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

# PREVALENCE AND DETERMINANTS OF PREGNANCY INDUCED HYPERTENSION AMONG WOMEN ATTENDING ANTENATAL CLINIC AT 37 MILITARY HOSPITAL ACCRA

**BY**

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## DECLARATION

I, Christabella Chakie Marbell, hereby declare that this proposal is a result of my independent work. References to other works have been duly acknowledged. I further declare that this proposal has not been submitted for award for any degree in this institution and other universities elsewhere.

…… …….

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**(STUDENT)**

**…….** **…….**

**DR. KWABENA OPOKU-MENSAH** **DATE**

**(ACADEMIC SUPERVISOR)**

## DEDICATION

I lovingly dedicate this dissertation to my parents Mr and Mrs Marbell, my husband Edmund Oduro Agyei and my lovely children Jayden and Janelle Agyei without their love and support this project would not have been a reality.

**ACKNOWLEDGEMENT**

I would like to express my heartfelt gratitude to God Almighty for his faithfulness.

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## ABSTRACT

### Introduction

Pregnancy Induced Hypertension (PIH) is a type of hypertension associated with pregnancy. It accounts as the primary cause of mortality and morbidity among pregnant women. Many women are not informed of the existence of the condition while others have different opinion on the physiological and pathological nature of PIH and others relate the signs to superstitions. The aim of this study was to determine the prevalence of pregnancy induced hypertension among women attending Antenatal clinic at 37 Military Hospital in Accra.

### Methods

This was a facility-based cross-sectional study which was conducted among health workers and pregnant women attending Antenatal Clinic at 37 Military Hospital in Accra. Simple random sampling method by lottery method was used to select 240 pregnant women for interview. Purposive sampling was also used to select 14 health workers on duty at the time of the survey. Data was collected using a pretested questionnaire. These questionnaires retrieved data on background information, risk factors and knowledge of participants on the management of Pregnancy Induced Hypertension. Microsoft Excel 2016 was used for data entry and STATA version IC 15.0 for Windows was used for analysis. Means and standard deviations were determined for continuous variables. Pearson chi-square test was used to determine the association between dependent and independent variables. Multivariate logistic regression was used to determine the strength of association of factors associated with PIH. Reported p-values in this study were two-sided with significance levels of 0.05.

**Results**

Out of 240 women in 20 weeks or more gestation, the prevalence of PIH was 8.8%. Less than half (37.5%) of pregnant women had good knowledge on PIH and its complications. Half of health workers stated proteinuria test was done in addition to blood pressure reading to confirm whether a pregnant woman had Pregnancy Induced Hypertension. Factors associated with developing Pregnancy Induced Hypertension were advanced maternal age (AOR=1.80; 95% CI: 1.16-2.79; p=0.039), presence of Pregnancy Induced Hypertension in previous pregnancy (AOR=0.07; 95% CI: 0.01-0.35; p=0.001) and non-consumption of fatty foods (AOR=0.19; 95% CI: 0.04-0.92; p=0.040).

**Conclusion**

Though the prevalence of Pregnancy Induced Hypertension was low, a bigger proportion of these women did not have good knowledge on the disease and its complications. The study found that women with no history of the condition had a lower risk of developing the disease for their current pregnancy. Older pregnant women were at a heightened risk of having Pregnancy Induced Hypertension while those who do not consume fatty foods were at a lower risk of the disease.

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## ABBREVIATION

ACOG - American College of Obstetricians and Gynaecologists

ANC - Antenatal Clinic

BP - Blood Pressure

CHWs - Community health workers

HELLP - Haemolysis, elevated liver enzymes, and a low platelet count.

HUM - Health Utilisation Model

ISSHP - International Society for the Study of Hypertension in Pregnancy

$MgSO_4$ -Magnesium Sulphate

PIH - Pregnancy Induced Hypertension

SSA - Sub-Saharan Africa

UN - United Nations Organization

WHO - World Health Organization

# CHAPTER ONE

# INTRODUCTION

## 1.1 Background

Pregnancy Induced Hypertension (PIH) is a kind of high blood pressure associated with pregnancy. Pregnancy Induced Hypertension continues to be a primary cause of high mortality and morbidities amongst women who are pregnant worldwide (Ayele, Lemma & Agedew, 2016). Aside elevated blood pressure levels, PIH is also characterized by protein in urine (proteinuria) and abnormal edema (Tesfaye, Tefera. & Sena, 2018). The American College of Obstetricians and Gynaecologists (ACOG) in collaboration with the United Nations (UN) Organization classifies hypertensive disorders in pregnancy as: Chronic Hypertension, Gestational Hypertension, Preeclampsia/Eclampsia (Tebeu, Foumane, Mbu, Fosso, Biyaga & Fomulu, 2011).

Pregnancy Induced Hypertension can be categorized as mild or severe. The former is when there is a new onset of hypertension with the systolic blood pressure being ≥ 140 mmHg and or diastolic blood pressure ≥ 90 mmHg, emerging from 20 weeks' gestation whereas the latter diagnoses is made when blood pressure measures ≥ 160 mmHg systolic and ≥ 110 mmHg diastolic continually (Ribowsky & Henderson 2012). Due to the severity of the condition in some women, high mortalities are associated with PIH and is heavily documented.

Globally, approximately three hundred and fifty thousand women who are pregnant pass away yearly from pregnancy associated causes and over 50% of such mortality taking place in Sub-

Saharan Africa (SSA). It is estimated that 12% of pregnant women's deaths are associated with PIH (Middendrop, Asbroek, Fred, Bio, Edusei, Meijjer,Newton & Agyemang, 2013). Globally, 10 % of pregnant women are affected by hypertension (Muti, Tshimanga, Notion, Bangure & Chonzi, (2015).

A systematic review by WHO concluded that PIH and its related complications is ranking third as the cause of maternal deaths in Africa , whereas in Latin America and the Caribbean , it contributes to 25.7% of mortality (WHO, 2011). In Africa, 9.1 % of mothers who die is because of hypertensive disorders of pregnancy (Arshad, Pasha, Khattak & Kiyani, 2011).

Aside the enormous mortalities, PIH is linked with delivery before term, Intra Uterine Growth Retardation, Abruption Placentae and Intra Uterine Foetal Death (Muti, et al., 2015). In addition, complications arising from PIH has the tendency of affecting both the mother and baby (Jones, Takramah, Axame, Owusu, Parbey, Tarkang, Takase, Adjuik & Kweku, 2017).

A number of risk factors have been documented to predict risk for PIH (Solomon & Seely, 2011). These include; Nulliparity, Multiple Pregnancies, History of Chronic Hypertension, Gestational Diabetes, Foetal Malformation and Obesity are associated with PIH (Khosravi, Dabiran, Lotfi & Asnavandy, 2014).

Maternal age less than 20 or over 40 years, occurrence of PIH in previous pregnancies, pre-existing diseases Like kidney Disease, Diabetes Mellitus (DM), Cardiac disease, undetected chronic hypertension, positive family history of PIH where there is genetic vulnerability, psychological

stress, use of alcohol, rheumatic arthritis, low BMI and being obese, and socioeconomic status being low are equally linked to PIH (Tesfaye, et al., 2018).

Surprisingly, most women are not informed on the existence of PIH whilst others have diverse views on the physiological and pathological cause and others liaise its signs with superstitions (Brown, Best, Pearce, Waugh, Robson & Bell, 2013). In Sub-Saharan Africa, pregnant women were stated taking the least suitable actions to reduce PIH as they mostly hold evil spirits and witchcraft responsible for the condition (Conde & Belizan, 2010). Evidence suggests that alternative complementary medicine was normally practiced by to keep themselves from harm, regulate the disease and to deal with hypertension (Conde & Belizan, 2010).

In a study conducted in the Tamale Metropolis among women with regards to PIH, it was revealed that 60% of the study participants lack knowledge on self-care management of PIH (Muzakiel, 2013). In addition, a similar study conducted by Musah and Iddrisu (2013) in the Tamale Teaching Hospital revealed that about 40% of pregnant women who attended ANC lack knowledge of self-care management of PIH and some of the pregnant women even considered oedema and weight gain as normal conditions of pregnancy. Hence, knowledge about PIH and its management is important as it influences health seeking behaviour among pregnant women in the world (Tuovinen, Raikkonen & Pesonen, 2012).

There is a clear indication from previous studies that most women are challenged in their level of understanding of PIH. This could result to worsening of the condition as well as increase in prevalence of the condition since some may result to their personal ways of handling the condition

which might proof ineffective. Studies have shown that, community health workers are instrumental in the management of PIH since they provide basic maternity services at the primary level. In India for instance community health workers are trained to counsel and prepare expectant mothers for safe delivery as well as educate them on the importance of immunization, breastfeeding and early detection of complications such as PIH (Ramadurg et al., 2016). The World Health Organization (WHO) stressed on the periodic screening for high blood pressure. Unfortunately, some countries particularly those in Low and Middle-income countries act contrary to this recommendation (Sheikh et al., 2016). Similar pattern was observed in some developing countries. Studies have shown that, various cadres of health care providers such as nurses, doctors, midwives as well as community health nurses are less knowledgeable on screening and management of pre-eclampsia (Sheikh et al., 2016). In some countries however, the health system has integrated management of maternal complications such as PIH into already existing health initiatives. Pakistan for instance, has included the current global management principles of pre-eclampsia in skilled birth attendant and periodic trainings for nurses.

Women who were diagnosed with Pregnancy Induced Hypertension were observed to be sensitive to a variety of endogenous substances (prostaglandins, thromboxane) that can cause vasospasm and platelet aggregation (Eze, Ambrose, Adams, Mohammed, Iliya & Sulaiman & Ponsiano, 2018). In view of this, proper management must be rendered by health professionals to such women to reduce the adverse events they mostly faced. In Ghana, there is scarcity of studies that focused on the connection between PIH, self-care, knowledge and hypertension control among pregnant women. Thus, this study was conducted to ascertain the prevalence of PIH in the 37 Military Hospital, determine the risk factors associated with PIH and also assess how women with PIH are managed.

## 1.2 Problem Statement

Pregnancy Induced Hypertension (PIH) and its related complications has persisted as public health threat in both developed and developing countries (Chawla & Anim-Nyame, 2015). The WHO estimated that the incidence of PIH and its related complications are 7 times more in low income countries (2.8% of live births) as compared to high income countries. Specific to PIH, approximately 2 to 10% of women are diagnosed with this condition globally. PIH is a major cause of maternal/neonatal morbidity and mortality (Muti et al., 2015).

In Sub-Saharan Africa, maternal health facilities are not well patronized leading to high prevalence (16.7%) of PIH and also accounts for about 40% to 60% of maternal death. In Ghana, the prevalence of PIH and its related complications account for 9% of maternal mortality (East, Conway, Pollock, Frawley & Brennecke, 2011). Even as PIH leads to high mortalities, it is a dangerous condition such that once blood pressure begins and continue to rise, destruction of maternal organs especially the kidneys begin. Similarly, PIH and its complications is associated with high levels of stillbirths among affected women (Duckitt & Harrington, 2014). Maternal and neonatal mortality is of great priority hence, Sustainable Development Goals 3 and 5 place emphasis on maternal health (WHO, 2011). Nevertheless, pregnancy related complications are never ceasing with PIH being one of such complications which is gradually increasing.

In the 37 Military Hospital where the study is was conducted, PIH and its complications is one of the highest recorded cases in the Maternity unit with an average of 3 admissions recorded on each day. One-third of all referred cases at the 37 Military Hospital are PIH related. Data collected in 2017 from the months of April to June showed that out of 261 emergency caesarean sections, 32

were as a result of PIH, 15 was due to preeclampsia and 10 on account of Eclampsia. The 37 Military Hospital is a Tertiary institution that attends to many clients and referred cases, however no identified study has been done on the prevalence of PIH and its related complications among pregnant women assessing health care at the facility.

### 1.3 Research questions

Following the problem statement, the following research questions were posed;

1. What is the prevalence of PIH and its complications among women attending ANC at 37 Military Hospital?

2. What knowledge does the pregnant woman have on PIH and its related complications?

3. How do health workers (Doctors, Midwives/Nurse-Midwives) manage PIH and its related complications?

4. What are the factors that influence the prevalence of PIH among women attending ANC at 37 Military Hospital?

### 1.4 Objectives

The following are the research objectives;

#### 1.4.1 General objective

The general objective was to determine the prevalence of PIH among women attending ANC at 37 Military Hospital Accra.

### 1.4.2 Specific objectives

Objectives specific to this study were;

1. To determine the prevalence of PIH and its complications among women attending ANC at 37 Military Hospital.

2. To assess the knowledge of pregnant women on PIH and its related complications.

3. To assess the management of PIH and its related complications by health workers (Doctors, Midwives/Nurse-Midwives).

4. To determine the factors influencing the prevalence of PIH and its complication among women attending ANC at 37 Military Hospital.

