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GESTATIONAL HYPERTENSION AND BIRTH OUTCOMES AT SHAI-OSUDOKU DISTRICT HOSPITAL IN THE GREATER ACCRA REGION OF GHANA

BY

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(237100243)

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DECLARATION

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

Amanda Seyram Adjoa Kudiabor

(237100243) …… …….

(Student's Name & ID) Signature Date

Certified by:

Dr Sandra Boatemaa Kushitor …… ……..

(Supervisor's Name) Signature Date

Certified by:

Dr Stephen Manortey …… ……..

(Head of Academics Program) Signature Date

DEDICATION

I dedicate this work to my caring mother, Dr (Pharm). Mrs. Happy Ekar Smart and my sister, Miss Annabel Senam Kudiabor.

ACKNOWLEDGEMENT

I express my heartfelt gratitude to God Almighty for granting me the strength and grace to successfully complete this project. I am deeply grateful for the invaluable guidance and unwavering support of my supervisor, Dr. Sandra Boatemaa Kushitor. Additionally, I extend my appreciation to my beloved mother, Dr (Pharm). Mrs. Happy Ekar Smart, my sister, Miss Annabel Senam Kudiabor, and my grandmother, Mrs. Margaret Amedzro, for their constant love, encouragement and support. I am also thankful to Dr. Kennedy T.C. Brightson, the Medical Superintendent and Mr. Michael Matey Mensah, the Senior Research Officer, all of Shai-Osudoku District Hospital, for their support and valuable insights. Special thanks to Mr. Makafui Kwami Agbanyo for his guidance and assistance throughout this journey. Finally, I commend myself for the determination and effort I invested in bringing this project to fruition despite the challenges.

DEFINITION OF TERMS

GESTATIONAL HYPERTENSION	A condition specific to pregnancy where there is development of hypertension at or after 20 weeks of gestation where blood pressure recordings is greater than 140 mmHg (systolic) and/or blood pressure greater than 90 mmHg (diastolic) measured on two separate occasions at least four hours apart on the absence of proteinuria or other systemic symptoms
PRE-ECLAMPSIA	A multi-system disorder, which can affect the placenta, kidneys, brain and other organs.
ECLAMPSIA	The new onset of seizures during pregnancy or postpartum, unrelated to other cerebral pathological conditions in a woman with pre-eclampsia.

LIST OF ABBREVIATIONS

ANC	Antenatal Care
APGAR	Appearance, Pulse, Grimace, Activity and Respiration
BP	Blood Pressure
C-section	Caesarean Section
CCT & CT	Controlled Cord Traction & Cord Traction
CHW	Community Health Workers
CVD	Cardiovascular Disease
GH	Gestational Hypertension
GHS	Ghana Health Service
GSS	Ghana Statistical Service
HDP	Hypertensive Disorder of Pregnancy
HELLP	Haemolysis-Elevated Liver Enzymes-Low Platelets syndrome
ICU	Intensive Care Unit
IUGR	Intrauterine Growth Restriction
KBTH	Korle Bu Teaching Hospital
MoH	Ministry of Health
NICU	Neonatal Intensive Care Unit
PIH	Pregnancy-Induced Hypertension
PNC	Post-Natal Care
RAAS	Renin-Angiotensin-Aldosterone System
SDG	Sustainable Development Goals
SODH	Shai-Osudoku District Hospital
SVD	Spontaneous Vaginal Delivery
WHO	World Health Organisation
WiFA	Women in Fertility Age
WoFA	Women of Reproductive Age

ABSTRACT

Background: Gestational hypertension poses a significant risk to maternal and foetal health, particularly in resource-limited settings like the Shai-Osudoku District Hospital (SODH) in the Greater Accra Region of Ghana. This study aimed to investigate the effect of gestational hypertension on birth outcomes within this specific healthcare context.

Methodology: Employing a quantitative method, data from medical records of women who delivered at Shai-Osudoku District Hospital between January 2023 and January 2024 were analysed. Variables such as maternal age, gravidity, parity, gestational age, blood pressure readings, mode of delivery, and neonatal outcomes were examined. Statistical analyses including descriptive statistics, Chi-Square tests, and logistic regression models were conducted to assess the association and effect between gestational hypertension and adverse birth outcomes.

Results/Findings: The prevalence of gestational hypertension was 32.2%. The association between gestational hypertension and birth outcomes indicated significant association between birth weight (0.016), first Apgar score (0.039), delivery complications (<0.001) and NICU admission (<0.001). The study also identified the effect between gestational hypertension and birth outcomes variables including delivery complications (eclampsia = 7.703 likely occurrence, pre-eclampsia = 10.282 likely occurrence), NICU admission (2.594), Apgar score 1 (4-6 = 0.581 likely occurrence).

Conclusion: The prevalence of gestational hypertension was very high at SODH compared to other hospitals in Ghana. Gestational hypertension has an effect on birth outcomes of newborns put to bed by diagnosed gestational hypertensive mothers, which emphasizes the need to intensify mitigating measures such as ensuring expectant mothers diagnosed with gestational hypertension take their anti-hypertensive medications to reduce effects gestational hypertension has on newborns.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Maternal mortality rates in rural communities of low-resource countries globally are disturbingly high, as reported by the World Health Organization (WHO) in 2019. In 2019, approximately 287,000 women died during pregnancy and childbirth, with 94% of these fatalities occurring in low-resource countries WHO (2019). Mohammed (2023) in his study also reported that, 585,500 deaths with 98% happening in the same countries with low resources.

Pregnancy-induced hypertension, a condition that is unique to pregnancy, includes gestational hypertension, pre-eclampsia, eclampsia, and Haemolysis-Elevated Liver Enzymes-Low Platelets (HELLP) syndrome (Meazaw *et al.,* 2020; Gemechu *et al.,* 2020; Antwi *et al.,* 2016; Singh & Srivastava, 2015). Pregnancy-induced hypertension (PIH) encompasses all women who are non-hypertensive early in pregnancy but eventually develop hypertension without proteinuria (Gemechu *et al.,* 2020; WHO, 2013; Rahimi, Mozafari & Parsian, 2013).

Gestational hypertension is characterised by the appearance of hypertension after 20 weeks of gestation without proteinuria (Oliver-Williams *et al.,* 2023; Gemechu *et al.,* 2020; Patel *et al.,* 2017). Hypertension generally subsides within 12 weeks after delivery for some mothers after delivery (Khosla *et al.,* 2021; Gemechu *et al.,* 2020) but some cases lead to future complications later in the life of the mother. The most noted complication that has gained notoriety is cardiovascular disease (CVD). Studies by Oliver-Williams *et al.* (2023) and Khosla *et al.* (2021) have suggested the intricate link between gestational hypertension and CVD complications in women diagnosed with gestational hypertension during their pregnancy.

Gestational hypertension continues to be a significant global health concern, not only due to the associated adverse outcomes for mothers, but also because it is closely linked to substantial morbidity and mortality in newborns (Abalos *et al.,* 2018; Stuart *et al.,* 2018; Phipps *et al.,* 2019). While obstetricians primarily focus on the risk of maternal death in pregnancies complicated by hypertensive disorders, the risk of perinatal death is even more alarming (ACOG, 2020). For example, severe pre-eclampsia carries a maternal death rate of less than 1%, while the rate of perinatal death is approximately 13% (Harmon *et al.,* 2015). In the case of eclampsia, the risks of maternal and perinatal deaths rise to around 5% and 28%, respectively (Akombi & Renzaho, 2019). Additionally, surviving newborns face the potential for serious short and long-term complications, including the risk of neurodevelopmental deficits, particularly in resource-limited countries (Phipps *et al.,* 2019).

Disproportionately high neonatal mortality rates are observed in Sub-Saharan Africa (SSA), with most of these deaths occurring within the first four weeks of life (Masaba & Mmusi-Phetoe, 2020). It is important to note that being a newborn is not a pathological condition in and of itself. However, it is estimated that for every early neonatal death, there is another unfortunate event of stillbirth, with PIH being the primary contributor to these perinatal losses (Adu-Bonsaffoh *et al.,* 2014). The adverse perinatal outcomes associated with hypertensive disorders are primarily attributed to placental insufficiency, placental abruption, and complications related to prematurity (Abalos *et al.,* 2018; Stuart *et al.,* 2018). The severity of adverse perinatal outcomes resulting from maternal hypertension is most pronounced in cases of severe pre-eclampsia or eclampsia and is contingent upon both the gestational age at delivery and the severity of the disease process.

Perinatal mortality serves as a significant benchmark for evaluating the care provided to mothers and reflects the standard of obstetric and paediatric care available (Adu-Bonsaffoh *et al.,* 2014).

The global perinatal mortality rate is estimated to be 47 per total births, with a significant discrepancy between developed regions (10 per births) and less developed regions like West Africa (76 per births). Estimations suggest that in Ghana, perinatal mortality stands at 45 per 1000 deliveries (Adu-Bonsaffoh *et al.,* 2014). Furthermore, 79.5% of these fatalities were linked to obstetric causes, including gestational hypertension.

An examination of the prevalence of PIH at the Korle Bu Teaching Hospital (KBTH) revealed a high occurrence rate of PIH among pregnant women who delivered at KBTH with most diagnosis being pre-eclampsia and gestational hypertension (Adu-Bonsaffoh *et al.,* 2014). Another study conducted at KBTH highlighted that inadequate management of the maternal condition and a lack of modern neonatal intensive care support in low-resource settings contribute to poor perinatal outcomes associated with gestational hypertension (Adu-Bonsaffoh *et al.,* 2017). Another study conducted in some selected hospitals in the Ashanti region indicated that gestational hypertension and pre-eclampsia accounted for 9.4% (Boachie-Ansah *et al.,* 2023). Therefore, a comprehensive approach addressing both maternal mortality due to gestational hypertension and perinatal deaths is recommended (Adu-Bonsaffoh *et al.,* 2017).

In the Tamale Metropolis smoking among women was the leading risk factor of PIH (Suglo, 2022). Another challenge in addressing hypertension during pregnancies in Ghana is the procrastination in seeking medical attention after detecting its symptoms, coupled with limited knowledge of the associated risk factors (Fondjo *et al.,* 2019). This significantly affects maternal and child health outcomes. The study by Adu-Bonsaffoh *et al.* (2017) was conducted in a tertiary hospital, which further suggests that, the situation may be dire in the primary and secondary hospitals in the region and country at large. Also, literature on the effect of gestational hypertension on birth outcomes is

understudied in Ghana. This study sought to assess the effect of gestational hypertension on birth outcomes at Shai-Osudoku District Hospital in the Greater Accra region of Ghana.

1.2 Problem Statement

Gestational hypertension remains a major global health issue not only because of the associated high adverse maternal outcomes but there is a close accompaniment of significant perinatal morbidity and mortality (Moussa & Rajapreyar, 2019). Globally, PIH complicate about 6–8% of all pregnancies (Muto *et al.,* 2016). Out of the total deaths among pregnant women recorded in Latin-American and the Caribbean, more than 25.7% were caused by PIH (Mohammed, 2023).

The repercussions of gestational hypertension extend beyond the immediate pregnancy period, significantly affecting both maternal and child outcomes (Turbeville & Sasser, 2020). Studies (Brown *et al.,* 2013; Duckitt & Harrington, 2014; Akombi & Renzaho, 2019) from diverse regions (Africa, Europe & UK), consistently demonstrate the association between gestational hypertension and adverse outcomes such as preterm birth, low birth weight, and increased risks of maternal morbidity and mortality. For instance, research conducted in North America, Europe, and Asia has reported that gestational hypertension contributes to a 30% higher risk of preterm birth and a 20% increased risk of low birth weight, highlighting the urgent need for global strategies to address this critical health challenge (Griner, 2022; Turbeville & Sasser, 2020). In addition, it is estimated that, approximately 500,000 newborns and foetuses die due to complications of PIH (Purisch & Gyamfi-Bannerman, 2017).

