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ECONOMIC BURDEN OF HYPERTENSIVE DISORDERS IN PREGNANCY: A CASE STUDY AT TEMA GENERAL HOSPITAL

BY

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DECLARATION

I, Irene Marilyn Fofoe Anuwa-Amarh, hereby declare that, except for references made to other people's work which have been duly acknowledged, this work is the result of my own research undertaken under supervision and that it has neither in part nor in whole been presented for another degree elsewhere.

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DEDICATION

This work is dedicated to God Almighty and to Anuwa-Amarh, my beloved husband and constant companion and to our children Ashitey, Amerley and Amorkor and Amarkai for their encouragement and support throughout the period of study.

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ABSTRACT

Background: Hypertensive disorders in pregnancy had become a huge economic (financial, social and psychological) burden on patients, families and the nation as a whole. Such economic burden on patients and their families cannot be underestimated. The objective of the study was to determine the economic burden of hypertensive disorders in pregnancy at Tema General Hospital.

Methods: An exploratory, cross-sectional cost-of-illness study was conducted with 50 eligible women enrolled and interviewed. Socio-demographic data of respondents, direct and indirect costs in the management hypertensive disorders in pregnancy were collected and analysed.

Results: Out of a total number of 50 pregnant women studied, almost half (48%) of them were pre-eclampsia cases with 2% being chronic hypertension with superimposed pre-eclampsia, 20% (10) due to gestational hypertension, 8% (4) due to eclampsia and 4% (2) due to chronic hypertension in pregnancy. The mean total cost per month was estimated at GHS559.65 (SDGHS205.95), US$143.50) -with direct costs accounting for 83% of total costs.

Conclusion: Hypertensive disorders in pregnancy cause considerable economic burden and a significant deterioration in household income impacting negatively on welfare of families. This could lead to families adopting unfavourable coping strategies which could reduce their ability of assessing health care and increasing their vulnerability to future financial crisis.

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LIST OF ACRONYMS

ANC	-	Antenatal Care
BOD	-	Burden of Disease
BP	-	Blood Pressure
CEA	-	Cost-Effectiveness Analysis
COI	-	Cost Of Illness
CVD	-	Cardiovascular Diseases
DALY	-	Disability Adjusted Life Years
GHS	-	Ghana Health Service
HDP	-	Hypertensive Disorders in Pregnancy
HTN	-	Hypertension
IQR	-	Inter Quartile Range
IUGR	-	Intrauterine Growth Retardation
NCDs	-	Non Communicable Diseases
NHIS	-	National Health Insurance Scheme
OPD	-	Out Patient Department
PIH	-	Pregnancy Induced Hypertension
RCH	-	Reproductive and Child Health
RM	-	Malaysian Ringgit
SSA	-	Sub-Saharan Africa
WHO	-	World Health Organization

DEFINITION OF TERMS

Burden: The costs, physical and psychological trauma that affect the lives of pregnant women diagnosed with hypertension during pregnancy and their families thus putting undue pressure on their finances.

Household: A group of people living in the same house and eating from the same pot.

Caregiver: Someone who may or may not live with the patient but assists the patient, and has been closely involved in her activities of daily living, health care, and social interaction.

Parity: The number of times a woman has given birth to a baby, alive or dead after 28 weeks of gestation.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Non-communicable diseases (NCDs) are medical conditions or diseases that are non-infectious or non-transmissible but chronic in nature and can last for long periods of time. The World Health Organisation (WHO) defines NCDs to include cardiovascular diseases, cancers, diabetes, and chronic respiratory diseases. Hypertension, which is also called high blood pressure, is a leading cause of cardiovascular diseases (CVD) worldwide (Lozano et al., 2012) and an important global cause of morbidity and mortality, hence the need to urgently take action on it (Beaglehole et al., 2008). Whereas high blood pressure was almost non-existent in Africa by the first half of the twentieth century, current estimates indicate that more than 40% of adults have hypertension within some settings in Africa, (Addo, Smeeth and Leon, 2007) and 25.4% in Ghana (Addo, Amoah and Kwadwo, 2006) and this is expected to keep rising.