## 1.5 Justification

Pregnancy Induced Hypertension (PIH) complicates 6 to 10% of pregnancies around the world (WHO, 2011). A number of factors including hypertension are typical problems of pregnancy. Pregnancy Induced Hypertension has remained one of such pregnancy related complications. Not only does PIH affect the mother but has substantial risk to the foetus as well (Eze et al., 2017). Current evidence suggests gradual increase in incidence of PIH particularly in resource limited countries with Ghana inclusively. PIH is a primary cause of maternal, foetal and new-born morbidity and mortality. Placental abruption, cerebrovascular events, organ failure and disseminated intravascular coagulation were the risk women diagnosed with PIH face (Kintiraki et al., 2015). According to Eze et al. (2018). The 3$^{rd}$ leading cause of maternal mortality worldwide was PIH and its other associated complications such as Preeclampsia.

In light of the fact that pregnant women are in danger of PIH and its associated complications, it is prudent that better understanding of the knowledge of pregnant women on PIH and how it is managed by health professionals be investigated. This may enhance early recognition of pregnancy complications and booking for ANC on time which will subsequently lead to a reduction in the occurrence of PIH and its associated complications among pregnant women. It is in contrast to this background that this study was proposed.

### 1.6 Conceptual framework

This study will adopt tenets from the Healthcare utilization model (HUM) ) by Andersen and Newman (2005) and the Model of Care (NSW Agency for Clinical Innovation, 2013) for the development of the conceptual framework (Figure 1). The two models were adapted because, they are relevant to the study and address the objectives of the study in terms of prevalence of Pregnancy Induced Hypertension, knowledge of pregnant women on PIH and its related complications, management of PIH and its related complications by health workers (Doctors, Midwives, Nurse-Midwives) and factors influencing the PIH and its complication among pregnant women.

The HUM recognises the role of HIV patient's knowledge on a condition as well as the three classification on factors influencing health condition/health system. These classes are: socio-demographic factors such as (age, educational level, marital status; health related (enabling) factors and sociologic (reinforcing) factors. In relation to this study, the tenets will be applied to assess the knowledge of pregnant women on PIH and its related complications. Also, the factors associated with PIH will be focused on the socio-demographic factors such as (age, educational level, marital status; health related (enabling) factors and sociologic (reinforcing) factors which are tenets from the HUM (Andersen & Newman, 2005).

The model of care broadly defines the way health services are delivered. It outlines best practice care and services for a person, population group or patient cohort as they progress through the stages of a condition, injury or event. The tenet adopted from the Model of Care pertaining to this study was the solution design. The solution design includes reviewing the issues identified, consulting key partners, prioritising issues, problem solving and selection and priorities solutions. The management of PIH and its complications by health workers focused on the Solution Design derived from the Model of Care. The integration of both models was appropriate to help address the objectives of this study following the conceptual framework (Figure 1) below.

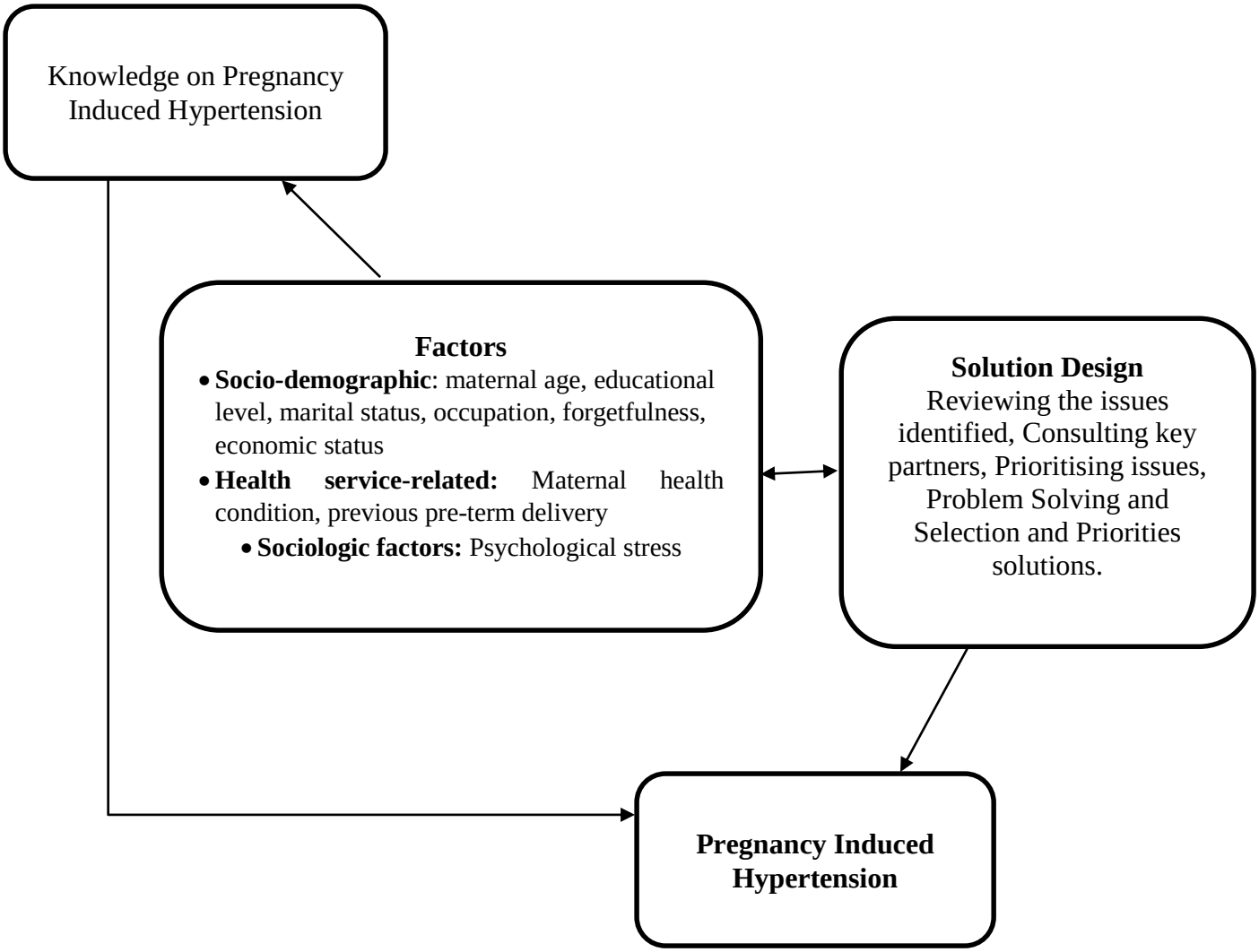



**Figure 1: Conceptual framework**

**Source:** Adapted from Andersen and Newman (2005) and NSW Agency for Clinical Innovation (2013)

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Introduction

Hypertension in pregnancy (also known as pregnancy induced hypertension (PIH) is defined as a systolic blood pressure ≥ 140 or diastolic blood pressure ≥ 90 mm Hg or both. Both systolic and diastolic blood pressure elevations are important in the identification of Hypertension Disorder of Pregnancy (HDP) (Kacica, Dennison, & Aubrey, 2013). PIH is a global problem and the most common medical problem requiring special attention in the intrapartum period (Shaman, 2010). This chapter seeks to discuss findings obtained from relevant studies conducted on prevalence of pregnancy induced hypertension, knowledge of pregnant women on PIH and its related complications, management of PIH and its related complications by health workers (Doctors, Midwives/Nurse-Midwives) and factors influencing the PIH and its complication among pregnant women. This study adopted the Healthcare Utilization Model and Model of Care as the conceptual framework. Tenets from these two models was used to develop the conceptual framework and to explain the theoretical prevalence based on the objectives of the study.

## Prevalence of Pregnancy induced hypertension

Pregnancy Induced Hypertension (PIH), one of the hypertensive disorders of pregnancy, affects about 5-8 % of all pregnant women worldwide. It is estimated that 9.1 % of maternal deaths in Africa are due to hypertensive disorders of pregnancy of which PIH is inclusive (Arshad, Pasha, Khattak, & Kiyani, 2011). Worldwide, 10 % of all pregnancies are complicated by hypertension,

with pre-eclampsia and eclampsia being the major causes of maternal and prenatal morbidity and mortality (Muti, Tshimanga, Notion, Bangura, & Chonzi, 2015).

A prospective, descriptive and comparative study during 12 months period showed that the prevalence of PIH among pregnant women in Lome was 33% (Baragou, Goeh-Akue, Pio, Afassinou, & Atta, 2014). A study carried out using systematic review and meta-analysis on hypertension in pregnancies in Africa revealed that, the prevalence of PIH was 44% (Nyaga e al., 2018). The Zimbabwe Maternal and Perinatal mortality study of 2007 found PIH to be among the top five causes of maternal mortality and the third highest reason for referral in labour (MoH, 2007).

A study carried out in Ethiopia among pregnant women using systematic review and meta-analysis showed that the prevalence of PIH was 6.29% (Berhe, Kassa, Fekadu, & Muche, 2018). A facility-based study carried out in Rwanda to assess the prevalence of PIH, postpartum haemorrhage and caesarean section (CS) revealed that, 1% of the of the pregnant women experienced PIH (Semasaka-Sengoma, Krantz, Nzayirambaho, Munyanshongore, Edvardsson, & Mogren, 2017).

A cross sectional study carried out to determine the prevalence and relative contribution of the various categories of hypertension disorders in pregnancy at Korle Bu Teaching Hospital (KBTH), Accra showed that, the prevalence of PIH was 50% (Adu-Bonsaffoh, Ntumy, Obed, & Seffah, 2017). A retrospective descriptive cohort study was carried out at Mpilo Central Hospital, Zimbabwe to determine the incidence of PIH among pregnant women and its related complications. The findings of the study showed that, the incidence of PIH was 1.3% and the most common major complication was HELLP syndrome (9.1%) (Ngwenya, 2017). Severe preeclampsia and eclampsia

are the deadliest forms. Moreover, severe preeclampsia is an important cause of adverse maternal outcomes such as stroke, lung damage, and liver rupture, and severe perinatal morbidity including prematurity, intrauterine growth restriction, and foetal death (Fokom- Domgue, & Noubiap, 2014).

A retrospective study conducted on the cases of Hypertensive Disorders in Pregnancy in a gynaecology ward of Bahawal Victoria Hospital (BVH) in Bahawalpur, Southern Punjab of Pakistan to determine the prevalence and factors associated with PIH among pregnant women. The results of the study demonstrate the prevalence of PIH to be 44.4%. The findings of that study again revealed the complications to be HELLP and still birth. (Ahmad, Masood, Minhas, & Haq, 2016). The findings on the HELLP is similar to the results obtained in the study carried out by Ngwenya (2017). A facility-based study carried out in Ethiopia revealed that the prevalence of PIH was 7.9% (Gudeta, Lema & Kitila, 2018).

The findings from the literature reviewed on the prevalence's obtained from different studies are different. These differences could be due to variation in geographical locations as well as study design used.

**2.2 Knowledge of pregnant women of Pregnancy Induced Hypertension and its related complications**

Knowledge on pregnancy induced hypertension most especially on danger signs and symptoms are very important to the pregnant mother. A cross sectional study conducted in Nigeria to assess pregnant women is knowledge of Pregnancy Induced Hypertension reported that most women (82.0%) had some knowledge, 65.5% knew about PIH through hospital education and the majority

(58.0%) believed that anybody can have Pregnancy Induced Hypertension and whereas 75.5%associated it to too much salt intake, stress (57.5%) and overweight (49.5%). Most of the participants chose to visit hospitals/clinics whenever they experience symptoms such as headache (63.5%), abdominal pain (72.5%), swollen face and leg (65.5%), not perceiving the baby's movement (77.5%), high blood pressure (65.0%), nausea and vomiting (60.0%) and blurred vision (62.5%) (Fadare, Akpor, & Oziegbe, 2016). A descriptive cross-sectional study carried out in Kirkuk City revealed that, pregnant women with Pregnancy Induced Hypertension had moderate knowledge on self-management care practices (Hussian, & AL- Saffar, 2016).

On the other hand, findings from a qualitative study in women in Vhemba District, Limpopo Province showed that, pregnant women with Pregnancy Induced Hypertension had deficit knowledge on Pregnancy Induced Hypertension symptoms, its management, and the prevention of complications and about the impact of Pregnancy Induced Hypertension on the unborn baby (Maputle, Khoza, & Lebese, 2015). Another qualitative research which was done among pregnant Moroccan women residing in Morocco and the Netherlands to explore their knowledge on PIH, revealed that more than 50% of the women had no knowledge at all even though they attest to the fact that PIH and its complications were dangerous (Ouasmani, Enggeltjes, Haddou Rahou, Belayachi, & Verhoeven, 2018).