Furthermore, emerging evidence suggests that gestational hypertension has long-term implications for cardiovascular diseases. Studies conducted in various parts of the world, including South America, Africa, and Australia; indicate a direct correlation between a history of gestational

hypertension and an elevated risk of cardiovascular diseases later in life. The prevalence of cardiovascular diseases among women with a history of gestational hypertension ranges from 10% to 25%, emphasizing the need for a holistic approach to maternal health that considers the long-term cardiovascular implications of gestational hypertension (American College of Obstetricians and Gynaecologist (ACOG, 2020).

In Ghana, the incidence of PIH is estimated to be within the range of 9-10% of all pregnancies (Pobee, 2016). This percentage varies across hospitals, clinics, and communities, as well as regional and district levels (Pobee, 2016). One of the challenges in addressing hypertension during pregnancies in Ghana is the procrastination in seeking medical attention after detecting its symptoms, coupled with limited knowledge of the associated risk factors (Fondjo *et al.*, 2019). Of the 5,247 fatalities reported by Der *et al.* (2013) amongst women between the ages of 15 and 49, 12.1% (634) are attributed to pregnancy-related complications. Furthermore, 79.5% of these fatalities are linked to obstetric causes, including PIH.

In the Shai-Osudoku district, gestational hypertension remains inadequately understood and addressed. Limited awareness and knowledge about this condition contribute to delayed detection and management, exacerbating the health risks faced by pregnant women in the district (Yarney, 2019). Currently, there is a paucity of data on the prevalence of gestational hypertension in the Shai-Osudoku district.

1.3 Rationale of the Study

This study contributes to the country's drive towards achieving Sustainable Development Goal (SDG) three (3.1), which aims to, "End preventable deaths of newborns and children under five years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per

1000 live births and under-five mortality to at least as low as 25 per 1000 live births" (UNDP, 2015). At present, there is a lack of empirical research that specifically focuses on gestational hypertension and its effect on birth outcomes at Shai-Osudoku District Hospital. This study aimed to address this significant research gap by offering evidence-based insights that are directly relevant to the local healthcare context. The results of this study will add to the current knowledge on gestational hypertension and may potentially form a basis for future research and interventions in similar settings.

The utilization of evidence-based practice plays a pivotal role in guaranteeing the utmost standard of care for expectant mothers experiencing gestational hypertension (Mishra, 2021). Through an examination of the correlation between gestational hypertension, traumatic labour, and delivery results, this investigation will produce factual information that can guide clinical judgement. It will empower healthcare practitioners at Shai-Osudoku District Hospital to make well-informed decisions regarding interventions, monitoring, and post-treatment care for this susceptible patient demographic. Governmental organizations such as the Ministry of Health (MoH), Ghana Health Service (GHS), the Shai-Osudoku District Health Directorate, and other non-governmental organizations can leverage the information obtained from this research to design and plan their health programs, particularly concerning gestational hypertension.

This study will contribute to reducing gestational hypertension and its associated morbidity and mortality by highlighting the statistics and trends of pregnancy induced hypertension (PIH) in SODH. The study by Boachie-Ansah *et al.* (2023) highlighted the high prevalence of PIH and suggested urgent measures to help the awareness creation to further mitigate it impact on public health. Adu-Bonsaffoh *et al.* (2017) also suggested that a facelift of the defunct multidisciplinary

approach to the management of PIH in the hospital would improve the clinical outcomes of women with maternal hypertension.

In summary, this study responds to the urgent need to comprehend the effect of gestational hypertension on birth outcomes in the particular context of Shai-Osudoku District Hospital. In doing so, it strives to enhance the quality of care for pregnant women affected by gestational hypertension and ultimately improve maternal and neonatal health outcomes in this population.

1.4 Conceptual Framework

The current study was guided by the conceptual framework established by the Commission on Social Determinants of Health framework, as set forth by the World Health Organization (Figure 1-1) (Solar & Irwin, 2010). A growing body of evidence suggests that health outcomes are not solely influenced by biological factors, but are also shaped by the social, economic, and cultural environment. Consequently, the occurrence of pregnancy-induced hypertension (PIH) may be the result of various factors at different levels of social determinants of health, rather than solely being attributed to individual biological factors (Figure 1.1).

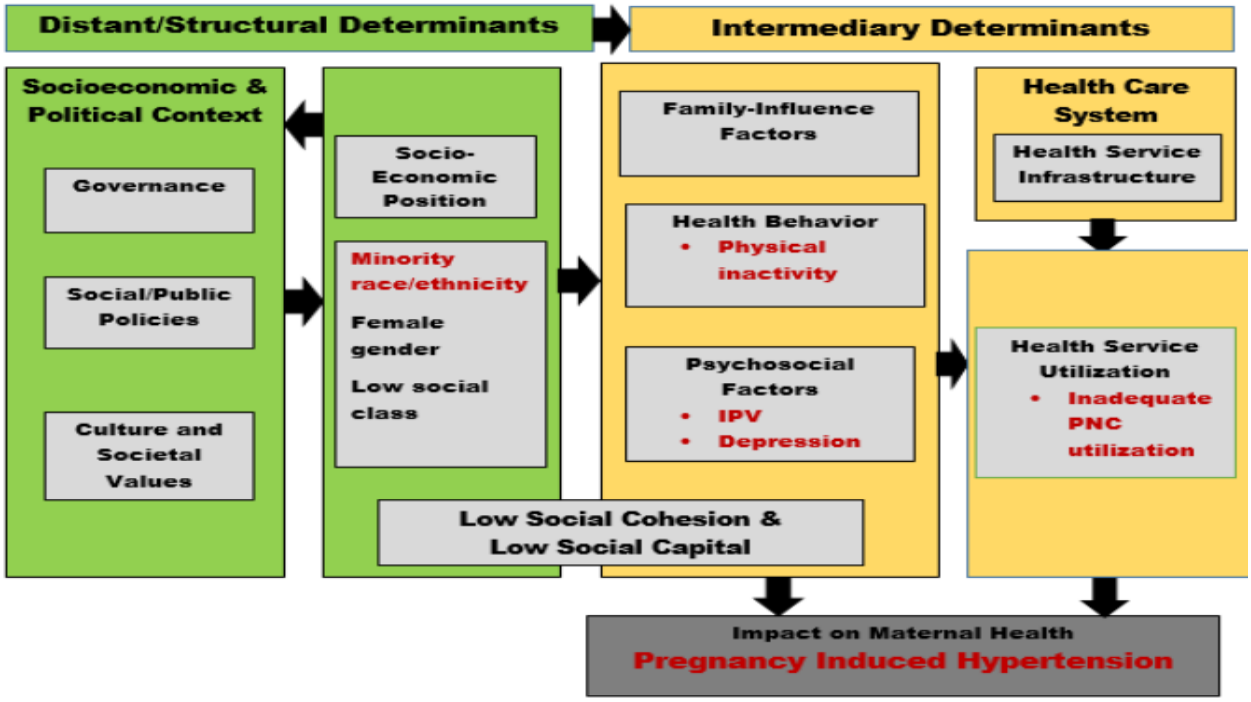

Figure 1.1: Determinants of Health framework, as set forth by the World Health Organization

(Source: Solar & Irwin (2010).

The framework distinguishes between "distant/structural determinants," which encompass political and social factors, and "intermediary determinants," which encompass the underlying social determinants of health that contribute to the observed disparities in health outcomes, including behavioural, psychosocial, and biological factors, as well as the healthcare system (Solar & Irwin, 2010). The interaction between these structural and intermediary determinants leads to variations in health and well-being. The sequence of outcomes is directly influenced by six sets of intermediary determinants: family influence, health and reproductive status, health behaviours, psychosocial status, access to health services, and utilization of health services. According to the framework, the interplay between socioeconomic and political factors, such as inadequate health policies, low socioeconomic status, being female, and belonging to a minority race/ethnicity;

family influence factors, such as being unmarried, lacking family support, and making poor decisions; health and reproductive factors, such as never having given birth, extreme age, and chronic diseases; health behaviours, such as smoking and physical inactivity; and psychosocial factors, such as stress, depression, and intimate partner violence, can contribute to an increased risk of developing PIH. To comprehensively address this maternal health issue, it is necessary to address each of these levels within the social determinants framework.

By identifying the interrelationship between the aforementioned psychosocial and behavioural risk factors, this framework allows for a comprehensive understanding of the social determinants of health approach to PIH. Knowledge regarding the interplay among these factors in the development of PIH is crucial for early identification of individuals at risk. Furthermore, this knowledge is essential for the implementation of effective interventions based on social determinants of health approach, targeting the most impactful modifiable risk factors, as well as for the early diagnosis and management of PIH.

1.5 Research Questions

1. What is the prevalence of gestational hypertension among pregnant women at Shai-Osudoku District Hospital?
2. What is the association between gestational hypertension and birth outcomes (neonatal birth weight, Apgar scores, neonatal intensive care unit admission, and maternal complications) at Shai-Osudoku District Hospital?
3. What is the effect of gestational hypertension on birth outcomes?

1.6 General Objective

This study aimed to assess gestational hypertension and birth outcomes at Shai-Osudoku District Hospital.

1.7 Specific Objectives

1. To determine the prevalence of gestational hypertension among pregnant women at Shai-Osudoku District Hospital
2. To assess the association between gestational hypertension on birth outcomes (neonatal birth weight, Apgar scores, neonatal intensive care unit admission, and maternal complications) at Shai-Osudoku District Hospital
3. To assess the effect of gestational hypertension on birth outcomes.

1.8 Profile of Study Area

The Shai-Osudoku District is located in the south-eastern region of Ghana, in the Greater Accra Region, and can be geographically situated between latitudes 5045' and 6005' degrees north and longitude 0005'E and 0020'W. The District shares borders with North Tongu District to the North-East, Yilo Krobo Municipality, and Upper Manya District to the North-West, Akwapim North Municipality to the West, Kpone Katamanso Municipality to the South-West, Ningo-Prampram District to the South, and Ada West District to the East.

The administrative capital of the district is Dodowa, and it encompasses a 22km stretch of the Volta River in its northeastern region. The land area of the district covers 968.36 square kilometres, accounting for 29.84% of the entire land space that the Greater Accra Region occupies, which is approximately 3,245 square kilometres. This district's location offers a significant advantage for the fishing industry, given the presence of the Volta River stretch and its proximity to Accra and Tema Metropolis, a benefit for businesses, primarily for export.

In 2020, the district's population was projected to be 67,105, with 32,680 males constituting 48.7% and 34,425 females (51.3%). People aged between 15-64 years constitute the majority of the population, accounting for 56.7%. The population density of the district, according to the GSS 2010 report, is 54 persons per square kilometre.

Agriculture is the primary economic activity in the district, employing 58.6% of the working population (GSS, 2014). The district is predominantly rural, with 76.7% of the inhabitants living in rural communities while only 23.3% reside in urban and peri-urban settings. The district has roughly 250 communities or settlements, some of which are rapidly urbanizing due to their proximity to Accra. Dodowa is the district's administrative capital, and it boasts of four town/area councils (i.e., sub-governance structures) and two traditional areas: Shai and Osudoku.

The Shai-Osudoku District Hospital (SODH) is a healthcare facility located at the district level, serving a diverse population within the Shai-Osudoku district. It was established in 1970 as a health post by the Shai (Se) community and was later transferred to the Ministry of Health. In 1985, the hospital was upgraded to a Health Centre and finally, to a district hospital in the middle of 2009. The hospital is located in Dodowa. Currently, the hospital has a capacity of 244 beds, with fourteen (14) wards and two (2) operating theatres.

