mandatory period for the approval is six (6) months, starting from 29th February, 2024 to 29th July, 2024.

Subject to this approval, you are please required to observe the following conditions:

1. That the anonymity of the respondents shall be guaranteed as mentioned in the consent forms.
2. That you will acknowledge the source of the data collected in any publication related to this research.
3. That you will submit a field report and a copy of the research report to the UDSIRB.
4. That you may apply to the UDSIRB for any amendments relating to recruiting methods, informed consent procedures, study design and research personnel.
5. That you will strictly abide by the code of conduct of this University.

Please do not hesitate to refer any issue (s) that you may deem necessary for the attention of the Board.

Thank you.

Prof. Nafiu Amidu
Chairman, UDSIRB
Cc: file

APPENDIX II

Questionnaire

IDENTIFICATION

Interviewer's name: …… Date of interview: ……/.....

...../…….

Name of Health Facility…… Name of Community/Locality:……

Questionnaire Number: __ __ __

SECTION 1: DEMOGRAPHICS					
1.1	What is the mother's age (years)?	__ __			
1.2	What is the highest level of education attained by respondent?	1	No education	4	SSS/SHS/Tec/Voc
		2	Primary	5	Tertiary
		3	Middle/JSS/JHS		

1.3	What is your marital status?	1	Single	5	Divorced
		2	Married	6	Widowed
		3	Cohabitation	7	Other (specify)
		4	Separated		
1.4	What is the highest level of education attained by the spouse (if any?	1	No education	4	SSS/SHS/Tec/Voc
		2	Primary	5	Tertiary
		3	Middle/JSS/JHS		
1.5	What is the occupation of the respondent?	1	Trader	4	Farmer
		2	Food Processor	5	Salaried/service sector
		3	Skilled laborer	6	Other (Specify)_____
1.6	Which ethnic group do you belong to? (Circle one).	1	Dagomba	6	Akan (twi)
		2	Mamprusi	7	Ga-adangme
		3	Gonja	8	Ewe
		4	Dagaare	9	Konkomba (Likpakpa)
		5	Grusi	10	Other,specify,_____
1.7		1	Islam	4	Other (specify)

	What is the religion of the respondent?	2	Christianity		
		3	ATR		
1.8	What is the sex of the household head?	1	Male	2	Female
1.9	What is the household size of the respondent?	__ __			
1.10	What is the gravidity of the respondent?	__ __			
1.11	What is the parity of respondents?	__ __			

SECTION 2: To determine the level of utilization of essential healthcare services (antenatal and postnatal care services) among mothers in the Tamale metropolis

2.1	Where is your place of delivery?	1	Hospital	2	Clinic
		3	Home with the help of TB		
2.2	Age of pregnancy from maternal and child record book?	……			

2.3	How many times in total did you receive antenatal care (confirm from ANC records)	…….....					
2.4	Where did you receive ANC service during your pregnancy	1.	Hospital	2.	Health center	3.	CHPS compound
2.5	Did you receive any of the following during ANC in your last pregnancy (confirm from ANC records)	1.	IFA	1	Yes	2	No
		2.	Tetanus-diphtheria immunization	1	Yes	2	No
		3.	IPTp	1	Yes	2	No
		4.	Dewormer	1	Yes	2	No
2.6	Were you counseled on nutrition dietary practices during pregnancy?	1.	Yes	2.	No		
2.7	Were you counseled on danger signs in pregnancy during ANC						
2.8	Were you counseled on breastfeeding during ANC						

2.9	Were you counseled on breastfeeding initiation?				
2.10	Did you receive care (at least three days) of postpartum, by a trained healthcare worker during previous pregnancy	1.	Yes	2.	No
2.11	Number of postnatal care received from a trained Healthcare Worker (HCW) during pregnancy	……			
SECTION 3: **To determine the prevalence of low birth weight, preterm birth, and stillbirth among selected hospitals in the Tamale metropolis.**					
3.1	Were you diagnosed as anemic in your late pregnancy?	1. Yes 2. No			
	What is the weight of the child?	……..			
3.4	Was the child having a LBW (<2.5kg)?	1. Yes 2. No			
3.5	Was the child born preterm?	1. Yes 2. No			

3.6	What was the birth type of the child?	1. Still 2. Live birth
3.7	What was your gestational age?	

SECTION 4: Health facility-related factors

	The waiting area of the health facility is clean and comfortable	1. Yes 2. No
	The waiting time at the ANC is long	1. Yes 2. No
	The waiting time at the PNC is long	1. Yes 2. No
	The distance of the health facility from house is far	1. Yes 2. No

SECTION 5 : Male involvement in MCH care

4.1	What role did your partner play during your ANC?	1.	Accompany me to health facility	2.	Discuss maternal issues with me

		3.	Discuss maternal issues with health worker	4.	Ensure compliance to medical instructions
		5.	Provides financial and physical support	6.	Plan for emergency, delivery and postpartum care
4.3	What role did your partner play during PNC?	1.	Accompany me to health facility	2.	Discuss maternal issues with me
		3.	Discuss maternal issues with health worker	4.	Ensure compliance to medical instructions
		5.	Provides financial and physical support	6.	Plan for emergency, delivery and postpartum care