Pregnant women's knowledge on Pregnancy Induced Hypertension and its complication is however necessary for maternal child health. A cross sectional study carried out in Kelantan to assess the pregnant mother's knowledge on pre-eclampsia demonstrated that substantial number of mothers exhibited lack of adequate knowledge regarding pre-eclampsia. Also, majority of them failed to

relate the preeclampsia to its associated warning signs and symptoms including swelling in face and hands, vision change with weights increased 5 pounds (3.2kg) within a week. Slightly more than one quarter (30.3%) of the mothers have ever heard of preeclampsia and health workers were the major source of information on preeclampsia (Zuo, Teng, Keng, & Jummaat, 2016). A cross sectional study carried out in Utah to assess pregnant mother's knowledge on preeclampsia. The results of the study showed that, 56.7% heard of the signs and symptoms preeclampsia from their health care providers (Wilkison, 2017). The findings obtained on the source of information on preeclampsia was found to be higher in the study carried out by Wilkison (2017) as compared to the results obtained in that study carried out by Zuo and colleagues.

**2.3 Management of Pregnancy Induced Hypertension by health workers**

Preeclampsia is a complex disease therefore needs the continuous cooperation of several providers and in a coordinated manner to provide optimum health care to pregnant women. However, standardizing criteria to treat patients with preeclampsia is problematical and severe flaws have been observed in the management of the disease (Perez-Cuevas, Fraser, Reyes, Reinharz, Daftari, Heinz & Robert, 2003). Again, preeclampsia still remains an enigma, and the present management focuses on monitoring and treatment of its manifestations (Mustafa, Ahmed, Gupta, Venuto, 2012).

A study carried out in India to assess the knowledge and management of PIH. The results showed that the auxiliary nurse midwives and staff nurses recommended and encouraged rest if they detected hypertension. They also encouraged decreased salt intake, iron supplementation and tetanus vaccination. In addition, some staff nurses administered antihypertensive, $MgSO_4$, or other

anticonvulsants. All auxiliary nurse midwives had some awareness of $MgSO_4$, but none had administered it themselves (Ramadurg, Vilder, Charanthimath,Katageri, Bellad & Mallapur, 2016).

A mixed method study carried out in Mozambique to assess pregnant mother's knowledge and management of preeclampsia revealed that, community health workers immediately refer the women who report to them with preeclampsia. The vast majority of the CHWs surveyed reported that they could neither measure blood pressure nor proteinuria (90 %). Fewer reported confidence in providing oral antihypertensives (14 %) or injections in pregnancy (5 %) (Boene et al., 2016).

The study conducted by Muti and colleagues showed that, the health workers had knowledge on the management of PIH and methyldopa was the drug of choice for management of PIH. Also, less than half of the health workers had sufficient knowledge on definition or management of PIH. In addition, delay in seeking care and shortage of resources were the major reported challenges in the proper management of PIH (Muti et al., 2015).

With regards to management of PIH among pregnant women in a study conducted by Sajith and colleagues in Pune, it was found that a majority of patients (67.3 %) were on combination therapy whereas 32.7% were on Monotherapy. Methyldopa was the commonest prescribed antihypertensive as monotherapy (17.3 %) as well as in combination therapy (i.e. 28.8 % with Methyldopa and Nifedipine) (Sajith et al., 2014).

### 2.4 Factors influencing Pregnancy Induced Hypertension

The factors influencing PIH are focus on factors derived from the HUM model. The factors influencing PIH varies across different locations. The results of a study conducted by Multi and colleagues to determine factors influencing Pregnancy Induced Hypertension among pregnant women in Zimbabwe revealed that, women with PIH were three times more likely to deliver a low birth weight baby, four times more likely to have still birth and four times more likely to have a baby with low Apgar score at 5 minutes compared to women without PIH (Muti et al., 2015).

The age of the pregnant women was found to be a significant risk factor associated with PIH. The results of a systematic review on pregnancy induced hypertension among pregnant women in Ethiopia showed that, pregnant women ≥35 years were more likely to develop pregnancy induced hypertension (Berhe, Kassa, Fekadu, & Muche, 2018). Similar to these findings Adu-Bonsaffoh and colleagues in Ghana reported that, age was a risk factor of pregnancy induced hypertension. They also found in their study that, women ≥35 years were more likely to develop PIH (Adu-Bonsaffoh et al., 2017).

Family history of chronic hypertension, family history of pregnancy induced hypertension, kidney diseases, psychological stress during pregnancy were found to be some factors contributing to Pregnancy Induced Hypertension among pregnant women in Southwest Ethiopia (Gudeta et al., 2018). A prospective study conducted among pregnant women in Pune indicated that, age group of 18-22 years and primigravidae patients were factors associated with Pregnancy Induced Hypertension (Sajith et al., 2014).

An unmatched case control study conducted in Hohoe Municipality of Ghana revealed that, Maternal age, high consumption of trans fatty food, a family history of hypertension and history of previous pre-term delivery were factors found to be associated with of Pregnancy Induced Hypertension (Jones et al., 2017).

Literatures reviewed on various studies have showed results on Pregnancy Induced Hypertension among pregnant women. This study however sought to determine prevalence of Pregnancy Induced Hypertension, knowledge of pregnant women of Pregnancy Induced Hypertension and its related complications, management of Pregnancy Induced Hypertension and factors influencing Pregnancy Induced Hypertension among pregnant women attending the 37 Military Hospital, Accra.

# CHAPTER THREE

# METHODOLOGY

## 3.0 Introduction

This chapter looks at the procedures and methods that were employed to conduct this study. The chapter focusses on issues such as the type of study design that was employed, study site description, study population as well as the required sample size for this study and sampling techniques. Again, tools for data collection, ethical considerations and data management and analysis are also included in this chapter.

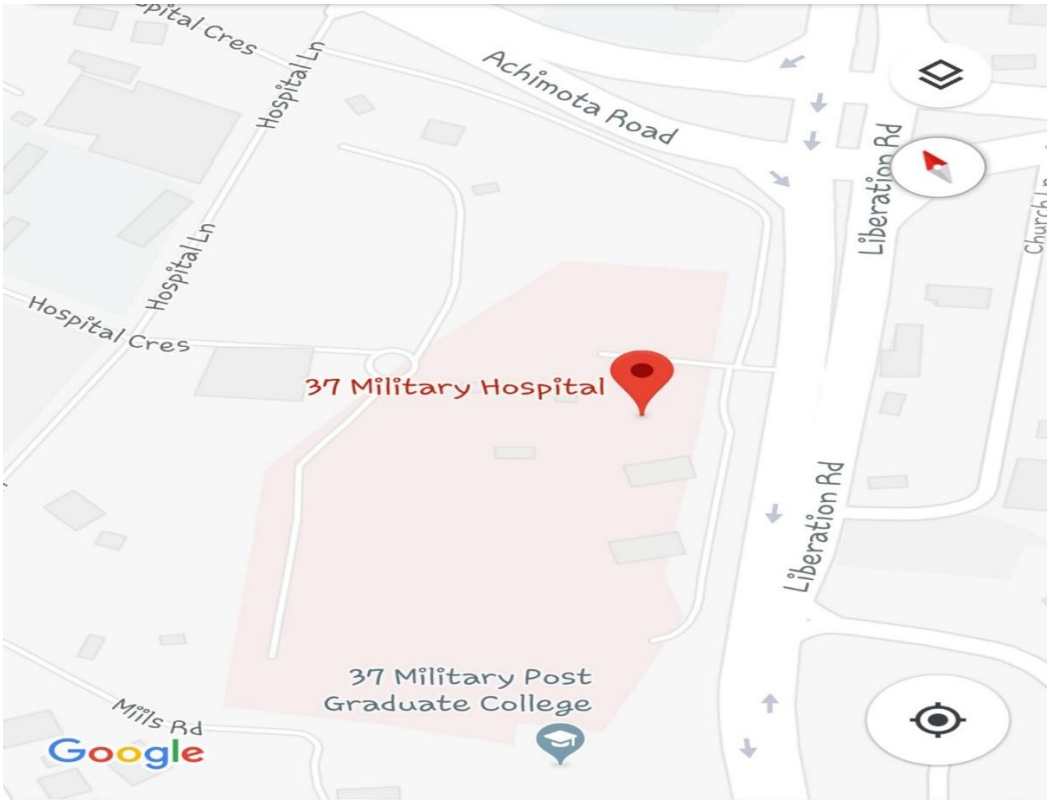
## 3.1 Study location

This study was conducted at the Antenatal Clinic (ANC) of the 37 Military Hospital in Accra. The 37 Military Hospital is hospital located in the South-Eastern part of Accra. The hospital is located close to the Jubilee House, the seat of government at the intersection of the Liberation road and Giffard Road. It is the largest military hospital in the country. The hospital was established by General George Giffard, a British Military Officer. It was established to provide treatment for troops who were injured in the Second World War. At the time of establishment, the hospital was called 37 General Hospital. However, the name of the hospital was changed to 37 Military Hospital of the Gold Coast in 1956. The hospital facilities were later expanded and opened to the public even though the hospital continues to be staffed mainly by military personnel.

This hospital serves as one of the referral hospitals in the country; it also serves as the National Disaster and Emergency Hospital. Furthermore, it serves as the United Nations Level IV hospital

for the West Africa sub-region. Thus, it provides medical care to the United Nations and other international staff within the sub-region. The hospital has a bed capacity of about 500 beds and comprises about 3,500 military and civilian employees. It is estimated to record an annual Outpatient attendance of about 26,486 visits and an annual inpatient attendance of about 13,208. Out of these attendances, about 85% is from the public. The hospital has a well-established Obstetrics and Gynaecology Department which offers quality services to women in their reproductive ages. Thus, the study will be conducted at the ANC located in the hospital where pregnant women report to be checked for issues pertaining to pregnancy as well as maternal and child health.

The ANC at 37 Military Hospital is commonly called Female Out Patient Department (FOPD). ANC is run every Monday to Friday. Clients are allocated to a team of Doctors ranging from A-D, each team has a day of the week for consultation. On an average a team attends to a number of 80 to 120 clients a day.




Source: Google Maps: https://www.google.com/maps/place/37+Military+Hospital/

**Figure 1 Location of 37 Military Hospital in Accra**

### 3.2 Study design

A facility-based cross-sectional study was used to determine the prevalence and determinants of pregnancy induced hypertension attending the 37 Military Hospital in Accra. A cross-sectional study was appropriate because it measures both outcome and exposure variables at the same time. This type of study also gives a snapshot of the outcome, which is the prevalence of Pregnancy Induced Hypertension.

### 3.3 Study population

The population of interest was all pregnant women attending the ANC of the hospital as well as health workers (Doctors, Midwives and Nurses-Midwives) on duty at the time of the study.

### 3.4 Inclusion criteria

- Pregnant women aged between 17 and 45 years were eligible for inclusion into this study.
- All pregnant women attending ANC at the 37 Military Hospital with gestational age greater than 20 weeks were included in the study.
- A health worker at the ANC of the 37 Military Hospital with six months or more work experience was eligible for inclusion into this study

### 3.5 Exclusion criteria

- All referrals at the time of data collection and pregnant women who were unable to communicate and or were critically ill were excluded.
- A health worker at the ANC of the 37 Military Hospital with less than six months work experience was not eligible for inclusion into this study

### 3.6 Sample size calculation

Prevalence of pregnancy induced hypertension of a reported study by Muti et al., (2015) in Zimbabwe was used in calculating the required sample size for this study. The study reported the prevalence of the disease to be 19.4% (Muti, Tshimanga, Notion, Bangure, & Chonzi, 2015). Thus,

the sample size of this study was calculated at 95% confidence interval using Cochran's formula of sample size calculation. The formula is given by:

n= $\frac{Z^2pq}{e^2}$ (Cochran, 1977)

Where:

- n= required sample size
- $Z^2$ = standard normal deviate for two tailed test based on 95% confidence level = 1.96
- p= proportion of pregnant women with pregnancy inducted hypertension = 19.4% = 0.194 (Muti et al., 2015b)
- q=1-p= proportion of pregnant women without pregnancy induced hypertension= 1-0.194= 0.806
- e= margin of error = 5% = 0.05
- Therefore, the sample size will be calculated as follows
- n = $\frac{1.96^2 \times 0.194\ (1-0.194)}{0.05^2}$
- n= $\frac{3.8416\ \times 0.194\ \times 0.806}{0.0025}$
- n= $\frac{0.60069}{0.0025}$
- n= 240.27= 240 participants
- However, to cater for non-response rate and uncompleted questionnaires, an attrition rate of 15% was used to upwardly adjust the sample size. Thus, 1.15 × 240 = 276. Therefore, 276 pregnant women were recruited in this study.