The Dodowa Health Research Centre is a prominent research institution situated in the Greater Accra Region of Ghana. The centre serves as a hub for conducting cutting-edge biomedical and public health research aimed at addressing various health challenges prevalent in the region and beyond. Over the years, the Dodowa Health Research Center has been involved in numerous projects, studies, and clinical trials spanning various health domains. These projects have encompassed a wide range of topics, including infectious diseases such as malaria, HIV/AIDS,

tuberculosis, neglected tropical diseases, as well as non-communicable diseases like hypertension, diabetes, and cancer. Additionally, the centre has conducted research on maternal and child health, reproductive health, nutrition, and health systems strengthening initiatives.

Clinical trials conducted at the Dodowa Health Research Centre have played a pivotal role in evaluating the safety and efficacy of new vaccines, drugs, and medical interventions (Oduro *et al.*, 2017). These trials adhere to rigorous ethical standards and protocols, ensuring the protection of participants' rights and well-being. By collaborating with local communities, healthcare providers, government agencies, and international partners, the centre strives to generate evidence-based solutions that can be translated into policies and practices to improve health outcomes at the local, national, and global levels.

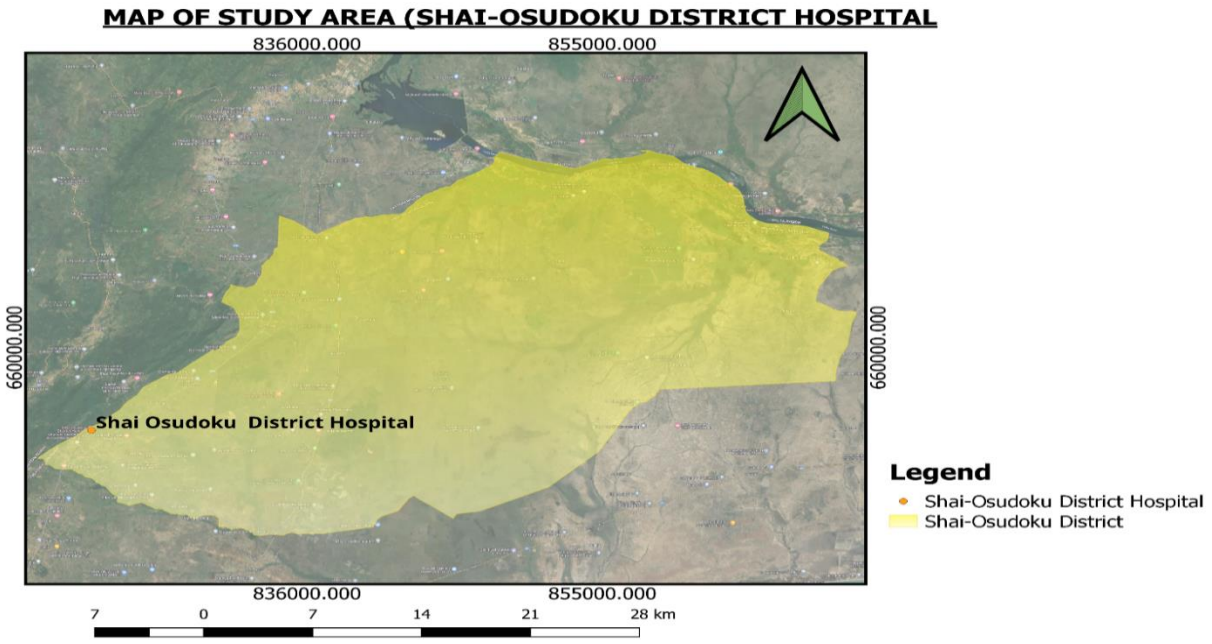

Figure 1.2: Map of Shai-Osudoku District and SODH

Source; Author's construct, 2023

1.9 Scope of Study

This study was restricted to Shai-Osudoku District Hospital. The study utilized data extracted from medical records of women who delivered at the hospital between January 2023 and January 2024.

1.10 Organization of Report

This thesis is made up of six (6) chapters. Chapter One contains the introduction, which dilates on the background of the study, problem statement, rationale, conceptual framework, objectives of the study, research questions, profile of study area, scope of the study and the organization of report. Chapter Two reviews related literature on gestational hypertension and its effect on birth outcomes. Chapter Three explains the methodology employed in this study and the kind of analysis carried out. Chapter Four presents the results from the analysis. Chapter Five presents a discussion of the findings. Finally, Chapter Six presents the conclusion and recommendations of this study.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter elucidates on the literature review delving into all aspects of gestational hypertension and its effects on birth outcomes. It encompasses six (6) topical areas spanning from the historical perspective of gestational hypertension (GH), the pathophysiology, maternal and foetal outcomes, barriers to timely diagnosis, health system response and community awareness and education.

2.2 Historical Perspectives and Pathophysiology of Gestational Hypertension

The specific etiology of pre-eclampsia has eluded scientists and physicians since the time of Hippocrates. Over the years, various models have been put forth to explain this condition. The ancient Greeks (Magee *et al.,* 2014) previously described the symptoms of pre-eclampsia and eclampsia. However, it was not until 1739 that eclampsia, which refers to pre-eclampsia accompanied by seizures, was distinguished from epilepsy by the French Obstetrician Sauvages. Subsequently, it was named eclampsia parturentium. Towards the end of the nineteenth century, eclamptic hypertension was discovered, leading to the belief that the disease was a manifestation of essential hypertension that was influenced by pregnancy (Conrad *et al.,* 2022).

Globally, gestational hypertension remains a significant concern in maternal healthcare, affecting both mothers and infants. Defined as new-onset hypertension during pregnancy without the presence of proteinuria (ACOG, 2020), this condition poses substantial risks to maternal and foetal health. Understanding the prevalence and identifying risk factors are crucial steps in developing effective preventive strategies and targeted interventions.

Globally, the prevalence of gestational hypertension varies across regions and populations. According to the World Health Organization (WHO, 2020), the global incidence of hypertensive disorders during pregnancy is approximately 10%. Macdonald-Wallis *et al.* (2015) in their separate study also indicated that an estimated 6-17% of pregnancies globally is complicated by gestational hypertension. In Sub-Saharan Africa, where maternal healthcare systems face unique challenges, gestational hypertension remains a prominent issue. The prevalence rates in this region are notably higher than the global average, with estimates ranging from 12% to 18% (Abalos *et al.,* 2018).

This wide-ranging prevalence emphasizes the need for region-specific investigations to inform tailored healthcare approaches.

Socio-economic factors, limited access to quality healthcare, and nutritional deficiencies contribute to the elevated prevalence. A meta-analysis by Lamminpää (2015) identified advanced maternal age, primiparity, multiple pregnancies, pre-existing diabetes, and obesity as significant risk factors. Additionally, socio-economic factors, such as inadequate access to prenatal care and educational resources, contribute to the global disparities in gestational hypertension prevalence (Zhang *et al.,* 2020). Evidence also points to associations with family history, vitamin D deficiency, depression, and pollution exposure (Rahman *et al.,* 2018; Boland *et al.,* 2018). Disparities exist between regions and social groups, with higher rates among women in Sub-Saharan Africa, Asians, adolescents, and those facing psychosocial stressors or limited care access (Valdés *et al.,* 2016).

Zooming into the Greater Accra Region of Ghana, there is a growing need for focused research on the prevalence and risk factors of gestational hypertension. Ghana, undergoing rapid urbanization and facing evolving lifestyle patterns, experiences unique healthcare challenges. According to a study by Amoakoh-Coleman *et al.* (2016), the prevalence of gestational hypertension in Ghana is

approximately 14%. Adu-Bonsaffoh *et al.* (2017) also in their separate study opined that prevalence of gestational hypertension has been estimated from 6-13% indicating a substantial burden on maternal health.

Several risk factors contribute to gestational hypertension in the Ghanaian context. High parity, inadequate antenatal care, and socio-economic disparities have been identified as significant contributors (Abubakari *et al.,* 2016). Adu-Bonsaffoh *et al.* (2017) further complimented this by stating that primigravid status, family history, smoking, and alcohol use also emerged as Ghana-specific risks, along with inadequate prenatal care. Lamptey *et al.* (2017) in their publications indicated strong links to obesity, diabetes, multiple pregnancy, and infectious diseases like HIV and malaria as some main factors. Additionally, cultural factors and dietary habits play a role, emphasizing the need for culturally sensitive interventions to address the specific risk factors within the Greater Accra Region. As Ghana's capital region, Greater Accra exhibits some of the highest burdens of hypertension risk factors like obesity, diabetes, stress, and toxins (Appiah *et al.,* 2020).

Studies conducted in Accra hospitals identify overweight/obesity, multiple pregnancy, and family history as among the strongest predictors of gestational hypertension locally (Agyare, 2018). Further research on prevalence, risks, and social determinants in Accra communities is critically needed to guide targeted interventions.

Gestational hypertension constitutes a major maternal and foetal health threat, with risk burdens potentially heightened in urban environments like Greater Accra. Local evidence to inform prevention is urgently needed through studies specifically profiling prevalence, risk factors, and disparities within Accra's diverse communities.

2.3 Pathophysiology of Gestational Hypertension

Normal Pregnancy vs. Gestational Hypertension:

In a normal pregnancy, intricate adaptations occur to support maternal and foetal well-being. Vasodilation, increased cardiac output, and changes in vascular resistance contribute to the delicate balance required for a healthy pregnancy. However, in gestational hypertension, these physiological adjustments are disrupted, leading to persistent elevated blood pressure (Brown *et al*., 2018).

Placental Insufficiency and Vasoconstriction:

A key element in the pathophysiology of gestational hypertension is believed to be impaired placental perfusion. The placenta plays a pivotal role in orchestrating vascular changes, and any compromise in its function can trigger a cascade of events. The placenta is pivotal in gestational hypertension pathology via abnormal trophoblast invasion, reduced blood flow, and the release of antiangiogenic proteins that damage maternal endothelium (Staff *et al.,* 2013). Placental insufficiency leads to reduced blood flow, resulting in oxidative stress, endothelial dysfunction, and vasoconstriction (Schoots *et al.,* 2018). Studies (Odibo *et al.,* 2013; Zhu *et al.,* 2016; Hannan *et al.,* 2017) reveal pre-eclamptic women have elevated levels of soluble fms-like tyrosine kinase 1 (sFlt-1) which neutralizes vascular endothelial growth factors, causing endothelial dysfunction. sFlt-1 originates from insufficiently developed placentas.

Role of Endothelial Dysfunction:

Research indicates endothelial dysfunction is a central driver of gestational hypertension pathophysiology (Khalil *et al.,* 2018). Normal pregnancy involves vascular changes mediated by

nitric oxide to allow dramatic blood flow expansion. In gestational hypertension, vascular maladaptation leads to inadequate nitric oxide and placental ischemia (Bramham *et al.,* 2014). This endothelial disruption and impaired vasodilation response may originate from genetic factors, oxidative stress, inflammation, and autoantibodies against receptors like angiotensin II type 1 (Khalil *et al.,* 2018). This imbalance contributes to elevated systemic vascular resistance, further exacerbating hypertension (Brown *et al.,* 2018).

Inflammatory Responses and Oxidative Stress:

Inflammation and oxidative stress are implicated in the pathogenesis of gestational hypertension. An altered immune response, marked by increased pro-inflammatory cytokines, contributes to endothelial activation and dysfunction (Staff *et al.,* 2019). Oxidative stress, resulting from an imbalance between reactive oxygen species and antioxidant defences, further amplifies vascular dysfunction and hypertensive processes.

Immune Imbalance

Research also indicates immune dysregulation contributes through imbalance of regulatory T cells, accumulation of inflammatory markers like TNF-alpha, and autoantibody formation (Cornelius, 2018). Some evidence implicates viral infections (HIV, adenovirus) that trigger inflammatory immune cascades (Singh *et al.,* 2013). Autoantibodies may target receptors like the angiotensin II type I receptor (AT1-AA), disrupting normal vascular and kidney function in pregnancy (Dechend *et al.,* 2013).