Evidence suggests that the incidence of hypertensive disorders in pregnancy (globally and regionally) keeps on increasing (Ye et al., 2014). Globally, 6 – 8% of pregnancies are complicated by hypertension annually (Peters & Flack, 2008). In Sub Saharan Africa (SSA), the incidence is between 5% to 18.6% (Baragou, Goeh-Akue, Pio, Afassinou, & Atta, 2014; Chowa, Lin, & Goma, F, 2011; Wolde, Segni, & Woldie, 2011) and 7.6% in Ghana (Adu-Bonsaffoh, Samuel, Binlinla, & Samuel, 2013). Annually, Hypertensive disorders in pregnancy (HDP) accounts for 10 – 15% of all maternal deaths in industrialized countries (Zibaeenezhad, Ghodsi, Arab, & Gholzom, 2010) and 16% in sub Saharan Africa. According to the Ghana Health Service (GHS), hypertensive disorders accounted for 23% of the maternal deaths recorded in 2013 (RCH/GHS, 2013).

Hypertensive disorders in pregnancy have now become a huge economic (i.e. financial and psychological) burden on the patient, the family and the nation and society as a whole (Jo, 2014b). Even though the actual economic burden are usually not quantified because of the scarcity of data, the high costs involved in its management cannot be underestimated.

1.2 Statement of problem

Hypertension is one of the most common medical condition that affects pregnant women. Globally, HDP complicates 5% to 10% pregnancies annually (Singh, 2013a). In the United States, hypertension (HTN) complicates about 1 in 10 pregnancies affecting over 240,000 women annually (Mustafa, Ahmed, Gupta and Venuto, 2012b). It is one of the major causes of maternal and perinatal morbidity and mortality. Developing countries are not left out of this crisis. In South Saharan Africa (SSA), the incidence is between 5% to 18.6% (Baragou et al., 2014; Chowa et al., 2011; Wolde et al., 2011). In Ghana, the incidence of HDP is 7.6% (Adu-Bonsaffoh et al., 2013).

Annually, HDP accounts for 10 – 15% of all maternal deaths in industrialized countries worldwide (Zibaeenezhad et al., 2010). In sub Saharan Africa, hypertensive disorders in pregnancy accounts for 16% of all maternal deaths. According to the Annual Reproductive and Child Health (RCH) report (2013) of the Ghana Health Service, hypertensive disorders in pregnancy accounted for 23% of the maternal deaths recorded that year. (RCH/GHS, 2013). The maternity unit of the Tema General Hospital reports a lot of cases due to HDP. According to records at the maternity unit, as at half year 2015, out of 1,366 admissions at the Lying ward of the hospital, 216 (15.8%) had HDP and 38.9% maternal deaths were due to HDP. Multiple factors affect the adverse outcome of HDP. These adverse outcomes lead

to prolonged stay in the hospital for both mother and baby, thus increasing the economic burden of the individual and household (Mustafa, Ahmed, Gupta and Venuto, 2012b).

Hypertension occurring during pregnancy and its complications can be reduced once prompt and accurate diagnosis is made. Cost of treatment then becomes less. However, cost of treatment increases when severe complications set in, leading to large part of household resources being spent on health care (Storeng et al., 2008). Huge expenses made in seeking health care can cause impoverishment of households or lead to further poverty. Households incur higher cost in seeking health care when complications set in during pregnancy than in uncomplicated pregnancy (ibid).

The purpose of undertaking this study was to explore from the patient perspective the economic burden of hypertensive disorders in pregnancy and to have a better understanding of the financial, social and psychological challenges faced by pregnant women diagnosed of having hypertensive disorders in pregnancy at Tema General Hospital.

1.3 Objectives of the study

1.3.1 General objective

The general objective of the study was to determine the economic burden of hypertensive disorders in pregnancy at Tema General Hospital.

1.3.2 Specific objectives

The specific objectives of the study were:

1. To estimate the direct costs of care for hypertensive disorders in pregnancy.
2. To estimate the indirect costs of care for hypertensive disorders in pregnancy.
3. To determine the intangible costs of care for hypertensive disorders in pregnancy.

1.4 Research questions

In order to achieve the above research objectives answers to the following research questions were sought:

1. What are the direct costs associated with care of patients with hypertensive disorders in pregnancy?
2. What are the indirect costs associated with care of patients with hypertensive disorders in pregnancy?
3. What are the intangible costs associated with care of patients with hypertensive disorders in pregnancy?

1.5 Justification

Hypertensive disorders in pregnancy are among the major causes of maternal and perinatal morbidity and mortality, thus, there is a need to estimate and describe the economic burden of receiving care on the patient, family, and employer. Understanding the economic burden (or costs) of hypertensive disorders in pregnancy can help patients and their families to prepare adequately, especially financially, towards pregnancy, delivery and postpartum. Again, policy makers would also understand the impact of cost of treatment of obstetric complications and the disease burden on the economic well-being of patients and households. Knowledge on costs of HDP would also inform financing schemes to look for

alternative strategies to finance health care to protect households from the unexpected financial burden faced in times of obstetric complications. From a health service perspective, costing data would be helpful to inform plans for implementing and scaling up interventions in relation to obstetric complications. It is hoped that the study would add to the existing empirical knowledge on the economic burden (or cost) of hypertensive disorders in pregnancy. It is expected that this study would also serve as a reference for researchers and also students who would like to further research on this topic especially in Ghana.