### 3.7 Sampling method

Simple random sampling method by lottery method was used to select participants for interview. To do this, a sampling frame from all pregnant women 20 weeks was developed from daily ANC attendance. From the developed sampling frame, pregnant women were then selected randomly for interview.

Purposive sampling was used to select health workers based on their eligibility into the study. Thus, health workers who were eligible for inclusion into this study and on duty during data collection were purposively selected to participate in this study.

### 3.8 Data collection techniques and tool

A structured questionnaire with open and close ended questions was used to elicit information from study participants and ANC stuff respectively. Participants for inclusion in this study were recruited at the ANC of the 37 Military Hospital.

On enrolment, the structured questionnaire which was used to ask for demographic information was abstracted from participant folders, risk factors, knowledge of participants and management of pregnancy induced hypertension was administered after a written informed consent was sought.

Blood pressure readings of eligible participants were read using the Omron M2 Basic digital blood pressure monitor. Participants were allowed a 10-minute period of rest before their blood pressure is measured. After this, blood pressure was measured twice at least 30 minutes apart.

Furthermore, structured questionnaires were administered to either Doctors, Midwives or Nurse-Midwives on duty. This structured questionnaire was used to collect data on how PIH is diagnosed as well as the management of pregnancy induced hypertension and its associated complications by health workers.

### 3.9 Data quality control

To guarantee data was of good quality, the data collection tool used in this study was validated via pre-testing. This pre-testing was done at the ANC of University of Ghana hospital. This was done to avoid misinterpretation and allow for modification of ambiguous questions.

Furthermore, all information gathered by study participants during and after the period of data collection was kept private. In addition, to ensure data quality, research assistants used in this study were trained a week prior to the data collection to ensure they are conversant with the data collection tool. During the data collection sessions, field supervisors regularly monitored research assistants to ensure they adhered to guidelines.

Also, at the end of each data collection session, the questionnaires were validated, and all errors were corrected. After data collection, there was double entry of data by two different data entry clerks to ensure validity. The template for data entry was coded to prevent any typographical errors associated with data entry.

### 3.10 Dependent and independent variable

#### 3.10.1 Dependent variable

The dependent variable in this study was Pregnancy Induced Hypertension. This was because Pregnancy Induced Hypertension is the outcome of this study.

#### 3.10.2 Independent variables

For this study, the independent variables included demographic characteristics of pregnant women, knowledge on Pregnancy Induced Hypertension as well as management of Pregnancy Induced Hypertension.

### 3.11 Operational definition

For this study, Pregnancy Induced Hypertension was operationalized as the development of resting systolic blood pressure ≥140 mm Hg and/or diastolic blood pressure ≥90 mm Hg, measured on two occasions at least 30 minutes apart, after 20 weeks of gestation in a previously normotensive woman. These criteria in addition to the presence of proteinuria (defined as two or more dipstick readings of ≥2, one catheter sample reading of ≥1+, or a 24-hour urine collection containing at least 300 mg of protein) was used to identify woman with preeclampsia in accordance with the criteria of the International Society for the Study of Hypertension in Pregnancy (ISSHP) and the American College of Obstetricians and Gynaecologists (ACOG, 2002).

Knowledge in this study was measured using 12 variables. Thus, a composite variable called "Knowledge on PIH and its complications" was created from these 12 variables. These variables were then scored. A wrong answer to each of the 12 variables was scored as "0" while "1" was assigned to a correct answer. With that, a scale of 0 to 12 was created. The lowest score was 0 and the highest score was 12. The scores were further categorized into two, poor knowledge on PIH and its complications (0-5) and good knowledge on PIH and its complications scored (6-12).

### 3.12 Data processing and analysis

#### 3.12.1 Data entry

After data collection, the data was sort, coded and entered using Epi Info Version 7.2.2. Accuracy of the entered data was checked, and the clean database was then converted into Stata version 15.0 file (Stata Corporation, Texas, USA) before analysis.

#### 3.12.2 Data analysis

Descriptive statistics was used for frequencies. Percentages were reported for categorical variables. Means and standard deviations were determined for continuous variables. Graphs and percentages were used to report on the prevalence of pregnancy induced hypertension and knowledge on the disease. In addition, Pearson Chi-square or Fisher's exact test (when required) was used to determine the association between the dependent variable (Pregnancy induced hypertension) and independent variables (socio-demographic characteristics, knowledge and management of the disease). To add to this, univariate analysis using unadjusted logistic regression was used to look for association between variables. Risk factors identified after the univariate

analysis were then be fitted into binary or multinomial logistic regression models. Reported p-values in this study were two-sided with significance levels of less than 0.05.

### 3.13 Ethical consideration

Ethical clearance was sought from the Institutional Review Board of the 37 Military Hospital. Approval was also sought from the Commander of the 37 Military Hospital and Head of the Antenatal Care Clinic of the hospital. Also, written consent was sought from eligible participants after explaining the benefits and risks involved in participation. Also, participants were made to understand that, participation is purely voluntary and can opt out at any time and this would not affect service delivery at the facility. They were also made to understand that, there was no compensation involved in participating in the study. Data collected was kept under lock and key, with only the principal investigator having access. In ensuring anonymity, participants were only identified with codes and numbers instead of their actual names during and after data collection.

### 3.14 Limitations of the study

There was some recall bias with some participants especially when they were questioned on lifestyle practices.

# CHAPTER FOUR

# RESULTS

## 4.0 Introduction

This chapter presents the analysis of data collected. The aim of this study was to determine the prevalence of Pregnancy Induced Hypertension among women attending ANC at 37 Military Hospital.

## 4.1 Demographic characteristics of pregnant women

Two hundred and forty pregnant women were involved in this study. The mean age of all participants was 29.5±5.11. More women were aged 25-29 years (37.1%) and 30-34 years (32.9%). The least (4.2%) age group were mothers aged 40-45 years. A small proportion (2.1%) of pregnant women had no education.

The rest had varying forms of education. More than half (52.9%) of respondents had tertiary education followed by those with senior high school education (27.9%) with less than a third (12.5%) having junior high school education. At the time of the study, majority (74.2%) of the respondents were married and 8.7% were single. A greater proportion (77.1%) of the pregnant women were Christians, 21.3% were Muslims and 1.7% indicated they professed African Traditional Religion. With regard to employment status, more women worked in the informal/private sector (42.9%) and the formal/public sector (32.1%).

Multiparous pregnant women constituted more than half (71.7%) of the 240 respondents involved in this study. A greater proportion (80.0%) of the respondents alluded that decision making at home was the responsibility of both husband and wife. Additionally, almost all (96.7%) of the pregnant women resided in urban areas compared to 3.3% who indicated they stayed in rural areas. Furthermore, most (82.1%) respondents were multigravida with a little more than half (51.7%) of respondents had pregnancies ranging between 20- 28 weeks of gestation. Most (68.7%) of the respondents stated their current pregnancy was planned compared to 31.3% that stated otherwise (Table 1).

**Table 1: Background characteristics of pregnant women**

| Variable | Frequency | Percentage (%) |
|---|---|---|
| **Age (in years)** | | |
| < 25 | 37 | 15.4 |
| 25-29 | 89 | 37.1 |
| 30-34 | 79 | 32.9 |
| 35-39 | 25 | 10.4 |
| 40-45 | 10 | 4.2 |
| **Mean (SD)** | 29.5 (5.11) | |
| **Level of education** | | |
| No education | 5 | 2.1 |
| Primary | 11 | 4.6 |
| Junior High | 30 | 12.5 |
| Senior High | 67 | 27.9 |
| Tertiary | 127 | 52.9 |
| **Marital status** | | |
| Single | 21 | 8.7 |
| Currently married | 178 | 74.2 |
| Currently not married | 41 | 17.1 |
| Widowed | | |
| **Religion** | | |
| Christian | 185 | 77.1 |
| Muslim | 51 | 21.3 |
| Traditionalist | 4 | 1.7 |
| **Tribe** | | |
| Ewe | 42 | 17.5 |
| Akan | 83 | 34.6 |
| Ga | 59 | 24.6 |

| | | |
|---|---|---|
| Other tribes | 56 | 23.3 |
| **Occupation** | | |
| Unemployed | 60 | 25.0 |
| Informa/Private sector worker | 103 | 42.9 |
| Formal/Public sector worker | 77 | 32.1 |
| **Parity** | | |
| Primiparous | 68 | 28.3 |
| Multiparous | 172 | 71.7 |
| **Decision making at home** | | |
| Husband only | 28 | 11.7 |
| Wife only | 17 | 7.1 |
| Husband and wife | 192 | 80.0 |
| Others | 3 | 1.2 |
| **Monthly income (GHC)** | | |
| <500 | 95 | 39.6 |
| ≥500 | 145 | 60.4 |
| **Place of residence** | | |
| Urban | 232 | 96.7 |
| Rural | 8 | 3.3 |
| **Gravidity** | | |
| Primigravida | 43 | 17.9 |
| Multigravida | 197 | 82.1 |
| **Gestation** | | |
| 20- 28 weeks | 124 | 51.7 |
| 29 – 32 weeks | 44 | 18.3 |
| 33- 40 weeks | 72 | 30.0 |
| **Current pregnancy planned** | | |
| Yes | 165 | 68.7 |
| No | 75 | 31.3 |

### 4.2 Background characteristics of Health workers

Almost half of the health workers (42.8%) were aged 20-24 years with majority being females (71.4%). Based on designation, 42.8% were Nurse-Midwives while 28.6% were both Doctors and Midwives. With regards to work experience, most (64.3%) have been working for 1 to 5 years (Table 2).

**Table 2: Background characteristics of Health workers**

| Variable | Frequency | Percentage (%) |
|---|---|---|
| **Age (years)** | | |
| 20-24 | 6 | 42.8 |
| 25-30 | 4 | 28.6 |
| 30+ | 4 | 28.6 |
| **Sex** | | |
| Male | 4 | 28.6 |
| Female | 10 | 71.4 |
| **Designation** | | |
| Doctor | 4 | 28.6 |
| Nurse-Midwife | 6 | 42.8 |
| Midwife | 4 | 28.6 |
| **Marital status** | | |
| Single | 6 | 42.9 |
| Married | 5 | 35.7 |
| Divorced/Separated | 3 | 21.4 |
| **Work experience (years)** | | |
| 1-5 | 9 | 64.3 |
| > 5 | 5 | 35.7 |

The prevalence of Pregnancy Induced Hypertension is summarized in figure 2 below. The prevalence of Pregnancy Induced Hypertension was 8.8%. Out of the 240 women sampled, more than half (57.9%) of the respondents were normal and 33.3% were pre-hypertensive hypertensive.

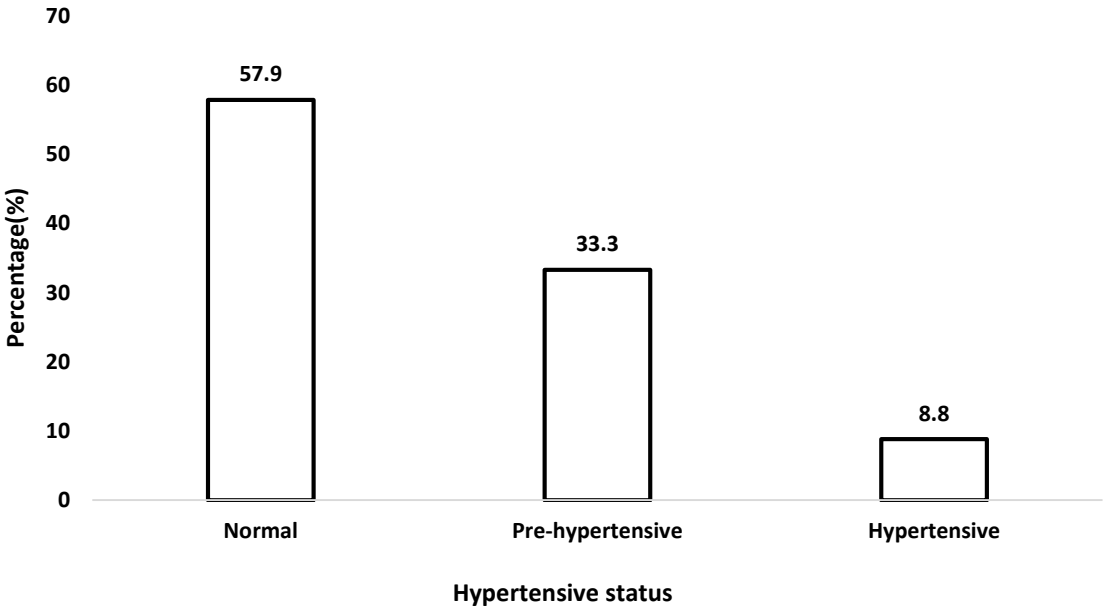



**Figure 2 : Prevalence of Pregnancy Induced Hypertension**

### 4.3 Knowledge on Pregnancy Induced Hypertension and its related complications

Knowledge on Pregnancy Induced Hypertension and its related complications was also determined in this study. As shown in Table 3 below, almost one third (32.9%) of the pregnant women stated they didn't know what Pregnancy Induced Hypertension was. However, 29.2% stated it was "high blood pressure that occurs in pregnancy after 20 weeks gestation to 42 days post-delivery", 19.6% stated it was "blood pressure which starts when one is not pregnant" while 18.3% indicated the condition was a result of both "high blood pressure that occurs in pregnancy after 20 weeks gestation to 42 days post-delivery" and "blood pressure which starts when one is not pregnant"

More than half of respondents (72.0%) who stated they knew what Pregnancy Induced Hypertension was indicated they received information on the disease from the health centre. With respect to the cause of PIH, almost half (46.6%) said there was no real cause of the disease and 11.2% attributed the disease to witchcraft/spiritual causes. A large proportion (81.4%) of pregnant women alluded they knew the signs and symptoms of pregnancy induced hypertension. The most common identified signs and symptoms of the disease condition were high blood pressure (95.4%), dizziness (78.6%), frontal headache (67.9%) and generalized body weakness (64.9%). Furthermore, a little more than half (51.3%) of the respondents knew controlling blood pressure helps to manage the disease. Majority (71.7%) of study respondents stated they knew the complications of pregnancy induced hypertension. The complications of pregnancy induced hypertension stated by respondents included foetal and maternal death (58.8%), dizziness, headache, bleeding and placenta disruption (22.1%), pre-eclampsia/eclampsia (10.3%) and preterm delivery (8.8%).