Renin-Angiotensin-Aldosterone System (RAAS) Dysregulation:

The renin-angiotensin-aldosterone system (RAAS) is intricately involved in blood pressure regulation. In gestational hypertension, there is evidence of RAAS dysregulation, characterized by increased renin activity and elevated angiotensin II levels. These changes contribute to vasoconstriction, sodium retention, and increased blood pressure (Vaka *et al.,* 2016).

2.4 Maternal and Foetal Outcomes Associated with Gestational Hypertension

Gestational hypertension, a hypertensive disorder during pregnancy, significantly influences both maternal and foetal well-being. Understanding the diverse outcomes associated with gestational hypertension is crucial for healthcare professionals to tailor interventions and provide optimal care for pregnant individuals.

2.4.1 Maternal Outcomes

Maternal outcomes in gestational hypertension encompass a spectrum of cardiovascular changes. Elevated blood pressure levels during pregnancy pose a risk for long-term cardiovascular complications for the mother, including an increased likelihood of developing chronic hypertension and cardiovascular disease later in life (Brown *et al.,* 2018).

Gestational hypertension is a precursor to pre-eclampsia, a severe form of hypertensive disorder during pregnancy. The transition from gestational hypertension to pre-eclampsia increases the risk of adverse maternal outcomes, including organ dysfunction, eclampsia, and the potential need for premature delivery to safeguard maternal health (ACOG, 2020). Women with the condition face 2-4 times greater risk of preeclampsia progression, placental abruption, acute kidney injury,

pulmonary edema, and stroke compared to normotensive pregnancies (Von Dadelszen *et al.*, 2016).

Gestational hypertension can adversely affect renal function in pregnant individuals. Renal complications, such as proteinuria and impaired kidney function, are observed in cases of severe gestational hypertension and pre-eclampsia, highlighting the systemic implications for maternal health (Ferreira *et al.,* 2020). For example, in Ghana, 20% of women with HIP had renal dysfunction (Dassah *et al.,* 2019; Fondjo *et al.,* 2019; Bugri *et al.,* 2023)

Beyond the clinical terminology and statistics lie the human experiences of those affected by gestational hypertension. Mothers navigating the complexities of managing hypertension during pregnancy often face heightened anxiety and stress. The anticipation of potential complications for both themselves and their infants underscores the emotional toll of gestational hypertension. Psychologically, mothers describe elevated distress balancing hypertension management with preparing for a new baby (Grunberg *et al.,* 2022). Studies reveal associations with operative delivery, postpartum hemorrhage, and extended hospitalization as (Von Dadelszen *et al.,* 2016).

Psychological Distress

Pregnant women grappling with gestational hypertension often experience heightened psychological distress. Qualitative studies reveal multiple emotional challenges described by hypertensive pregnant women. The uncertainty surrounding the condition, coupled with concerns for the well-being of both the mother and the unborn child, can lead to increased anxiety levels (Bayrampour *et al.,* 2016). Smorti *et al.* (2023) and Ismail *et al.* (2013) also complimented by indicating that anxiety, stress, sadness, and depression are commonly reported in response to dealing with a high-risk pregnancy. The emotional toll of gestational hypertension is further

exacerbated by the potential progression to more severe hypertensive disorders, such as pre-eclampsia, creating a delicate balance between hope and apprehension (Smith *et al.,* 2017). Quantitatively, women with gestational hypertension have markedly higher depression scores than normotensive controls (Horsley, 2021).

Effect on Quality of Life:

The psychosocial impact of gestational hypertension extends to the perceived quality of life of affected pregnant women. Research indicates that the compromised physical health associated with gestational hypertension can contribute to a diminished sense of well-being, affecting daily activities and interpersonal relationships (Mukona *et al.,* 2020).

Relationship Dynamics:

Gestational hypertension can disrupt the dynamics of interpersonal relationships. Partners and family members may also experience heightened stress and concern for the well-being of the pregnant woman, creating a complex network of emotional support and strain (Lindheimer *et al.,* 2019). Partners often become overprotective, restricting activities out of safety concerns (McManus & Fox, 2014). Hospitalization disrupts family life and removes support systems (Ismail *et al.,* 2013). Body image worries and feeling like a "bad mother" also manifest when hypertension results in delivery complications or low birth weight (Cramer, Chung & Li, J., 2022). The need for open communication and mutual understanding within these relationships becomes essential to navigate the psychosocial challenges associated with gestational hypertension.

2.4.2 Foetal Outcomes

One of the significant foetal outcomes associated with gestational hypertension is intrauterine growth restriction (IUGR). Insufficient placental perfusion due to hypertensive disorders may restrict the transfer of nutrients to the foetus, leading to suboptimal foetal growth and development (Vaka *et al.,* 2016).

Gestational hypertension is a recognized risk factor for preterm birth. The compromised uteroplacental circulation associated with hypertension may necessitate preterm delivery to prevent further maternal and foetal complications, contributing to increased neonatal morbidity and mortality (Brown *et al.,* 2018). Gestational hypertension correlates to higher risks of intrauterine growth restriction, preterm delivery, and low birth weight (Xiao *et al.,* 2014). This predisposes to neonatal complications like respiratory distress, impaired neurodevelopment, stillbirth, and death (Abalos *et al*., 2018). Placental underperfusion is implicated, along with potential teratogenic effects of antihypertensive medications on the foetus (Xiao *et al.,* 2014). However, tight blood pressure control can mitigate risks (Webster *et al.,* 2014).

Neonates born to mothers with gestational hypertension are at a higher risk of various morbidities. These may include respiratory distress syndrome, intraventricular haemorrhage, and low Apgar scores, underscoring the intricate interplay between maternal health and foetal outcomes (Brown *et al.,* 2018).

Focusing on foetal outcomes, every premature birth and every neonatal struggle is a poignant reminder of the delicate balance between maternal health and the well-being of the unborn child. The narratives of families navigating the challenges of gestational hypertension bring to light the

human dimensions of these clinical outcomes, emphasizing the importance of holistic, patient-centred care (Halmambetova, 2022).

Effect on Foetal Development:

The pathophysiological changes in gestational hypertension extend beyond maternal health, impacting foetal development. Reduced placental blood flow compromises nutrient and oxygen delivery to the foetus, potentially leading to intrauterine growth restriction and preterm birth (Brown *et al.,* 2018).

Behind the intricate molecular and physiological processes lies the human experience of gestational hypertension. Women facing this condition navigate a delicate balance, both physically and emotionally. The anxiety of potential complications, coupled with the physical toll of hypertension, underscores the need for a holistic understanding of gestational hypertension beyond its biological dimensions (Zabak *et al.,* 2023).

The pathophysiology of gestational hypertension involves a complex interplay of vascular, inflammatory, and hormonal factors. This nuanced understanding not only provides a foundation for clinical management but also emphasizes the importance of comprehensive care that addresses the emotional and psychological dimensions of the women facing this condition (Qu and Khalil, 2020).

2.4.3 Coping Mechanisms and Resilience

Exploring the coping mechanisms employed by pregnant women facing gestational hypertension reveals a spectrum of responses. While some individuals may adopt adaptive coping strategies, such as seeking social support and engaging in stress-reducing activities, others may resort to

maladaptive coping mechanisms, potentially exacerbating the psychosocial impact (Bayrampour *et al.,* 2016).

2.5 Barriers to Timely Diagnosis and Management of Gestational Hypertension

Gestational hypertension, a critical aspect of maternal health, demands timely diagnosis and effective management to mitigate potential adverse outcomes. Early detection and treatment of gestational hypertension is crucial for mitigating risks of progression to preeclampsia and other adverse outcomes. However, the existing literature highlights several barriers that impede the prompt identification and comprehensive management of gestational hypertension, ultimately affecting maternal and foetal health.

2.5.1 Challenges in Timely Diagnosis

Limited Access to Prenatal Care:

A recurring barrier identified in numerous studies is the limited access to prenatal care, particularly in resource-constrained settings. Women facing economic challenges, residing in remote areas, or lacking transportation may encounter difficulties in accessing timely antenatal services, leading to delayed diagnosis of gestational hypertension (Amoakoh-Coleman *et al.,* 2016; Brown *et al.,* 2018).

Inadequate Blood Pressure Monitoring:

Timely diagnosis relies on consistent blood pressure monitoring throughout pregnancy. However, research indicates variations in the frequency and accuracy of blood pressure measurements during antenatal visits, contributing to delays in identifying gestational hypertension (Magee *et al*., 2014).

2.5.2 Barriers to Effective Management:

Health System Challenges:

The effectiveness of gestational hypertension management is contingent upon a well-functioning health system. In settings where healthcare infrastructure is strained, shortages of skilled healthcare professionals, limited availability of medications, and inadequate monitoring equipment contribute to suboptimal management (Brown *et al.,* 2018). Centralization of specialist care far from rural communities poses a major barrier to the timely diagnosis and management of gestational hypertension (Jensen *et al.,* 2013). Weak procurement chains also create shortages of blood pressure equipment and medications (Lama *et al.,* 2020). Poor medical records and inadequate monitoring data further exacerbate quality deficits. Limited knowledge, outdated practices, and inconsistent guideline implementation hinder evidence-based care (Jensen *et al.,* 2013). Short appointments, workforce shortages, and weak referral systems also constrain optimal management.

Patient Education and Awareness:

Adequate patient education plays a pivotal role in ensuring timely and effective management of gestational hypertension. Barriers such as low health literacy, cultural beliefs, and language disparities hinder pregnant individuals from fully understanding the importance of adherence to treatment regimens and regular follow-up appointments (Lindheimer *et al.,* 2019). Poor communication, dismissive attitudes, and lack of patient-centred care discourage women from actively participating in their treatment (Tajik *et al.,* 2017).

Socioeconomic Disparities:

Socioeconomic factors, including income levels and educational attainment, are linked to disparities in the timely management of gestational hypertension. Women facing financial constraints may encounter challenges in accessing medications, attending regular check-ups, and maintaining a healthy lifestyle, all of which are integral components of effective management (Amoakoh-Coleman *et al.,* 2016). Late initiation of prenatal care and non-adherence with medications or monitoring also serve as barriers (Jepson, 2017; Young & Kruske, 2011). Unreliable transportation and costs may inhibit accessing care when needed (Jeoson, 2017). Stigma and negative attitudes surrounding young maternal age or unmarried status further impede care.

2.5.3 Contextual Barriers in the Greater Accra Region:

Transitioning to the specific context of the Greater Accra Region in Ghana, unique challenges emerge. While the country has made strides in improving maternal healthcare, barriers persist, including infrastructural gaps, uneven distribution of healthcare facilities, and limited community awareness (Ghana Statistical Service, 2014).

The multifaceted nature of barriers in the Greater Accra Region emphasizes the need for tailored interventions. Addressing health system challenges, enhancing patient education programs, and employing community health workers to bridge the awareness gap are essential strategies to improve the timely diagnosis and management of gestational hypertension in this specific setting.

2.6 Health System Responses to Gestational Hypertension

Gestational hypertension poses a considerable challenge to maternal health, necessitating effective health system responses to ensure timely diagnosis, comprehensive management, and improved outcomes for both mothers and infants. Multiple studies demonstrate that developing clear evidence-based guidelines and standards for hypertension management during pregnancy enables improved care. Implementing standardized protocols for diagnosis, monitoring, and medications has been associated with increased treatment compliance and reduced adverse outcomes in facilities across high, middle, and low-income countries (Gillon *et al.,* 2014; Nakimuli *et al.,* 2016; Payne *et al.,* 2014). Effective responses also include training programs on applying the latest guidance.

Research also highlights task-shifting aspects of care to midwives and community health workers as a health system strategy. This allows improved case finding through expanded access to blood pressure screening (Okyere *et al.,* 2019). Referral linkages and management integration across community, primary, and tertiary facilities is also crucial for risk stratification and timely treatment access (Mannava *et al.,* 2015).

Multiple studies emphasize health education and social support interventions facilitated through health systems. Patient counselling and peer groups approaches to increase hypertension awareness and self-care capacities demonstrate reduced complications and improved experiences (Tucker *et al.,* 2018; Huh *et al.,* 2014).

Quality of Maternal Care in the Management of Gestational Hypertension

Quality care during pregnancy and childbirth is essential, especially for women experiencing high-risk conditions like gestational hypertension. Gestational hypertension, a significant concern in maternal health, necessitates a comprehensive examination of the quality of maternal care provided worldwide. Global efforts have aimed to standardize and enhance the management of hypertensive disorders during pregnancy, recognizing the potential impact on both maternal and foetal outcomes (ACOG, 2020). Globally, studies indicate quality gaps in care for hypertensive pregnant women. A WHO analysis across 45 countries found low adherence to evidence-based guidelines, with fewer than 40% of women receiving key interventions like magnesium sulfate or antihypertensives (Vogel *et al.,* 2014).

Quality maternal care in the context of gestational hypertension encompasses timely and accurate diagnosis, effective management strategies, and continuous monitoring throughout pregnancy. Deficits exist in monitoring, counselling, and information provision, resulting in poor comprehensibility and experiences for women (Abubakari *et al.,* 2016). Research suggests that adherence to evidence-based guidelines, regular blood pressure monitoring, and timely initiation of antihypertensive medications contribute to improved outcomes for both mothers and infants (Magee *et al.,* 2014). Disempowering attitudes from clinicians and system issues like understaffing compromise quality (Lama *et al.,* 2020).

Despite these advancements, challenges persist, particularly in resource-limited settings. Inconsistent access to healthcare facilities, shortage of skilled healthcare professionals and limited patient education contribute to disparities in the quality of maternal care for gestational hypertension globally (Brown *et al.,* 2018).

Transitioning to the context of the Greater Accra Region in Ghana unveils a unique set of challenges and opportunities in the management of gestational hypertension. Ghana, experiencing rapid urbanization and evolving healthcare infrastructure, grapples with the need to enhance the quality of maternal care to meet the demands of a diverse and growing population (Ghana Statistical Service, 2014).

In this region, the quality of maternal care for gestational hypertension is intricately linked to healthcare accessibility, community awareness, and healthcare provider training. Studies indicate that while efforts have been made to improve maternal healthcare services in Ghana, disparities persist, particularly in rural areas where access to quality care remains a challenge (Amoakoh-Coleman *et al.,* 2016). Research identifies patient-provider communication issues, staff shortages, and infrastructure challenges affecting hypertension care quality, though data specific to pregnancy is limited (Khatri, Mengistu, & Assefa, 2022). Rural women face pronounced quality deficits, with one study in the Ashanti region finding that 0% received adequate monitoring during delivery (Kuinor *et al.,* 2019). While Accra may offer more resources, standards are still inconsistent. The few Accra-based studies reveal quality gaps in gestational hypertension management remain. Clinical documentation is frequently incomplete, counselling and education are inadequate, and workloads limit thorough care (Oliver-Commey *et al.,* 2017; Agyare, 2018). Women describe distress from poor clinician attitudes and having limited knowledge of their condition (Aziato *et al.,* 2016).

Quality maternal care for gestational hypertension in the Greater Accra Region demands a multifaceted approach. Adequate training for healthcare providers, community education programs, and improved infrastructure are critical components to enhance the overall quality of care. Additionally, incorporating innovative technologies and telemedicine solutions may bridge

geographical gaps and facilitate continuous monitoring of pregnant individuals with gestational hypertension (Nyfløt *et al.,* 2019).

In conclusion, despite some progress, considerable deficits in the quality of maternal care for gestational hypertension persist globally and in Ghana's Greater Accra facilities. Improving competencies, standards, system supports, and patient-centred care remains critical for optimizing outcomes.

2.6.1 Integrated Prenatal Care Services:

Early and Regular Antenatal Visits:

Health systems globally recognize the pivotal role of early and regular antenatal visits in addressing gestational hypertension. Studies underscore the significance of timely prenatal care in facilitating early diagnosis, continuous monitoring, and the implementation of preventive measures to manage hypertension-related complications (ACOG, 2020; Magee *et al.,* 2014).

Standardized Blood Pressure Monitoring Protocols:

Standardized blood pressure monitoring protocols are integral components of health system responses to gestational hypertension. Implementing evidence-based guidelines for accurate and consistent blood pressure measurements during antenatal visits contributes to early detection and timely intervention (Magee *et al.,* 2014).

2.6.2 Role of Midwives and Obstetricians in Gestational Hypertension Management

Gestational hypertension, a common complication during pregnancy, requires coordinated and specialized care for optimal maternal and foetal outcomes. This literature review explores the

distinct yet complementary roles of midwives and obstetricians in the comprehensive management of gestational hypertension.

Early Detection and Diagnosis:

Research indicates midwives play an important role in early detection of gestational hypertension through routine prenatal blood pressure screening (Lori *et al.,* 2017). Midwives also provide frontline treatment such as initiating antihypertensives for mild to moderate cases, under obstetric guidance on medication choice and dosage (Kamani *et al.,* 2020). For monitoring, midwives conduct ongoing blood pressure checks, foetal heart rate assessments, urine tests, and maternal counselling (Kamani *et al.,* 2020). Studies show midwife-led care produces comparable outcomes to physician care for low-risk hypertensive pregnancies (Sandall *et al.,* 2016). Obstetricians, with their specialized training, validate and confirm diagnoses, ensuring accurate and prompt management (Magee *et al.,* 2014; American College of Obstetricians and Gynecologists [ACOG], 2020). Obstetricians perform indicated foetal and maternal tests like ultrasounds, EKGs, and lab work to assess complications (Vikse *et al.,* 2017). They provide co-management input on challenging medication regimens and delivery timing (Vikse *et al.,* 2017). For high-risk patients, obstetricians coordinate referrals to tertiary care.

Antenatal Care and Monitoring:

Midwives play a crucial role in providing consistent antenatal care for individuals with gestational hypertension. They offer regular monitoring, education, and emotional support, fostering a strong patient-provider relationship. Obstetricians, as leaders in high-risk pregnancy care, contribute their expertise through advanced monitoring techniques, ensuring the comprehensive assessment of maternal and foetal well-being (ACOG, 2020; Amoakoh-Coleman *et al.,* 2016).

Patient Education and Empowerment:

Midwives excel in patient education, equipping pregnant individuals with knowledge about gestational hypertension, self-care practices, and warning signs. This empowers women to actively participate in their care. Obstetricians further enhance this education by providing detailed insights into the potential complications, treatment options, and long-term implications of gestational hypertension, fostering informed decision-making (Lindheimer *et al.,* 2019; ACOG, 2020).

Treatment Planning and Medication Management:

Midwives, in collaboration with obstetricians, contribute to the development and implementation of personalized treatment plans. Lifestyle modifications, dietary recommendations, and regular monitoring are key elements emphasized by midwives. Obstetricians, armed with a deeper understanding of pharmacological interventions, manage medication regimens and escalate care when necessary, ensuring optimal blood pressure control and minimizing risks (Magee *et al.,* 2014; ACOG, 2020).

Intrapartum and Postpartum Care:

Midwives play a central role in providing continuous support during labour and delivery for women with gestational hypertension. They monitor vital signs, facilitate non-pharmacological pain management, and advocate for a safe birthing environment. Obstetricians are instrumental in guiding the management of labour complications, making critical decisions regarding the mode and timing of delivery, and addressing emergent situations to ensure the best outcomes for both mother and child (ACOG, 2020; Amoakoh-Coleman *et al.,* 2016).

Multidisciplinary Collaboration:

Effective gestational hypertension management necessitates seamless collaboration between midwives and obstetricians. A multidisciplinary approach, involving clear communication and shared decision-making, optimizes care. Midwives provide valuable insights into the holistic needs of pregnant individuals, while obstetricians contribute specialized medical expertise, creating a synergistic model that benefits the patient (Amoakoh-Coleman *et al.,* 2016; ACOG, 2020). Effective communication and role clarity between midwives and obstetricians facilitates prompt referral of worsening cases while maintaining midwife agency in routine care (Jepsen *et al.,* 2017). This integration of providers optimizes gestational hypertension management across risk levels.

The dynamic interplay between midwives and obstetricians in gestational hypertension management exemplifies a collaborative and patient-centred approach. The unique skills and perspectives each professional brings to the continuum of care ensure that pregnant individuals receive comprehensive and personalized management, ultimately improving maternal and fetal outcomes (Amoakoh-Coleman *et al.,* 2016; ACOG, 2020).

2.6.3 Maternal Education and Empowerment:

Health Literacy Programs:

Health systems worldwide recognize the importance of maternal education in empowering pregnant individuals to actively engage in their care. Health literacy programs, including educational materials, counselling sessions, and community outreach initiatives, aim to enhance understanding and encourage proactive participation in the management of gestational hypertension (Lindheimer *et al.,* 2019).

Cultural Competence and Sensitivity:

Health system responses extend beyond clinical protocols to encompass cultural competence and sensitivity. Recognizing the diverse cultural contexts in which gestational hypertension manifests, health systems strive to tailor educational materials and interventions to resonate with the cultural beliefs and practices of the communities they serve (Lindheimer *et al.,* 2019).

2.6.4 Interdisciplinary Collaboration:

Team-Based Care Approaches:

Health systems increasingly adopt team-based care approaches to address the multidimensional aspects of gestational hypertension. Interdisciplinary collaboration involving obstetricians, midwives, nurses, nutritionists, and mental health professionals ensures comprehensive care that addresses both the physiological and psychosocial dimensions of gestational hypertension (Brown *et al.,* 2018).

Integrated Health Information Systems:

The integration of health information systems plays a crucial role in facilitating seamless communication and coordination among healthcare providers. Electronic health records and centralized databases enable real-time access to patient information, contributing to a more cohesive and collaborative approach in managing gestational hypertension (Brown *et al.,* 2018).

2.6.5 Contextual Adaptations in Local Settings:

Tailored Community Health Programs:

Recognizing the contextual variations in health-seeking behaviours, health systems implement tailored community health programs. These initiatives aim to increase awareness, reduce stigma, and address specific socioeconomic factors that may influence the timely seeking of care for gestational hypertension (Amoakoh-Coleman *et al.,* 2016).

Telemedicine and Mobile Health Solutions:

In the era of technological advancements, health systems explore the integration of telemedicine and mobile health solutions to overcome geographical barriers. Remote monitoring, virtual consultations, and mobile applications provide avenues for continuous care and support for pregnant individuals managing gestational hypertension, particularly in regions with limited access to healthcare facilities (Nyfløt *et al.,* 2019).

From standardized clinical protocols to culturally sensitive educational initiatives and interdisciplinary collaboration, health systems play a pivotal role in shaping comprehensive and patient-centred approaches. Recognizing the contextual nuances and leveraging technological advancements further enhance the capacity of health systems to address the complexities associated with gestational hypertension (Nyfløt *et al.,* 2019).

2.7 Community Awareness and Education Programs for Gestational Hypertension

Gestational hypertension, a significant contributor to maternal morbidity and mortality, necessitates comprehensive community awareness and education programs to facilitate early

detection and effective management. Lack of awareness and knowledge regarding gestational hypertension contributes to late diagnosis and poor self-management. Community education programs are vital for improving early recognition and care-seeking. Globally, initiatives have been undertaken to enhance community understanding of gestational hypertension, recognizing the pivotal role of informed communities in promoting maternal health (ACOG, 2020).