**Table 3: Knowledge on Pregnancy Induced Hypertension and its related complications**

| Variable | Frequency | Percentage |
|---|---|---|
| **Definition of PIH** | | |
| High blood pressure that occurs in pregnancy after 20 weeks gestation to 42 days post delivery | 70 | 29.2 |
| Blood pressure which starts when one is not pregnant | 47 | 19.6 |
| Both | 44 | 18.3 |
| I do not know | 79 | 32.9 |
| **Information source on PIH** | | |
| Health centre | 116 | 72.0 |
| School | 6 | 3.7 |
| Media | 27 | 16.8 |
| Relatives | 9 | 5.6 |
| Friends | 3 | 1.9 |
| **Causes of PIH** | | |
| Real cause not known | 75 | 46.6 |
| Stress | 64 | 39.7 |
| Witchcraft/Spiritual cause | 18 | 11.2 |
| Other causes | 4 | 2.5 |

| | | |
|---|---|---|
| **Know signs and symptoms of PIH** | | |
| Yes | 131 | 81.4 |
| No | 30 | 18.6 |
| **Signs and Symptoms of PIH** | | |
| Rapid weight gain | 52 | 39.7 |
| Swelling of face, fingers and feet | 77 | 58.8 |
| Dizziness | 103 | 78.6 |
| Blurred vision | 71 | 54.2 |
| Nausea and vomiting | 61 | 46.6 |
| Frontal headache | 89 | 67.9 |
| Confusion | 61 | 46.6 |
| Upper abdominal/epigastric pain | 35 | 26.7 |
| High blood pressure | 125 | 95.4 |
| Generalised body weakness | 85 | 64.9 |
| Reduced urine output | 35 | 26.7 |
| Reduced foetal movement | 41 | 31.3 |
| **Blood pressure controls helps manage PIH** | | |
| Yes | 123 | 51.3 |
| No | 14 | 5.8 |
| I do not know | 103 | 42.9 |
| **Know Complications of PIH** | | |
| Yes | 68 | 28.3 |
| No | 172 | 71.7 |
| **Complications of PIH** | | |
| Foetal and maternal death | 40 | 58.8 |
| Pre-eclampsia/Eclampsia | 7 | 10.3 |
| Preterm delivery | 6 | 8.8 |
| Others (Bleeding/Dizziness/Headache/Placenta disruption) | 15 | 22.1 |

Overall, majority of respondents (62.5%) had poor knowledge whilst 37.5% had good knowledge on the disease (Figure 4).

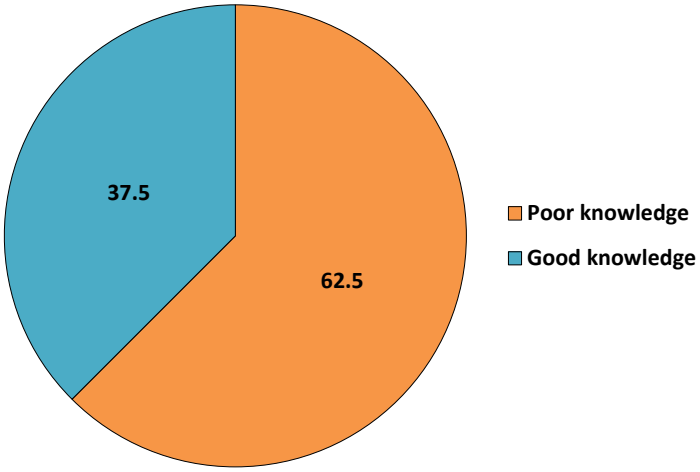



**Figure 3: Knowledge on Pregnancy Induced Hypertension**

### 4.4 Managing Pregnancy Induced Hypertension

Health workers were interviewed on management of pregnancy induced hypertension. Out of 14 health workers interviewed, half (50%) indicated that no additional test is done if blood pressure measurement is high while the other half (50%) indicated otherwise. Proteinuria is the additional indicated by all 7 (100%) health workers who indicated the availability of additional test. Majority (78.6%) of the health personnel give advice to pregnant women. More of the advice is targeted at diet and reducing stress (36.4%). Majority (71.4%) of the health workers give treatment to pregnant women with PIH. The most common medications for treatment from the health worker perspective were Methyldopamin (40%) and ATII Blockers (30%). this is indicated in Table 4 below.

**Table 4 : Managing Pregnancy Induced Hypertension**

| Variable | Frequency | Percentage (%) |
|---|---|---|
| **Are there any additional tests done if blood pressure measurement is high?** | | |
| Yes | **7** | 50.0 |
| No | **7** | 50.0 |
| **Name of additional test** | | |
| Proteinuria test | **7** | 100 |
| **Give advice to pregnant women with PIH** | | |
| Yes | 11 | 78.6 |
| No | 3 | 21.4 |
| **Type of advice given** | | |
| Check diet and limit stress | 4 | 36.4 |
| Have enough rest | 1 | 9.1 |
| Limit stressful activities | 2 | 18.2 |
| Reduce stress, rest, sleep and lower salt intake | 2 | 18.1 |
| Stick to medication | 2 | 18.1 |
| **Give treatment for PIH** | | |
| Yes | 10 | 71.4 |
| No | 4 | 28.6 |
| **Medications for treatment** | | |
| ATII Blockers | 3 | 30.0 |
| β-Blockers | 1 | 10.0 |
| ACE Blockers | 1 | 10.0 |
| Methyldopamin | 4 | 40.0 |
| Diuretics | 1 | 10.0 |

### 4.5 Family History of Diseases and Lifestyle Activities

Table 5 illustrates that majority of the respondents (76.2%) had no family history of hypertension likewise diabetes (81.3%) and pregnancy induced hypertension (92.9%). Only 7.1% stated they had a family history of PIH. Again, 7.5% stated they experienced PIH in their last pregnancy. Most (85.8%) of the respondents do not consume alcohol while majority (68.3%) engage in exercise. Majority (48.3%) consume vegetable in 1-2 serves daily and almost the same proportion (45%) consume mostly 1-2 serves of fruits daily. Five percent do not consume vegetables at all while 3.3

% do not eat fruits. More than half of the respondents (56.3%) consume fatty foods and 62.1% indicated they were stressed during the current pregnancy.

**Table 5: Family History of Diseases and Lifestyle Activities**

| Variable | Frequency | Percentage (%) |
|---|---|---|
| **Family history of Hypertension** | | |
| Yes | 57 | 23.8 |
| No | 183 | 76.2 |
| **Family History of Diabetes** | | |
| Yes | 45 | 18.7 |
| No | 195 | 81.3 |
| **Family History of PIH** | | |
| Yes | 17 | 7.1 |
| No | 223 | 92.9 |
| **PIH in Previous pregnancy** | | |
| Yes | 18 | 7.5 |
| No | 222 | 92.5 |
| **Drink alcohol** | | |
| Yes | 34 | 14.2 |
| No | 206 | 85.8 |
| **Daily vegetable consumption** | | |
| I do not eat vegetables | 12 | 5.0 |
| < 1 serve a day | 30 | 12.5 |
| 1-2 serves a day | 116 | 48.3 |
| 3-5 serves a day | 79 | 32.9 |
| > 5 serves a day | 3 | 1.3 |
| **Daily fruit consumption** | | |
| I do not eat fruits | 8 | 3.3 |
| < 1 serve a day | 48 | 20.0 |
| 1-2 serves a day | 108 | 45.0 |
| 3-5 serves a day | 63 | 263.3 |
| > 5 serves a day | 13 | 5.4 |
| **Engage in exercise** | | |
| Yes | 164 | 68.3 |
| No | 76 | 31.7 |
| **Consume fatty foods** | | |
| Yes | 135 | 56.3 |
| No | 105 | 43.7 |
| **Stress during pregnancy** | | |
| Yes | 149 | 62.1 |
| No | 91 | 37.9 |

### 4.6 Association between background characteristics, Family History of Diseases and Lifestyle activities and PIH

Table 6 below shows there was no significant association between age ($\chi^2$ =7.82, p=0.098, α=0.05), educational level ($\chi^2$ =1.96, p=0.744, α=0.05), occupation ($\chi^2$ =5.28, p=0.071, α=0.05) and pregnancy induced hypertension. Also, there was no statistically significant association between knowledge on PIH ($\chi^2$ =2.17, p=0.140, α=0.05), family history of hypertension ($\chi^2$ =0.28, p=0.0596, α=0.05) and pregnancy induced hypertension.

However, there was significant associations between gravidity ($\chi^2$ =5.02, p=0.025, α=0.05), family history of PIH ($\chi^2$ =5.01, p=0.025, α=0.05), PIH at last pregnancy ($\chi^2$ =41.47, p<0.001, α=0.05) and pregnancy induced hypertension. There was also a statistically significant difference between the consumption of fatty foods and PIH ($\chi^2$ =10.95, p=0.001, α=0.05).

**Table 6: Association between background characteristics, Family History of Diseases and Lifestyle activities and PIH**

| Variable | Normal n (%) | PIH n (%) | Total n (%) | Chi-square (p-value) |
|---|---|---|---|---|
| **Age (in years)** | | | | 7.82 (0.098) |
| < 25 | 36 (16.4) | 1 (4.8) | 37 (15.4) | |
| 25-29 | 81 (37.0) | 8 (38.1) | 89 (37.1) | |
| 30-34 | 73 (33.3) | 6 (28.6) | 79 (32.9) | |
| 35-39 | 22 (10.1) | 3 (14.3) | 25 (10.4) | |
| 40-45 | 7 (3.20) | 3 (14.3) | 10 (4.2) | |
| **Level of education** | | | | 1.96 (0.744) |
| No education | 4 (1.8) | 1 (4.8) | 5 (2.1) | |
| Primary | 10 (5.6) | 1 (4.8) | 11 (4.6) | |
| Junior High | 28 (12.8) | 2 (9.5) | 30 (12.5) | |
| Senior High | 63 (28.8) | 4 (19.0) | 67 (27.9) | |
| Tertiary | 114 (52.0) | 13 (61.9) | 127 (52.9) | |
| **Marital status** | | | | 0.09 (0.956) |
| Single | 19 (8.7) | 2 (9.5) | 21 (8.7) | |
| Currently married | 163 (74.4) | 15 (71.4) | 178 (74.2) | |
| Currently not married | 37 (16.9) | 4 (19.1) | 41 (17.1) | |
| Widowed | | | | |
| **Religion** | | | | 0.46 (0.796) |
| Christian | 169 (77.2) | 16 (76.2) | 185 (77.1) | |