2.7.1 Global Health Initiatives:

International organizations and health agencies have played a crucial role in developing and promoting global health initiatives aimed at raising awareness about gestational hypertension. Collaborative efforts, such as the World Health Organization's (WHO) "Born Too Soon" campaign, emphasize the importance of community education in preventing complications associated with hypertensive disorders during pregnancy (WHO, 2019).

2.7.2 Online/Offline Platforms and Social Media Campaigns:

The advent of digital communication has facilitated the dissemination of information on gestational hypertension through online platforms and social media campaigns. Global organizations leverage these channels to reach diverse audiences, sharing educational materials, testimonials, and expert advice to enhance community awareness and engagement (Pehlivanov *et al.,* 2019).

Studies from diverse settings demonstrate multiple modalities for improving community awareness of hypertension in pregnancy. Mass media campaigns using print, radio and television have increased basic knowledge in India, Pakistan and Guatemala (Sharma *et al.,* 2020). Community health worker and group education sessions have successfully disseminated

prevention information to women in Nigeria, Brazil and the Philippines (Adeleye *et al.,* 2019; Moran *et al.,* 2015). Combination approaches show particular promise. However, tailored messaging and addressing sociocultural beliefs are needed to change attitudes and behaviours (Sharma *et al.,* 2020). Follow-up reinforcement also appears key for sustaining impacts.

In sub-Saharan Africa, community education has been delivered through various platforms from churches to schools. A Nigerian program training female groups led to earlier health seeking and hospital delivery among members (Ezugwu *et al.,* 2014). Simple pictorial tools boosted knowledge when combined with group talks in Kenyan informal settlements (Mutiso *et al.,* 2018). Interactive discussions and male engagement were deemed important for changing norms.

Narrowing to the Greater Accra Region

Transitioning to the specific context of the Greater Accra Region in Ghana unveils localized challenges and opportunities in implementing community awareness and education programs for gestational hypertension. In Ghana, limited research exists on community hypertension awareness, while studies show low education levels generally (Adjahoto *et al.,* 2021).

1. Health Education in Local Languages:

In Ghana, where linguistic diversity is prominent, community awareness programs for gestational hypertension often prioritize health education in local languages. Tailoring information to cultural norms and linguistic preferences enhances community understanding and fosters active participation in maternal health initiatives (Amoakoh-Coleman *et al.,* 2016).

2. Community Health Workers (CHWs):

Deploying Community Health Workers (CHWs) emerges as a promising strategy in the Greater Accra Region. Trained CHWs act as conduits of information, delivering educational materials, conducting awareness sessions, and providing support to pregnant individuals in the community. This grassroots approach is integral to bridging gaps in healthcare access and knowledge dissemination (Amoakoh-Coleman *et al.,* 2016).

3. Mobile Health (mHealth) Interventions:

Considering the widespread use of mobile phones in Ghana, mHealth interventions play a crucial role in community awareness. Text messages, voice calls, and mobile applications deliver targeted information, appointment reminders, and support for pregnant individuals managing gestational hypertension, particularly in remote areas (Labrique *et al.,* 2013).

2.7.3 Challenges and Opportunities

1. Cultural Sensitivity in Health Messaging:

While community awareness programs in the Greater Accra Region have made strides, challenges persist in ensuring cultural sensitivity. Tailoring health messages to align with cultural beliefs and practices is essential to overcome potential resistance and foster community acceptance (Lindheimer *et al.,* 2019).

2. Infrastructure and Access Disparities:

Disparities in infrastructure and healthcare access within the Greater Accra Region pose challenges to equitable community engagement. Efforts to enhance awareness must address these disparities,

ensuring that educational programs reach individuals across urban and rural settings (Ghana Statistical Service, 2014).

Community awareness and education programs for gestational hypertension are essential components of maternal health strategies globally and within specific regions like the Greater Accra Region in Ghana. A nuanced understanding of local contexts, cultural sensitivities, and leveraging technological innovations are pivotal for the success of these programs. As global and local efforts converge, community-based education remains a cornerstone in the collective pursuit of improving maternal outcomes associated with gestational hypertension.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Research Design

This research focused on assessing gestational hypertension and birth outcomes, at Shai-Osudoku District Hospital. The study employed a quantitative method. A descriptive cross-sectional study was used to assess the prevalence of gestational hypertension among participants and its effect on their birth outcomes. This method was used because this study utilised participants' medical records from the SODH records unit.

3.2 Study Population

The targeted population for the study were all women who had their antenatal care and delivered at SODH between January 2023 and January 2024. These women had all their medical records in the repository of the hospital's database.

3.3 Inclusion Criteria

- Pregnant women who received antenatal care and delivered at Shai-Osudoku District Hospital.
- Deliveries that occurred after 20 weeks of gestation.
- Medical records with complete and relevant information for the variables of interest.

3.4 Exclusion Criteria

- Pregnant women who had been transferred to SODH for emergency medical attention.
- Pregnant women with incomplete medical records.

- Cases with severe maternal complications unrelated to gestational hypertension.
- Pregnant women who were diagnosed with pre-existing hypertension or chronic hypertension.
- Multiple pregnancies (e.g., twins, triplets) to maintain homogeneity in the study population.

3.5 Data Collection Methods and Instruments

The data collection methods for this study involved secondary data sources. Data was collected from the hospital's birth registry. This data provided information on neonatal birth weight, Apgar scores, neonatal ICU admission, and other relevant variables. The birth registry data was anonymized. Medical records of these mothers were also reviewed to extract data on birth outcomes, maternal complications and hypertension diagnosis before pregnancy.

3.6 Data Variables

Gestational Hypertension: The assessment of gestational hypertension involved measuring the blood pressure of pregnant women. The unit of measurement for blood pressure was millimeters of mercury (mmHg), and the tool of measurement used by the nurses was a sphygmomanometer for blood pressure.

Neonatal Birth Weight: The assessment of neonatal birth weight involved measuring the weight of the newborn shortly after birth. The birth weight were categorised into three starting from low birth weight (≤2kg), normal birth weight (2.1-3.9kg) and macrosomic (≥4kg). The unit of measurement was kilograms (kg), and the tool of measurement included a calibrated infant scale.

Apgar Score at 1 and 5 minutes: The Apgar score was assessed by evaluating the newborn's appearance, pulse, grimace, activity, and respiration at 1 and 5 minutes after birth. The Apgar score is a qualitative assessment and does not have a specific unit of measurement. The tool of measurement included a standardized Apgar scoring system by the nurses.

Neonatal ICU Admission: The assessment of neonatal ICU admission involved recording the admission of newborns to the neonatal intensive care unit. The unit of measurement is binary (yes/no), indicating whether the newborn was admitted to the ICU. The tools of measurement included medical records and hospital databases.

Maternal Complications: Maternal complications were assessed by documenting the occurrence of conditions such as pre-eclampsia and postpartum haemorrhage during the antenatal and postnatal periods. The assessment involved using diagnostic criteria specific to each complication. The unit of measurement depends on the specific complications. Tools of measurement included medical records, diagnostic tests, and clinical examinations.

3.7 Data Handling

This included the process of organizing and categorizing the data systematically, ensuring accuracy and consistency. Data handling procedures included the coding and entry of the collected data into a computer database. This was accessed from the district hospital's data management system from February 9th to March 15th, 2024 with the help of the systems manager and two nurses from the ANC unit and the maternity unit to ensure consistency. Data entry was double-checked to minimize errors and ensure accuracy. All data was treated as confidential and stored securely.

3.8 Statistical Analysis

The data was summarized in Microsoft Excel 2016 and then coded with numbers for descriptive and inferential analysis using STATA software package version 17. Descriptive statistics such as frequency distributions, means, and standard deviations were used to summarize the characteristics of the study population. The association between gestational hypertension and birth outcomes, was examined using Chi-Square tests for categorical variables. Logistic regression models were used to predict the relationship between gestational hypertension and continuous birth outcome variables. All statistical analyses were conducted using a significance level of $p < 0.05$.

3.9 Ethical Consideration

Ethics encompass fundamental principles of proper conduct, particularly in research involving the gathering of data on individuals. In order to safeguard privacy, confidentiality must be ensured (Chen *et al.,* 2017). Ethical considerations were carefully addressed throughout the study to ensure the protection and well-being of the participants. Ethical approval was sought from the Ethical Review Committee of Ensign Global College (ENSIGN/IRB/EL/SN-243) and Dodowa Health Research Centre (DHRCIRB/008/01/24) (Appendix 1 & 2). This study does not involve human subjects, so informed consent was not used, and there were no risks.

3.10 Assumptions

This study assumed that, gestational hypertension cases diagnosed at Shai-Osudoku District Hospital were accurately identified and documented by healthcare professionals using standard medical protocols and diagnostic criteria. The study also assumed that, the quality of healthcare services provided at Shai-Osudoku District Hospital was consistent and adhered to established

medical guidelines for managing gestational hypertension and ensuring positive birth outcomes. The research assumed consistency in the reporting and recording of gestational hypertension cases and birth outcomes by healthcare staff at Shai-Osudoku District Hospital over the duration of the study period. While specific to the Shai-Osudoku District Hospital, the research assumed that, findings from the study may have broader implications and applicability to similar healthcare settings and populations within the Greater Accra Region of Ghana, though generalization beyond this context may require further research and validation.

3.11 Limitations

The research was limited to data collected from Shai-Osudoku District Hospital only, which may not fully capture the diversity of gestational hypertension cases and birth outcomes across the entire Greater Accra Region of Ghana. There could be inconsistencies or missing information, affecting the accuracy and completeness of the analysis due to the use of retrospective data. The study may not account for temporal trends or changes in medical practices, healthcare policies, or socio-demographic factors over time, which could affect the relationship between gestational hypertension and birth outcomes. The quality of data recorded in medical records, including inaccuracies or discrepancies, could introduce errors or bias into the analysis, affecting the reliability of the study results. While the findings may have implications for healthcare practices in similar settings, they may not be directly generalizable to other regions or countries with different healthcare systems, populations, or socio-cultural contexts. The research may focus solely on the association between gestational hypertension and immediate birth outcomes, potentially overlooking other long-term maternal and neonatal health outcomes or complications.

CHAPTER FOUR

4.0 RESULTS

4.1 Introduction

The result of this study was presented based on the following objectives of the study: (i) to determine the prevalence of gestational hypertension among pregnant women at Shai-Osudoku District Hospital; (ii) to assess the association between gestational hypertension on birth outcomes (neonatal birth weight, Apgar scores, neonatal ICU admission, and maternal complications) at Shai-Osudoku District Hospital; (iii) to assess the effect of gestational hypertension on birth outcomes. The results are grouped into four main topics comprising of the demographics, prevalence of gestational hypertension, association and effect of gestational hypertension and birth outcomes.

4.2 Demographic Characteristics of Participants

4.2.1 Age Distribution of Participants

Based on the data from the records unit of SODH, the lowest age of the women was 13 and the highest was 53. The highest age group of pregnant women was 21-30 years (643, 45.7%), followed by 31-40 year (573, 40.8%), ≤ 20 (123, 8.7%) and the lowest being 41≤ (67, 4.8%). The table (Table 4.1) below illustrates the age distribution of the women.

Table 4.1: Age Distribution of Participants

Variables	Frequency (n=1406)	Percentage (%)
Age of mothers (years)		
Mean [SD, (min, max)]	29.7 [6.5, (13, 53)]	
Age group of mothers (years)		
≤ 20	123	8.7
21-30	643	45.7
31-40	573	40.8
41≤	67	4.8

4.2.2 Antenatal Related Factors

A total of 6 antenatal related factors were analysed for this study and the results are as follows; relating to the gravidity, women with 1-3 gravidity were 291 representing 20.7%, 800 women representing 56.9% had their gravidity between 4-6, 293 women representing 20.8% had their gravidity between 7-9 and 22 women representing 1.6% had their gravidity equal or more than 10. Regarding the parity, 1038 women representing 73.8% had their parity between 1-3, 348 women representing 24.8% had their parity between 2-6 and 20 women representing 1.4% had their parity equal or more than 7.