| | | | | |
|---|---|---|---|---|
| Muslim | 46 (21.0) | 5 (23.8) | 51 (21.2) | |
| Traditionalist | 4 (1.8) | 0 (0.0) | 4 (1.7) | |
| **Tribe** | | | | 2.26 (0.521) |
| Ewe | 40 (18.3) | 2 (9.5) | 42 (17.5) | |
| Akan | 73 (33.3) | 10 (47.6) | 83 (34.6) | |
| Ga | 55 (25.1) | 4 (19.1) | 59 (24.6) | |
| Other tribes | 51 (23.3) | 5 (23.8) | 56 (23.3) | |
| **Occupation** | | | | 5.28 (0.071) |
| Unemployed | 58 (26.5) | 2 (9.5) | 60 (25.0) | |
| Informa//Private sector worker | 95 (43.8) | 8 (38.1) | 103 (42.9) | |
| Formal/Public sector worker | 66 (30.1) | 11 (52.4) | 77 (32.1) | |
| **Parity** | | | | 0.01 (0.980) |
| Primiparous | 62 (28.3) | 6 (28.6) | 68 (28.3) | |
| Multiparous | 157 (71.7) | 15 (71.4) | 172 (71.7) | |
| **Decision making at home** | | | | 2.32 (0.509) |
| Husband only | 25 (11.4) | 3 (14.3) | 28 (11.7) | |
| Wife only | 14 (6.4) | 3 (14.3) | 17 (7.1) | |
| Husband and wife | 177 (80.8) | 15 (71.4) | 192 (80.0) | |
| Others | 3 (1.4) | 0 (0.0) | 3 (1.2) | |
| **Monthly income (GHC)** | | | | 0.38 (0.540) |
| <500 | 88 (40.2) | 7 (33.3) | 95 (39.6) | |
| ≥500 | 131 (59.8) | 14 (66.7) | 145 (60.4) | |
| **Place of residence** | | | | 0.79 (0.373) |
| Urban | 211 (96.4) | 21 (100.0) | 232 (96.7) | |
| Rural | 8 (3.6) | 0 (0.0) | 8 (3.3) | |
| **Gravidity** | | | | 5.02 (0.025) ** |
| Primigravida | 43 (19.6) | 0 (0.0) | 43 (17.9) | |
| Multigravida | 176 (80.4) | 21 (100.0) | 197 (82.1) | |
| **Gestation** | | | | 3.66 (0.160) |
| 20- 28 weeks | 116 (53.0) | 8 (38.1) | 124 (51.7) | |
| 29 – 32 weeks | 37 (16.9) | 7 (33.3) | 44 (18.3) | |
| 33- 40 weeks | 66 (30.1) | 6 (28.6) | 72 (30.00 | |
| **Current pregnancy planned** | | | | 0.08 (0.782) |
| Yes | 150 (68.5) | 15 (71.4) | 165 (68.7) | |
| No | 69 (31.5) | 6 (28.6) | 75 (31.3) | |
| **Knowledge on PIH** | | | | 2.17 (0.140) |
| Poor knowledge | 140 (63.9) | 10 (47.6) | 150 (62.5) | |
| Good knowledge | 79 (36.1) | 11 (52.4) | 90 (37.5) | |
| **Family History of hypertension** | | | | 0.28 (0.596) |
| No | 166 (75.8) | 17 (80.9) | 183 (76.2) | |
| Yes | 53 (24.2) | 4 (19.1) | 57 (23.8) | |
| **Family history of diabetes** | | | | 0.39 (0.534) |
| No | 179 (81.7) | 16 (76.2) | 195 (81.3) | |
| Yes | 40 (18.3) | 5 (23.8) | 45 (18.7) | |
| **Family history of PIH** | | | | 5.01 (0.025) ** |
| No | 206 (94.1) | 17 (80.9) | | |
| Yes | 13 (5.9) | 4 (19.1) | | |

| | | | | |
|---|---|---|---|---|
| **PIH at last pregnancy?** | | | | 41.47 (<0.001) ** |
| No | 210 (95.9) | 12 (57.1) | 222 (92.5) | |
| Yes | 9 (4.1) | 9 (42.9) | 18 (7.5) | |
| **Alcohol intake** | | | | 0.41 (0.523) |
| No | 187 (85.4) | 19 (90.5) | 206 (85.8) | |
| Yes | 32 (14.6) | 2 (9.5) | 34 (14.2) | |
| **Daily vegetable consumption** | | | | 0.64 (0.958) |
| I do not eat vegetables | 11 (5.0) | 1 (4.8) | 12 (5.0) | |
| < 1 serve a day | 28 (12.8) | 2 (9.5) | 30 (12.5) | |
| 1-2 serves a day | 106 (48.4) | 10 (47.6) | 116 (48.3) | |
| 3-5 serves a day | 71 (32.4) | 8 (38.1) | 79 (32.9) | |
| > 5 serves a day | 3 (1.4) | 0 (0.0) | 3 (1.3) | |
| **Daily fruit consumption** | | | | 0.64 (0.958) |
| I do not eat fruits | 8 (3.6) | 0 (0.0) | 8 (3.3) | |
| < 1 serve a day | 47 (21.5) | 1 (4.8) | 48 (20.0) | |
| 1-2 serves a day | 98 (44.8) | 10 (47.6) | 108 (45.0) | |
| 3-5 serves a day | 54 (24.7) | 9 (42.9) | 63 (26.3) | |
| > 5 serves a day | 12 (5.5) | 1 (4.8) | 13 (5.4) | |
| **Engage in exercise** | | | | 1.33 (0.248) |
| Yes | 152 (69.4) | 12 (57.1) | 164 (68.3) | |
| No | 67 (30.6) | 9 (42.9) | 76 (31.7) | |
| **Consume fatty foods** | | | | 10.95 (0.001) ** |
| Yes | 116 (53.0) | 19 (90.5) | 135 (56.3) | |
| No | 103 (47.0) | 2 (9.5) | 105 (43.7) | |
| **Stress during pregnancy** | | | | 0.85 (0.355) |
| Yes | 134 (61.2) | 15 (71.4) | 149 (62.1) | |
| No | 85 (38.8) | 6 (28.6) | 91 (37.9) | |

**** Statistically significant**

### 4.7 Risk factors associated with PIH

Binary logistic regression was performed to determine risk factors associated with PIH as shown in Table 7. Age, PIH at last pregnancy and consumption of fatty foods were significantly associated with developing PIH. The logistic regression test showed that age increased the risk of developing PIH. Older women were 80% more likely to develop PIH compared to their younger counterparts (AOR=1.80; 95% CI: 1.16-2.79; p=0.039).

The model also predicted that pregnant women who did not experience Pregnancy Induced Hypertension in their last pregnancy were 93% less likely to develop PIH for their current pregnancy compared to those who experienced the condition in their last pregnancy (AOR=0.07; 95% CI: 0.01-0.35; p=0.001). Furthermore, no consumption of fatty food decreased the odds of developing PIH. Thus, pregnant women who indicated they do not consume fatty foods were 81% less likely to develop the condition compared to those who eat fatty foods (AOR=0.19; 95% CI: 0.04-0.92; p=0.040).

Though not statistically significant, good knowledge on PIH reduced the odds of developing PIH (AOR=0.54; 95% CI: 0.13-2.21; p=0.392). Also, not being stressed during pregnancy decreased the likelihood of developing PIH (AOR=0.49; 95% CI: 0.15-1.62; p=0.244) .

**Table 7: Risk factors associated with PIH**

| | COR | AOR |
|---|---|---|
| **Variable** | **OR (95% CI) p-value** | **OR (95% CI) p-value** |
| **Age (in years)** | 1.57 (1.03 - 2.41) 0.038 | |
| < 25 | | Ref |
| 25-29 | | 2.84 (0.28 – 2.91) 0.380 |
| 30-34 | | 1.57 (0.13 - 1.86) 0.719 |
| 35-39 | | 2.12 (0.15 – 2.93) 0.575 |
| 40-45 | | 1.80 (1.16 – 2.79) 0.039 ** |
| **Level of education** | 1.04 (0.64 - 1.66) 0.861 | |
| No education | | |
| Primary | | |
| Junior High | | |
| Senior High | | |
| Tertiary | | |
| **Marital status** | 1.05 (0.43 - 2.57) 0.909 | |
| Single | | |
| Currently married | | |
| Currently not married | | |
| Widowed | | |
| **Religion** | 0.96 (0.36 – 2.53) 0.937 | |
| Christian | | |
| Muslim | | |
| Traditionalist | | |
| **Tribe** | 1.03 (0.67 – 1.60) 0.875 | |
| Ewe | | |
| Akan | | |
| Ga | | |
| Other tribes | | |
| **Occupation** | 2.12 (1.09 – 4.12) 0.027 | |
| Unemployed | | Ref |
| Informa//Private sector worker | | 1.74 (0.29 – 10.29) 0.542 |
| Formal/Public sector worker | | 2.63 (0.41 – 16.82) 0.306 |
| **Parity** | 0.99 (0.37 – 2.66) 0.980 | |
| Primiparous | | |
| Multiparous | | |
| **Decision making at home** | 0.75 (0.42 – 1.36) 0.340 | |
| Husband only | | |
| Wife only | | |
| Husband and wife | | |
| Others | | |
| **Monthly income (GHC)** | 1.34 (0.52 – 3.46) 0.541 | |
| <500 | | |
| ≥500 | | |
| | 0.58 (0.03 – 10.37) 0.710 | |

| | | |
|---|---|---|
| **Place of residence** | | |
| Urban | | |
| Rural | | |
| **Gravidity** | 1.59 (0.63 – 1.78) 0.101 | |
| Primigravida | | |
| Multigravida | | |
| **Gestation** | 1.18 (0.72 – 1.95) 0.508 | |
| 20- 28 weeks | | |
| 29 – 32 weeks | | |
| 33- 40 weeks | | |
| **Current pregnancy planned** | 0.88 (0.32 – 2.34) 0.782 | |
| Yes | | |
| No | | |
| **Knowledge on PIH** | 1.94 (0.79 – 4.79) 0.146 | |
| Poor knowledge | | Ref |
| Good knowledge | | 0.54 (0.13 – 2.21) 0.392 |
| **Family History of hypertension** | | |
| No | | |
| Yes | | |
| **Family history of diabetes** | 0.72 (0.25 – 2.07) 0.536 | |
| No | | |
| Yes | | |
| **Family history of PIH** | 0.26 (0.08 – 0.92) 0.035 | |
| No | | 0.45 (0.08 – 2.45) 0.354 |
| Yes | | Ref |
| **PIH at last pregnancy?** | 0.06 (0.02 – 0.17) <0.001 | |
| No | | 0.07 (0.01 – 0.35) 0.001 ** |
| Yes | | Ref |
| **Alcohol intake** | 1.62 (0.36 – 7.31) 0.527 | |
| No | | |
| Yes | | |
| **Daily vegetable consumption** | 1.10 (0.64 – 1.92) 0.723 | |
| I do not eat vegetables | | |
| < 1 serve a day | | |
| 1-2 serves a day | | |
| 3-5 serves a day | | |
| > 5 serves a day | | |
| **Daily fruit consumption** | | |
| I do not eat fruits | 1.68 (1.00 – 2.83) 0.049 | |
| < 1 serve a day | | |
| 1-2 serves a day | | |
| 3-5 serves a day | | |
| > 5 serves a day | | |
| | 1.70 (0.68 – 4.23) 0.253 | |

| | | |
|---|---|---|
| **Engage in exercise** | | |
| Yes | | |
| No | | |
| **Consume fatty foods** | 0.11 (0.03 – 0.52) 0.005 | |
| Yes | | Ref |
| No | | 0.19 (0.04 – 0.92) 0.040 ** |
| **Stress during pregnancy** | 0.63 (0.23 – 1.69) 0.359 | |
| Yes | | Ref |
| No | | 0.49 (0.15 – 1.62) 0.244 |

**** Statistically significant**

# CHAPTER FIVE

# DISCUSSION

## 5.0 Introduction

Pregnancy Induced Hypertension (PIH) is major cause of maternal, foetal and neonatal mortality and morbidity both in developed and developing countries (Ayele et al., 2015). The current study was therefore conducted among pregnant women in the 37 Military Hospital to determine the prevalence of PIH and knowledge on its complications among pregnant women and as well, assess the management of PIH among health workers and determine factors influencing PIH among pregnant women.

### Prevalence of PIH and its complications

The current study found prevalence of PIH among pregnant women attending the 37 Military Hospital to be 8.8%. A cross sectional study done in parts of Ethiopia reported prevalence of PIH to be 7.9% (Tesfaya & Tilahun, 2019). Likewise, a systematic review study done in Ethiopia found prevalence of PIH as 6.07% (Berhe et al., 2018). These figures are not widely interspaced indicating nearly similar prevalence of PIH among pregnant women. However, a cross-sectional study conducted in Korle Bu, Ghana recorded a prevalence of 21.4% (Adu-Bonsaffoh, 2017). This prevalence appears to be extremely higher than the prevalence from this and other studies (Tesfaya & Tilahun, 2019; Berhe et al., 2018). The variation in prevalence of PIH could be associated with variation in biological factors such as having family history of PIH, gestational age and the presence of ailments such as asthma and kidney problems among pregnant women as suggested by Tesfaya & Tilahun, 2018. The difference in prevalence of PIH could also be attributed to differences in sample size and population size of the two hospitals Regardless, there is still a significant burden of PIH in the Ghanaian population as

evidenced by these prevalence rates hence, the need for more action-oriented research to determine cause and solutions to this canker.

**Knowledge on PIH and its related complications**

Generally, knowledge of pregnant women on PIH in this study was low as majority (62.5%) could not identify what PIH was including its causes, complications, signs and symptoms. This coincide with findings of a cross sectional study done in Tanzania where it was indicated that most pregnant women had no knowledge on maternal mortality attributed to PIH (Eze et al., 2018). Similarly, Maputle et al. (2015) found knowledge deficit on pregnancy induced hypertension among pregnant women from their qualitative study done in Limpopo. Some authors indicated that at each ANC visit to a hospital, it is imperative pregnant women report immediately any of these symptoms: severe headache, difficult breathing, nausea and vaginal bleeding which are signs of PIH for immediate care (Magee et al., 2008; ACOG, 2002). This indicates that given health education by health personnel on common PIH signs and symptoms to pregnant women during ANC visit is essential in breaching the gap in poor knowledge which can lead to early reporting by pregnant women anytime they observe any of such signs and symptoms.

**Management of PIH and its related complications by health workers**

The role of health care providers in management of PIH disorders cannot be overemphasised as they form the immediate point of contact to PIH patients. This is why Ribowsky & Henderson (2012) stated that ongoing monitoring for increased hypertension and proteinuria, consideration of expectant management or labour induction, and appropriate use of antihypertensive therapy are essential components in the management of women with PIH. Knowledge on PIH and its complications among health workers is key as this forms the

baseline for rendering proper management and care to pregnant women suffering from PIH. The commonly used medications for the treatment of PIH include methyldopa and labetalol (Eze at al., 2018). In this current study, most care providers give treatment for PIH among pregnant women with the major medication for treatment been methylodapanin, a result consistent with findings of Muti et al. (2015). Nevertheless, Muti et al. (2015) again reported that less than half of the health personnel interviewed in their study had insufficient knowledge on definitions and management of PIH. Although the scope of this study did not access the knowledge of care givers on PIH, it is very essential for in-service training and onsite coaching as a way of re-enforcing good management practices for PIH among health workers.

**Factors influencing PIH and its complication**

Many studies have reported on the risk factors associated with PIH with the most common ones being early adolescent nulliparity, illiteracy, lack of occupation and family history of hypertension (Tebeu et al. 2011). Similarly, Ayele et al. (2016) stated previous history of PIH, advanced maternal age (Ayele et al., 2016; Jones et al., 2017; Owiredu 2012) and lack of awareness on risk of hypertension (Ayele et al., 2016) as common risk factors for PIH. At multivariate analysis level, the study found an association between PIH and the following: aging among pregnant women, PIH at last pregnancy and with stress during pregnancy. This is similar with findings of a case control study done in Cameroon where the risk of developing PIH was associated with women having family history of PIH and women with histories of hypertension during pregnancy (Tebeu et al., 2011).

Also, Owiredu et al. (2012) found a significant association between PIH and family history of hypertension from their case control study conducted in Ghana. Findings of this study again concur with results of a case control study done in the Hohoe Municipality of Ghana where

PIH was significantly associated with consumption of trans fatty foods and family history of hypertension (Jones et al., 2017). Results of this study as well as what is found in literature indicate that risk factors associated with PIH are mostly hereditary and also based on the lifestyle of pregnant women in terms of diet. This explains the importance of history taking for pregnant women on ANC visit as this will provide the avenue for detecting women with previous histories of PIH or family histories of hypertension. This will direct the type of counselling to be given to such mothers as well as their counterparts.

To this end, the prevalence of PIH determined in the 37 Military Hospital from this study was high. Women with PIH were at higher risk of adverse pregnancy outcomes than those without as indicated in some study (Muti et al., 2015). It was also found that poor knowledge of management of PIH and inadequate resources are a threat to the proper management of PIH. The role of health care providers on management of PIH cannot be underestimated hence, the need for onsite coaching and refresher training among staffs to improve counselling and care given to pregnant women with PIH. This underscores the need for increased human resources and capacity building as well as resource mobilisation for proper management of pregnant women with PIH in the country.

The study has also identified knowledge gap on pregnancy induced hypertension among pregnant women attending ANC at the 37 Military Hospital. As a result, health care providers should implement the focused health education on pregnancy induced hypertension (PIH) during antenatal visit since this is likely to breach the gap in knowledge and increase mother's awareness on risk factors of PIH and how to reduce its likelihood of occurring. The focused health education not only will breach knowledge gap on PIH but will also promote healthy

dietary habit among pregnant women by reducing the intake of excessive fats which has the tendency of predisposing pregnancy women to PIH. Also, as found from this study, women with family history of PIH are at increased risk of experiencing the condition thus, special emphasis should be given pregnant women with family history of PIH for better management of pregnancy induced hypertension among such mothers.

# CHAPTER SIX

# CONCLUSION AND RECOMMENDATIONS

## 6.1 Summary

This study was done purposely to find the prevalence of PIH among pregnant women attending ANC at 37 Military Hospital, and to assess the knowledge of PIH among the women, assess the management of PIH by health worker in the facility and to determine the factors influencing the prevalence of PIH among the pregnant women.

Two hundred and forty pregnant women were recruited using simple random sampling method and interviewed using structured questionnaires after consent was sought. A pregnant woman was diagnosed with PIH when resting systolic blood pressure reads ≥140 mm Hg and/or diastolic blood pressure ≥90 mm Hg, after it has been measured on two occasions at least 30 minutes apart qualified to participate in the study.

Data entry was done using Epi Info Version 7.2.2 and analysed with Stata version 15.0 file (Stata Corporation, Texas, USA). Data analysis using descriptive statistics using frequencies, percentages, means and averages. Graphs and percentages were used to report on the prevalence of pregnancy induced hypertension and knowledge on the disease. Pearson Chi-square or Fisher's exact test (when required) was used to determine the association between Pregnancy Induced Hypertension and socio-demographic characteristics, knowledge and management of the disease. To find association between variables, univariate analysis using unadjusted logistic regression. Identified risk factors after the univariate analysis was done, were fitted into binary or multinomial logistic regression models. Two-sided p-values was used in this study with significance levels of less than 0.05.

Results of analysis shows the prevalence of PIH among pregnant women attending the 37 Military Hospital to be 8.8%, majority (62.5%) did not have knowledge of PIH including its causes, signs and symptoms and complications whereas 37.5% had knowledge. Regarding the management of PIH by health workers, diet, limiting stress and methylodapanin were the way PIH was managed. For factors influencing PIH, advance maternal age, gravidity, family history of PIH previous history of PIH, consumption of fatty foods was found to be statistically significant.

## 6.2 Conclusion

In conclusion, the current study has found the prevalence of PIH to be 8.8% among pregnant women seeking care from the 37 Military hospital. Results of this and other studies have suggested that women who encounter Pregnancy Induced Hypertension (PIH) are greatly challenged with pregnancy outcomes including maternal mortality.

Broadly, majority of the pregnant women are ill-informed about PIH including its signs and symptoms, complications and management. Apparently, an improvement in knowledge on PIH among pregnant women will lead to an improvement in early reporting and management of PIH cases in early stages.

The role of health care providers in health education and early management of PIH among pregnant women cannot be underestimated as this forms the baseline for reducing complications arising from PIH. It therefore implies that there should be increased human resources, capacity building and in-service training of staff on proper management of PIH.

### 6.3 Recommendation

Based on results and conclusion of the study, the following recommendations are proposed to appropriate authorities to help ameliorate the health status of women with PIH and reduce the prevalence of the condition among pregnant women in the 37 Military hospital.

1. Staff at the Antenatal care (ANC) clinic of the 37 Military hospital should periodical organize health education topic on PIH including its causes, signs and symptoms, complications and the need for immediate reporting to the facility anytime they (pregnant women) observe any PIH signs and symptoms and use Posters in local language as well. This will breach the gap in knowledge and an improvement in reporting of the condition by pregnant women.

2. Pregnant women should also do well to attend these educational sessions of ANC for their own benefits. Family members, especially husbands, should also participate in these sessions in order to encourage their pregnant women to observe the issues discussed. The Obstetrics and Gynaecology (O&G) department can find ways to encourage women to these educational sessions.

3. There should be periodic in-service training on proper counselling and management of PIH among old staff at ANC department of the 37 Military hospital. This is likely to teach staff new management skills and to re-inform them to stick to the protocol for proper management of the condition.

4. The administration of the 37 Military hospital must make it compulsory to organize refresher training for new nurses on PIH and how to give proper counselling and management of PIH.

5. More nurses in the same hospital can be trained on PIH so that they can assist existing staff to be able to manage PIH cases irrespective of the number of pregnant women that reports to the hospital on daily basis.

6. Staff of the ANC and family planning unit of the 37 Military hospital must be tasked by the hospital's administration to do graphical illustration showing trend of PIH on monthly, quarterly or yearly basis. In this way, the hospital is able to track if there is a rise or decrease in trend of cases. This will trigger the hospital to know when to intensify health education and all other efforts geared towards the reduction and management of PIH.

7. Since the study found older pregnant women at risk of PIH, it recommends that, pregnant women 40 years and above should be given periodic attention in order to detect PIH complications particularly early.

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# APPENDIX

## Appendix 1: Consent Form (Pregnant women)

### CONSENT FORM

**Research title:** Prevalence and determinant of Pregnancy Induced Hypertension (PIH) among women attending ANC at 37 Military Hospital Accra

Principal Investigator: Christabella Chakie Marbell
Address: C/O School of Public Health
College of Health Science
University of Ghana
Legon

**General Information about research**

Pregnancy induced hypertension (PIH) is a form of high blood pressure found among pregnant women. This condition (PIH) is capable of causing death among affected pregnant women. Research has shown that apart from death, PIH can lead to premature delivery or birth. Unfortunately, some pregnant women do not have enough knowledge on how to control this condition. It has been shown however that early management of PIH is likely to reduce deaths and other serious health conditions among pregnant women. Based on this information, this research will be conducted among pregnant women. The research will involve asking mothers some few questions concerning PIH so that results that will be obtained can be used to help mothers understand PIH the more and also how to manage them.

**Possible risk**

The study will not involve the collection of any sample or material from participants. In view of this, no risk is expected to occur to any participant as a result of taking part in the study.

**Possible benefit**

Pregnant women who will be involved in the study will be aware of their hypertension status at the end of the study. Also, the information that will be obtain from all the participants at the end of the study will be used to develop new strategies in educating pregnant women on PIH and how to manage such conditions.

**Alternatives to participation**

Any pregnant woman who may not be willing to participate in the study is at liberty to do so. But when this happens, no other person will be allowed to be interviewed on behalf of the individual who want to opt out of the study.

**Confidentiality**

Confidentiality of participants will be observed. All the information that will be collected from you during the study will be treated confidentially. Your name will not be needed or used for the final data analysis.

**Compensation**

No form of monetary compensation will be given to participants for participating in the study. But all participants will be acknowledged for their time and responses at the end of the interview period.

**Additional cost**

No pregnant woman will be asked to pay any amount of money before participating in the study.

**Voluntary participation**

Participation in this study will be based on the willingness of a pregnant woman. Thus participation is voluntary. Individuals who may not show interest in the study after being taken through the study protocol or individuals who may opt out of the study along the study are at liberty to do so without any form of force.

## VOLUNTEER AGREEMENT

The above document describing the benefits, risks and procedures for the research title "**Prevalence and Determinants of Pregnancy Induced Hypertension among pregnant women attending 37 Military Hospital, Accra**" has been explained to me.

I have read or have had someone read all of the above, asked questions, received answers regarding participation in this study, and am willing to give consent to participate in this study as a volunteer.

_____ _____

Date Name and Signature or mark of volunteer

**If volunteers cannot sign the form themselves, a witness must sign here:**

I was present while the nature and purpose of this study were read to the volunteer. All questions asked were answered satisfactorily regarding participation in this study, and volunteer gave consent to participate in this study.

_____ _____

Date Name and Signature or mark of witness

I certify that the nature and purpose in this research have been duly explained to the above individual.