On the gestational period (weeks), the results are as followed, 11 women representing 0.8% ended their gestation as pre-term, 168 women representing 11.9% ended their gestation as full term and 1227 women representing 87.3% ended their gestation as late term.

On the systolic and diastolic BP of the pregnant women, the minimum systolic BP was 72 and the maximum was 242 with a mean of 128 and SD of 24.1. With the diastolic BP, the minimum was 23 and the maximum was 192 with a mean of 82 and SD of 18.1.

Regarding the severity of the BP based on both the systolic and diastolic BP, 48 women representing 3.4% had extreme BP, 338 women representing 24% had mild BP, 881 women representing 62.7% had normal BP and 139 women representing 9.9% had severe BP. The table below highlights the antenatal related factors of the pregnant women.

Table 4.2: Related Antenatal Factors Assessed

Variables	Frequency (n=1406)	Percentage (%)
Gravidity		
1-3	291	20.7
4-6	800	56.9
7-9	293	20.8
10≤	22	1.6
Parity		
1-3	1038	73.8
2-6	348	24.8
7≤	20	1.4
Gestational period (weeks)		
Pre-term	11	0.8
Full term	168	11.9
Late term	1227	87.3
Systolic BP		
Mean [SD, (min, max)]	128 [24.1, (72, 242)]	
Diastolic BP		
Mean [SD, (min, max)]	82 [18.1, (23, 192)]	
Severity of blood pressure		
Extreme	48	3.4
Mild	338	24.0
Normal	881	62.7
Severe	139	9.9

4.2.3 Intrapartum related factors

The study analysed 5 intrapartum related factors from the hospital data accessed and the results are as follows; under mode of delivery, delivery via Spontaneous Vaginal Delivery (SVD) was the highest mode (912, 64.9%) and delivery via Controlled Cord Traction (CCT & CT) was the lowest mode recorded (1, 0.1%).

Relating to delivery complications, women who had no complication in their delivery was the highest (1200, 85.4%), followed by women whose delivery was complicated with pre-eclampsia (181, 12.9%), women whose delivery was complicated by eclampsia (23, 1.6%) and post–partum eclampsia was the least (2, 0.1%) recorded delivery complication.

With regards to the first Apgar score, newborns with 7-10 Apgar score (1128, 80.2%) was the highest recorded and the lowest recorded Apgar score was 0-3 (65, 4.6%). The minimum Apgar score was 0 and the maximum was 9, the mean score was 6.9 and the SD was 1.5.

Regarding the second Apgar score, newborns with 7-10 Apgar score was the highest (1295, 92.2%) and the lowest score recorded was newborns with 0-3 Apgar score (37, 2.6%). The minimum second Apgar score recorded was 0 and maximum score was 10. The mean score was 8.1 with SD of 1.5.

Regarding the NICU admissions, 1076 newborns representing 76.5% were not admitted to NICU and 330 newborns representing 23.5% were admitted to NICU.

Table 4.3: Related Intrapartum Factors Assessed

Variables	**Frequency (n=1406)**	**Percentage (%)**
Mode of delivery		
Elective C-section	184	13.1
Controlled Cord Traction	1	0.1
Emergency C-section	309	22.0
Spontaneous Vaginal Delivery	912	64.9
Delivery Complications		
Pre-Eclampsia	181	12.9
Eclampsia	23	1.6
Post-partum Eclampsia	2	0.1
None	1200	85.4
Apgar score 1		
0-3	65	4.6
4-6	213	15.2
7-10	1128	80.2
Mean [SD, (min, max)]	6.9 [1.5, (0, 9)]	
Apgar score 2		
0-3	37	2.6
4-6	73	5.2
7-10	1295	92.2
Mean [SD, (min, max)]	8.1 [1.5, (0, 10)]	
NICU admission		
No	1076	76.5
Yes	330	23.5

4.2.4 Foetal Related Factors

The study analysed 3 foetal factors namely sex of baby, birth weight and birth outcome (stillbirth, macerated, alive and fetal distress) and the results are as follows; on the sex of the newborns, 643 newborns representing 45.7% were males and 763 newborns representing 54.3% were females.

Relating to the birth weight of the newborns, normal birth weight (2.1-3.9kg) was the highest recorded (1224, 87.1%) and weight either equal to 4kg or more (63, 4.5%), was the lowest.

Under the birth outcomes, 5 newborns representing 0.4% were stillbirth, 17 newborns representing 1.2% were macerated, 1380 newborns representing 98.2% were alive and 70 newborns representing 5.0% faced fetal distress. The table below illustrate the analysed results.

Table 4.4: Foetal Related Factors

Variables	Frequency (n=1406)	Percentage (%)
Sex of baby		
Male	643	45.7
Female	763	54.3
Birthweight (kg)		
Low birth weight (≤ 2)	119	8.5
Normal birth weight (2.1 - 3.9)	1224	87.1
Macrosomic (4≤)	63	4.5
Birth outcome		
Stillbirth		
Yes	5	0.4
No	1401	99.6
Macerated		
Yes	17	1.2
No	1389	98.8
Alive		
Yes	1380	98.2
No	26	1.8
Fetal distress		
Yes	70	5.0
No	1336	95.0

4.3 Prevalence of Gestational Hypertension at SODH

Concerning the prevalence of gestational hypertension in SODH, 92 pregnant women representing 6.5% were diagnosed with chronic hypertension, 452 pregnant women representing 32.2% were diagnosed with gestational hypertension and 862 pregnant women were not diagnosed with hypertension. The table below depicts the hypertension status pregnant women gathered.

Table 4.5: Hypertension Status

Hypertension Status	**Frequency (n=1406)**	**Percentage (%)**
Chronic hypertension	92	6.5
Gestational hypertension	452	32.2
No hypertension	862	61.3

4.4 Association between Gestational Hypertension and Birth Outcomes

Using the Chi-Square method, the results to assess association between gestational hypertension and birth outcomes, the results indicated that, all variables were significant ($p=<0.05$) with the exception of three variables (Apgar score 2, parity and sex of baby). The table (Table 4.6) below illustrates the analysis of the association between gestational hypertension and birth outcomes.

Table 4.6: Association between Gestational Hypertension and Birth Outcomes

Variables	Gestational Hypertension		
	Yes, n (%)	No, n (%)	$\chi 2$ (p-value)
Birthweight			
Low birth weight (≤ 2)	51 (42.9)	68 (57.1)	**8.2968 (0.016) ***
Normal birth weight (2.1 - 3.9)	377 (30.8)	847 (69.2)	
Macrosomic (≥ 4)	24 (38.1)	39 (61.9)	
Apgar score 1			
0-3	28 (43.1)	37 (56.9)	**6.4710 (0.039) ***
4-6	57 (26.8)	156 (73.2)	
7-10	367 (32.5)	761 (67.5	
Apgar score 2			
0-3	16 (43.2)	21 (56.8)	2.2481 (0.325)
4-6	22 (30.1)	51 (69.9)	
7-10	414 (31.9)	882 (68.1)	
Delivery complication			
None	291 (24.2)	909 (75.8)	**240.1663 (<0.001) ***
Pre-Eclampsia	144 (79.6)	37 (20.4)	
Eclampsia	17 (73.9)	6 (26.1)	
Post-partum Eclampsia	0 (0)	2 (100.0)	
NICU admission			
No	285 (26.5)	791 (73.5)	**67.3513 (<0.001) ***
Yes	167 (50.6)	163 (49.4)	
Gravidity			
1-3	249 (28.2)	633 (71.8)	**17.0661 (0.001) ***
4-6	180 (39.0)	281 (61.0)	
7-9	22 (37.3)	37 (62.7)	
10-13	1 (25.0)	3 (75.0)	
Parity			
1-3	391 (31.8)	839 (68.2)	0.9401 (0.625)
4-6	59 (35.1)	109 (64.9)	
7-8	2 (25.0)	6 (75.0)	
Age of mother (years)			
≤ 20	23 (18.7)	100 (81.3)	**46.9211 (<0.001) ***
21-30	165 (25.7)	478 (74.3)	
31-40	236 (41.2)	337 (58.8)	
≥ 41	28 (41.8)	39 (58.2)	
Gestational age (weeks)			
Pre-term	6 (54.5)	5 (45.5)	**15.3197 (<0.001) ***
Full term	74 (44.1)	94 (55.9)	
Late term	372 (30.3)	855 (69.7)	
Mode of delivery			
Elective C-section	84 (45.7)	100 (54.3)	**126.1470 (<0.001) ***
Controlled cord traction	1 (100.0)	0 (0)	
Emergency C-section	166 (53.7)	143 (46.3)	

Spontaneous Vaginal Delivery	201 (22.0)	711 (78.0)	
Sex of baby			
Male	236 (32.3)	494 (67.7)	0.0228 (0.880)
Female	216 (32.0)	460 (68.0)	
Alive			
Yes	439 (31.8)	941 (68.2)	**3.8703 (0.049) ***
No	13 (50.0)	13 (50.0)	

*=Statistically significant

4.5 Multivariate Logistics Regression Showing the Effect of Gestational Hypertension on Birth Outcomes

This analysis was to further explore the effect of gestational hypertension and the birth outcome variables analysed in this study. Expectant mothers who were diagnosed with gestational hypertension were 7.703 time likely to have eclampsia [aOR= 7.703, (95% CI = 2.825, 21.004), p=<0.001] and 10.282 times likely to have pre-eclampsia [aOR= 10.282, (95% CI = 6.563, 16.108), p=<0.001] compared to expectant mothers who had no complication during delivery. Newborns from expectant mothers diagnosed with gestational hypertension were 2.594 times likely to be admitted at NICU after birth [aOR= 2.594 (95% CI = 1.756, 3.832), p=<0.001] compared to none gestational hypertensive expectant mothers. On the effect on the Apgar score 1, newborns were 0.581 times likely to have an Apgar score between 4-6 [aOR= 0.581 (95% CI = 0.391, 0.862), p=0.007] compared to none gestational hypertensive mothers.

With respect to the age of expectant mothers, women between the ages of 31-40 years were 2.526 times [aOR= 2.526, (95% CI = 1.439, 4.432), p=0.001] likely be diagnosed with gestational hypertension and women 41 years above were 2.613 times [aOR= 2.613, (95% CI = 1.195, 5.714), p=0.016] likely to be diagnosed with gestational hypertension compared to women below the ages of 30. Regarding the mode of delivery, expectant mothers were 0.441 times [aOR= 0.441, (95% CI = 0.307, 0.634), p=<0.001] likely to have spontaneous vaginal delivery compared to elective

C-section. No significant effect was found between gestational hypertension and Apgar score 1, birth weight and gravidity). Table 4.7 shows the multivariate analysis to explore the effect of gestational hypertension on birth outcomes.