Date Name and Signature of Person Who Obtained Consent

_____ _____

## Appendix 2: Consent Form (Health Worker)

**CONSENT FORM**
(HEALTHWORKERS)

**Research title:** Prevalence and Determinant of Pregnancy Induced Hypertension (PIH) among women attending ANC at 37 Military Hospital Accra

**Principal Investigator**: Christabella Chakie Marbell
Department of Social and behavioural Science
College of Health Science, School of Public Health
University of Ghana, Legon

**GENERAL INFORMATION**

My name is Christabella Chakie Marbell, a student from the School of Public Health, University of Ghana, Legon. I am conducting a study on the Pregnancy Induced Hypertension among women attending ANC at 37 Military Hospital.

The study will involve answering questions from a closed and open-ended questionnaire about the management of Pregnancy Induced Hypertension among women Attending ANC at 37 Military Hospital.

No Coercion will be used to obtain response from participants. It will be appreciated if you could participate in this study. This is an academic research which forms part of my work for the award of a Masters' Degree in Public Health.

This research will pose no potential risk to study population or the society. Participation in this study is voluntary and you can choose not to answer any individual question or all questions. You can opt out of the study at any time. However, I will encourage you to fully participate in the study since your answers will be contributing immensely towards the success of this study by responding to these questions.

Kindly give adequate information to the under listed questions. Your identity will not be disclosed in any way. Information gathered would be used only for the purpose of this research. Thank you for your cooperation.

**Who to contact for further clarification/questions**

If you have a complaint or you wish to seek further clarification, please contact principal investigator.

**Christabella Chakie Marbell**
Department of Social and behavioural Science
College of Health Science, School of Public Health
University of Ghana, Legon
Email: cmarbell@gmail.com Telephone No. 0244751232

**Your rights as a Participant**

This research has been approved by the 37 Military Hospital Institutional Review (37MH-IRB). If you have any questions about your rights as a research participant, you can contact the IRB Office between the hours of 7:30am – 3:30pm through the land line 0302 769667 or email address: irb37milhosp@gmail.com.

## VOLUNTEER AGREEMENT

The above document describing the benefits, risks and procedures for the research title "**Prevalence and Determinants of Pregnancy Induced Hypertension among women attending ANC at 37 Military Hospital, Accra**" has been explained to me.
I have read or have had someone read all the above, asked questions, received answers regarding participation in this study, and am willing to give consent to participate in this study as a volunteer.

_____ _____

Date Name and Signature or mark of volunteer

**Appendix 3: Questionnaire (Pregnant Woman)**

**QUESTIONNAIRE**

***Study ID: ……***
***Paper code: ……..***

***37 MILITARY HOSPITAL***

I am a masters' student conducting a study on **"*Prevalence and determinates of Pregnancy Induced Hypertension among women attending ANC at 37 Military Hospital Accra*"**. All responses will be treated with confidentiality as intended for purely academic work. Please answer the questions by ticking [ √] or write in the spaces provided. Skip Pattern

## SECTION A-SOCIO DEMOGRAPHIC CHARACTERISTICS

1. Age (Years) ……

2. Educational level:
   (1) [ ] No formal education
   (2) [ ] Primary
   (3) [ ] JHS
   (4) [ ] SHS/vocational
   (5) [ ] Tertiary

3. Occupation:
   (1) [ ] No employment
   (2) [ ] Farming
   (3) [ ] Trading
   (4) [ ] Artisanship
   (5) [ ] Civil servant
   (6) Others ----------

4. Marital Status:
   (1) [ ] Single
   (2) [ ] Married
   (5) [ ] Co-habiting
   (3 ) [ ] Divorced/Separated
   ( 4) [ ] Widowed

5. Religion:
   (1) [ ] Christianity
   (2) [ ] Islam
   (3) [ ] African Traditional
   (4 ) [ ] others

6. Tribe:
   (1) [ ] Ewe (2) [ ] Akan (3 [ ] Ga
   (4) [ ] Others……

7. Decision making at home
   (1) [ ] Husband only
   (2) [ ] Wife only
   (3) [ ] Husband and wife only
   (4) [ ] Others……

8. Monthly Income (GHC): ……

9. Place of residence
(1) [ ] Urban (2) [ ] Rural

10. Gravida:

……Parity ……

11. Gestation (Weeks) ……

12. Was your pregnancy planned? (1) [ ] Yes (2) [ ] No

## SECTION B-KNOWLEDGE ON PREGNANCY INDUCED HYPERTENSION

13. What is Pregnancy Induced Hypertension (PIH)?
   (1) [ ] High blood pressure that occurs in pregnancy after 20 weeks gestation to 42 days post delivery
   (2) [ ] Blood pressure which starts when one is not pregnant
   (3) [ ] both (4) [ ] I do not know

14. Where did you hear of Pregnancy Induced Hypertension? (You can tick more than 1)
   (1) [ ] Health centre (2) [ ] School (3) [ ] Media
   (4) [ ] Relatives (5) [ ] Friends
   6) [ ] Others……

15. What causes Pregnancy Induced Hypertension (PIH)?
   (1) [ ] real cause not known (2) [ ] stress (3) [ ] witchcrafts /spiritual cause
   (4) [ ] Others (specify)……

16. Do you know the signs and symptoms of PIH? (1) [ ] Yes (2) [ ] No

17. If yes, which are the signs and symptoms of PIH?

| Variables | Yes | No | I don't know |
|---|---|---|---|
| Rapid weight gain | | | |
| Swelling of face , fingers and feet | | | |
| dizziness | | | |
| Blurred vision | | | |
| Nausea and vomiting | | | |
| Frontal headache | | | |
| confusion | | | |
| Upper abdominal/epigastric pain | | | |
| High blood pressure | | | |
| Generalised body weakness | | | |
| Reduced urine output | | | |
| Reduced foetal movement | | | |

18. When you have any of these signs and symptoms where do you seek health care? (1) [ ] health centre
(2) [ ] herbalist (3) [ ] Mallam (4) [ ] Pastors (5) [ ] others (specify)……

19. Do you know any complications of PIH? (1) [ ] Yes (2) [ ] No

20. If yes,What are complications of PIH?
……
……

21. Does controlling of blood pressure help manage PIH and its complications
1) [ ] Yes (2) [ ] No (3) [ ] I do not know

**SECTION C- FAMILY HISTORY OF PIH**

Do you have a family history of: ***(Tick all that apply)***
Diabetes? [ ] Hypertension [ ] Cardiac disease? [ ]
Renal disease? [ ] Sickle cell disease? [ ]

Has any of your relative been diagnosed of Pregnancy Induced Hypertension?
(1) [ ] Yes (2) [ ] No

During last pregnancy, were you diagnosed of PIH? (1) [ ] Yes (2) [ ] No

**SECTION D- NUTRITION AND LIFESTYLE**

Do you drink alcohol? (1) [ ] Yes (2) [ ] No

If yes, how often do you have a drink containing alcohol?
0 [ ] Never 1 [ ] 2-3times a week 3 [ ] Monthly 4 [ ] 4 or more times a week
5 [ ] 2-4times a month

How much units of alcohol do you drink on a typical day when you are drinking?
1 [ ] 2-3 units per day 2 [ ] 3-4units per day 3 [ ] 5-6units per day
4 [ ] 7,8 &9 units per day 5 [ ] 10 or more units per day

How many serves of vegetables do you usually eat each day? A serving of vegetable is equivalent to:1 cup cooked or raw, including soups and stews
0 [ ] I don't eat vegetables 1 [ ] < 1 Serve a day 2 [ ] 1-2 Serves a day
3 [ ] 3-5 serves a day 4 [ ] More than 5 serves a day

How many serves of fruit do you usually eat each day? A serving of fruit is equivalent to: 1 orange or 1 banana or 2 small; 1 cup chopped pineapple or watermelon, etc.
0 [ ] I don't eat fruits 1 [ ] < 1 Serve a day 2 [ ] 1-2 Serves a day
3 [ ] 3-5 serves a day 4 [ ] More than 5 serves a day

Do you smoke?
0 [ ] No
1 [ ] Yes

If yes, how many sticks of cigarette or tobacco do you smoke in a day?
1 [ ] < 5stick
2 [ ] 10 sticks
3 [ ] 15sticks
4 [ ] 20sticks and above

On average, how many times in a week do you smoke Daily
1 [ ] 5-6 days per week

2 [ ] 3-4 days per week
3 [ ] 1-2 days per week
4 [ ] 1-3 days per month

Do you eat fatty foods?
0 [ ] No
1 [ ]Yes

Do you do exercise that cause a small increase in breathing (brisk walking, cycling, jogging, gardening, washing) for at least 10 minutes continuously?
0 [ ] No
1 [ ]Yes

If yes how many days per week Number of days …….

What is your average duration of time of exercise?
1 [ ] < 30minutes
2 [ ] > 30minutes
3 [ ] 1 hour
4 [ ] Above 1 hour

Would you say you are being stressed during this pregnancy?
0 [ ] No
1 [ ]Yes

**SECTION E: ANTHROPOMETRIC DATA**

Weight ……. Kg Height ……. cm

**Blood pressure measurement**

1. Blood Pressure (systolic/disystolic) ……/……
2. Blood Pressure (systolic/disystolic) ……/……
3. Blood Pressure (systolic/disystolic) ……/……

**Appendix 4: Questionnaire (Health Workers)**

# QUESTIONNAIRE (health workers)

***Study ID: ……***
***Paper code: ……***

***37 MILITARY HOSPITAL***

I am a masters' student conducting a study on **"*Prevalence and determinates of Pregnancy Induced Hypertension among women attending ANC at 37 Military Hospital Accra*"**. All responses will be treated with confidentiality as intended for purely academic work. Please answer the questions by ticking [√] or write in the spaces provided. Skip Pattern

## SECTION A-SOCIO DEMOGRAPHIC CHARACTERISTICS

1. Age (Years) (1) [ ] 20-25 (2) [ ] 25-30 (2) [ ] 35- 40 (2) [ ] 45+

2. Position at health facility:
   (1) [ ] Doctor (2) [ ] Nurse (3) [ ] Midwife (4) [ ] Other specify

3. Sex: (1) [ ] Male (2) [ ] Female

4. Marital Status:
   (1) [ ] Single
   (2) [ ] Married
   (3) [ ] Divorced/Separated
   (4) [ ] Widowed

5. How long have you worked in the hospital (years)?
……

6. Which apparatus do you often use to measure Blood Pressure?
   (1) [ ] Sphygmomanometer
   (2) [ ] Digital

7. Do you determine the risk factors for PIH to initiate management
(1) [ ] Yes (2) [ ] No (if No move to Question 8 )

8. When do you determine the risk factors for the first time?

(1) [ ] 1st trimester (2) [ ] 2nd trimester (3) [ ] 3rd trimester

9. How many times do you take blood pressure measurement for each pregnant woman during for each session?

……

……

10. When do you diagnose PIH?

| |
|---|
| (1) [ ] from onset of pregnancy |
| (2) [ ] when there's significant elevation of BP from boking BP |

(3) [ ] when BP is high from 20wks gestation / within 42 days postpartum
(4) [ ] when BP is high before 20wks gestation

11. Are there any additional tests done if Blood Pressure measurement is high
(1) [ ] Yes (2) [ ] No (**if NO move to Que. 11)**

If yes, which test?

……

……

……

12. After reading, do you give any advice regarding your results?
(1) [ ] Yes
(2) [ ] No

13. If yes, what advice do you give?

……

……

……

14. If no, why?

……

……

……

15. Depending on the results, do you give treatment?
(1) [ ] Yes

(2) [ ] No

16. If yes, what do you give as treatment?
(1) [ ] ATII Blockers (2) [ ] β-Blockers (3) [ ] ACE Blockers
(4) [ ] Methyldopamin (5) [ ] Duiretics

17. If no, why?

……

……

Why the choice of treatment in ***Que.15***?

……

……

## Appendix 5: Ethical clearance

**Institutional Review Board**
37 Military Hospital
Neghelli Barracks
ACCRA

Tel: 0302 769667
Email:irbmilhosp@gmail.com

12 April 2019

**ETHICAL CLEARANCE**

**37MH-IRB IPN/291/2019**

On 12 April 2019, the 37 Military Hospital (37MH) Institutional Review Board (IRB) at a Board Meeting reviewed and approved your protocol.

**TITLE OF PROTOCOL: Proposal Title: Prevalence and Determinants of Pregnancy Induced Hypertension Among Pregnant Women Attending the 37 Military Hospital Accra**

**PRINCIPAL INVESTIGATOR: Christabella Charkie Marbell**

Please note that a final review report must be submitted to the Board at the completion of the study.

Please report all serious adverse events related to this study to 37MH-IRB within seven (7) days verbally and fourteen (14) days in writing.

This certificate is valid until 31 March 2020.

**DR EDWARD ASUMANU**
(37MH-IRB, Vice Chairman)

37 MILITARY HOSPITAL
INSTITUTIONAL REVIEW BOARD
DATE 12-04-19

Cc: Brig Gen MA Yeboah-Agyapong
Commander, 37 Military Hospital