Table 4.7: Multivariate Analysis between Gestational Hypertension and Birth Outcomes

Variables	**Unadjusted**	**Adjusted**
	uOR (95% CI) p-value	**aOR (95% CI) p-value**
Birthweight		
Normal birth weight (2.1 - 3.9)	Ref	Ref
Low birth weight (≤ 2)	1.685 (1.149, 2.471) **0.008**	0.610 (0.335, 1.110) 0.106
Macrosomic (≥ 4)	1.382 (0.819, 2.332) 0.225	0.864 (0.467, 1.598) 0.641
Delivery complications		
None	Ref	Ref
Eclampsia	8.850 (3.457, 22.657) **<0.001**	7.703 (2.825, 21.004) **<0.001**
Post-partum eclampsia	1	1
Pre-eclampsia	12.157 (8.275, 17.859) **<0.001**	10.282 (6.563, 16.108) **<0.001**
Apgar Score 1		
7-10	Ref	Ref
0-3	1.569 (0.945, 2.604) 0.081	0.949 (0.458, 1.967) 0.889
4-6	0.757 (0.546, 1.052) 0.097	0.581 (0.391, 0.862) **0.007**
NICU admission		
No	Ref	Ref
Yes	2.843 (2.204, 3.669) **<0.001**	2.594 (1.756, 3.832) **<0.001**
Gravidity		
10-13	Ref	Ref
1-3	1.180 (0.122, 11.399) 0.886	1.980 (0.181, 21.607) 0.575
4-6	1.922 (0.198, 18.618) 0.573	2.134 (0.197, 23.158) 0.533
7-9	1.784 (0.175, 18.221) 0.625	2.527 (0.220, 29.030) 0.457

Variables	Unadjusted uOR (95% CI) p-value	Adjusted aOR (95% CI) p-value
Age of mother		
≤ 20	Ref	Ref
21-30	1.501 (0.922, 2.441) 0.102	1.422 (0.822, 2.459) 0.208
31-40	3.044 (1.879, 4.934) **<0.001**	2.526 (1.439, 4.432) **0.001**
≥ 41	3.121 (1.601, 6.065) **0.001**	2.613 (1.195, 5.714) **0.016**
Gestational age		
Pre-term	Ref	Ref
Full term	0.656 (0.193, 2.234) 0.500	2.880 (0.068, 1.214) 0.090
Late term	0.362 (0.109, 1.195) 0.096	0.731 (0.178, 3.009) 0.664
Delivery mode		
Elective C-section	Ref	Ref
Controlled cord traction	1	1
Emergency C-section	1.382 (0.958, 1.993) 0.083	0.851 (0.559, 1.296) 0.453
SVD	0.336 (0.242, 0.468) **<0.001**	0.441 (0.307, 0.634) **<0.001**
Alive		
No	Ref	Ref
Yes	0.466 (0.214, 1.015) **0.054**	0.700 (0.238, 2.056) 0.516

CHAPTER FIVE

5.0 DISCUSSION

5.1 Introduction

The research explored the effect of gestational hypertension on birth outcomes at Shai-Osudoku District Hospital. It provided evidence on the prevalence of gestational hypertension among pregnant women who gave birth in SODH between the timeframe stated for this study. Findings revealed that, there was a significant number of pregnant women who developed gestational hypertension during their pregnancy and how it affected the birth outcomes of their newborns.

5.2 Prevalence of Gestational Hypertension

Making inference to the analysed results in the previous chapter (Table 4.5), the recorded number of diagnosed cases of gestational hypertension was 32.2% of the population of pregnant women who attended SODH within the timeframe. Compared to the global prevalence conducted by WHO (2020), the results of this study was 22.2% higher than what has been recorded in previous studies. The prevalence in this study was also higher than the global average of 6-17% recorded by Macdonald-Wallis *et al.* (2014) in their study. Compared to the average recorded in Sub-Sahara Africa by Abalos *et al*. (2014) which was between 12%-18%, the results recorded in this study was 14%-20.2% higher.

According to a study by Amoakoh-Coleman *et al.* (2016), the prevalence of gestational hypertension in Ghana is approximately 14%. Adu-Bonsaffoh *et al.* (2017) also in their separate study opined that the prevalence of gestational hypertension has been estimated from 6-13% indicating a substantial burden on maternal health. Gestational hypertension within the Tamale

metropolis was estimated at 15.7% by Mohammed (2023) which is lower than the result in the study. At Korle-bu Teaching Hospital in Ghana, a tertiary referral health facility in Nigeria, and North West Ethiopia, prevalence rates of 21.4 percent, 17 percent, and 16.8 percent, respectively, have been recorded during pregnancy, which was highlighted by Awuah *et al.* (2020) which were also lower to the result of this study. A similar study was undertaken by Njukang *et al.* (2020) discovered that the prevalence of gestational hypertension was 14.5% among their study participants. Additionally, this study's finding is higher than the predicted rate by Fonjo *et al.* (2019) to be between 6.55% and 7.03% among pregnant women. These previous studies project an indication that the prevalence of gestational hypertension recorded in this study was extremely high compared to previous studies carried out locally in Ghana, Sub-Sahara Africa and globally. This indicates that, much attention should be implemented out in order to curtail the alarming rate of prevalence in the hospital. Mitigation measures must be implemented in order to sensitise the communities the hospital serves on gestational hypertension and it associated risk factors that pregnant women are prone to through during gestation.

5.3 Association between Gestational Hypertension and Birth Outcomes

Based on the results above (Table.4.6) all the birth outcomes except the Apgar score 2, parity and sex of baby had a significant association with gestational hypertension. These results provide a clear indication of how gestational hypertension can affect birth outcomes and further complicate the child delivery process in general. This affirms the study of Brown *et al.* (2018) whom opined that compromised uteroplacental circulation associated with hypertension may necessitate preterm delivery to prevent further maternal and foetal complications, contributing to increased neonatal morbidity and mortality. According to Xiao *et al.* (2014), gestational hypertension correlates to higher risks of intrauterine growth restriction, preterm delivery, and low birth weight which this

study affirms due to significance in most of the childbirth outcomes. Abalos *et al.* (2013) also stated that, gestational hypertension predisposes to neonatal complications like respiratory distress, impaired neurodevelopment, stillbirth, and death which is seen in the results of this study. Brown *et al.* (2018) further stated that neonates born to mothers with gestational hypertension are at a higher risk of various morbidities. These may include respiratory distress syndrome, intraventricular haemorrhage, and low Apgar scores, underscoring the intricate interplay between maternal health and foetal outcomes. This affirms the findings of Brown *et al.* (2018) to a certain point, however, the second Apgar score regardless of being high did not have any significance with association gestational hypertension.

Focusing on foetal outcomes, every premature birth and every neonatal struggle is a poignant reminder of the delicate balance between maternal health and the well-being of the unborn child. This emphasises the need to implement measures and actions by the management of SODH to further enhance the effort of their staff to manage gestational hypertension cases based on the associated effect it can have on the foetus that is to be born.

5.4 Effect of Gestational Hypertension on Birth Outcomes

Concerning the effect of gestational hypertension on birth outcomes, the results (Table 4.7) indicated that, there was a significant effect of gestational hypertension on delivery complication (eclampsia and post-partum eclampsia) and NICU admissions. This further clarifies that the intensity of gestational hypertension intricately affects newborn birthweight, NICU admissions and some delivery complications. This indicates that, critical measures and actions need to commence when severe gestational hypertension cases are diagnosed at SODH in order to mitigate the severity of gestational hypertension on the birth outcomes of the newborn. This study shares

the similar opinion with Xiao *et al.* (2014) who in their publication stated that gestational hypertension correlates to higher risks of intrauterine growth restriction, preterm delivery, and low birth weight. Abalos *et al.* (2013) further compliment by stating that gestational hypertension predisposes to neonatal complications like respiratory distress, impaired neurodevelopment, stillbirth, and death. This indicates that, if antihypertensive medications or treatment protocols are not initiated on time after diagnosis, not only the mothers, but the newborns face these neonatal complications highlighted. Research suggests that adherence to evidence-based guidelines, regular blood pressure monitoring, and timely initiation of antihypertensive medications contribute to improved outcomes for both mothers and infants (Magee *et al.*, 2014). Implementing standardized protocols for diagnosis, monitoring, and medications has been associated with increased treatment compliance and reduced adverse outcomes in facilities across high, middle, and low-income countries (Gillon *et al.*, 2019; Nakimuli *et al.*, 2016; Payne *et al.*, 2014).

Reduced placental blood flow compromises nutrient and oxygen delivery to the foetus, potentially leading to intrauterine growth restriction and preterm birth (Brown *et al.*, 2018). Neonates born to mothers with gestational hypertension are at a higher risk of various morbidities. These may include respiratory distress syndrome, intraventricular haemorrhage, and low Apgar scores, underscoring the intricate interplay between maternal health and foetal outcomes (Brown *et al.*, 2018).

CHAPTER SIX

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

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

6.2 Conclusions

Findings from this study highlights on the prevalence of gestational hypertension in SODH which was higher than all the averages recorded in other hospitals in Ghana, in Sub-Sahara Africa and globally. The high prevalence indicates the precarious situation the hospital is facing and how a continuous surge could affect maternal healthcare delivery. SODH being a secondary hospital provides a clearer view of how gestational hypertension is bedevilling pregnant women in peri-urban areas in Ghana which has characteristics of both urban and rural areas.

This study further probed into how gestational hypertension affected newborns and noted that some negative birth outcomes were intricately linked to gestational hypertension.

This study further elucidates the intricate relationship between gestational hypertension and birth outcomes. The study concludes that the severity of gestational hypertension significantly affects the severity of the negative birth outcomes hence the detection of gestational hypertension must trigger early mitigation measures to curtail the effects on the newborn.

6.3 Recommendations

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

i. Preconception Clinic established in hospitals must enhance the awareness of gestational hypertension among women in fertility age (WiFA) and women of reproductive age (WoFA) to ensure early detection, management and prevention of gestational hypertension during pregnancy in order to avoid complications.

ii. Health practitioners of SODH such as midwives, nurses and pharmacists should provide adherence counselling for women who are diagnosed with gestational hypertension.

iii. Futher studies need to be carried out by other hospitals on how to manage gestational hypertension among pregnant women in order to help improve medical interventions.

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APPENDIX

Appendix 1: IRB Approval

ENSIGN GLOBAL
COLLEGE

OUR REF: ENSIGN/IRB/EL/SN-243 January 11, 2024.
YOUR REF:

INSTITUTIONAL REVIEW BOARD SECRETARIAT

Amanda Kudiabor
Ensign Global College
Kpong.

Dear Amanda,

ETHICAL CLEARANCE TO UNDERTAKE POSTGRADUATE RESEARCH

At the General Research Proposals Review Meeting of the *INSTITUTIONAL REVIEW BOARD (IRB)* of Ensign Global College held on Wednesday, January 10, 2024, your research proposal entitled **"Gestational Hypertension Impact on Traumatic Childbirth and Birth Outcomes at Shai-Osudoku District Hospital in the Greater Accra Region of Ghana"** was considered.

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

We wish you all the best.

Sincerely,

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

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

Appendix 2: Ethical Clearance

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

My Ref. DHRC/1RB/028/02/24
Your Ref. No.

Dodowa Health Research Centre
Ghana Health Service
P. O. Box DD1
Dodowa

Email: irbdodowa@gmail.com

8th February 2024

Amanda Seyram Adjoa Kudiabor
C/O Ensign Global College
P. O. Box AK 136
Akosombo

Dear Madam,

ETHICAL CLEARANCE

TITLE OF PROTOCOL: GESTATIONAL HYPERTENSION IMPACT ON TRAUMATIC CHILDBIRTH AND BIRTH OUTCOMES AT SHAI-OSUDOKU DISTRICT HOSPITAL IN THE GREATER ACCRA REGION OF GHANA

Protocol ID: DHRCIRB/008/01/24

Principal Investigator: Amanda Seyram Adjoa Kudiabor

Upon addressing the comments raised, the IRB has approved your proposal.
The approval requires that you submit a periodic report on the progress of the project during the implementation period and a final full report to the Institutional Review Board (IRB) on completion of the study.
The IRB may observe or cause to be observed procedures and records of the study during and after implementation. Please note that any modification of the project must be submitted to the IRB for review and approval before its implementation.

You are required to report all serious adverse events related to your study to the IRB where applicable within seven days verbally and fourteen days in writing. You are also to inform the IRB and your Institution before any publication of the research findings.
This certificate is valid till 7th February 2025. Please quote the protocol identification number in all future correspondence in relation to this protocol.

……
Mrs. Gifty Ofori Ansah
(DHRCIRB Chairperson)