1.6 Conceptual Framework

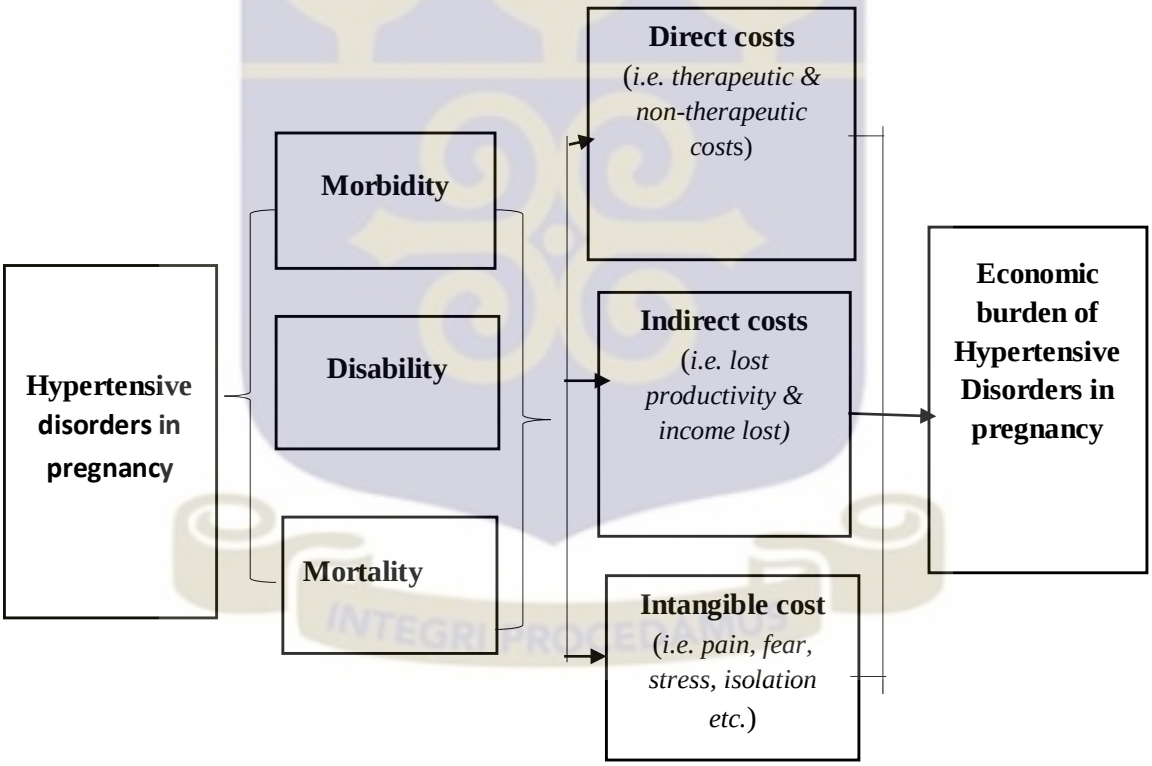
Caring for pregnant women diagnosed of having hypertensive disorders involves money, time and psychological issues. The individual and her family are faced with unexpected expenditure and psychological trauma. Three (3) broad classifications of costs are recognized in health economics. These are direct costs, indirect costs, and intangible costs as shown in Figure 1.

Direct costs are classified into direct medical and direct non-medical. The direct medical costs are costs directly incurred during the course of treatment of the illness such as costs of consultations, drugs, admission fee, all types of tests, out – of - pocket payment for treatment. Direct non-medical costs include health care costs that are not directly related to the treatment of illness such as transportation cost of the individual and caregiver, cost of food, water and other needed items which are not related to the treatment adds to the problem.

Indirect costs include valued time spent by patient and caregiver travelling for care, waiting for services, time spent by caregiver to care for the ill and costs of productivity loss. Due to

the illness, both the patient and caregiver may not be able to engage in any productive work. This reduces the family's income leading to poor distribution of the little resources left for the upkeep of the family. Intangible costs are attributable to the psychological trauma experienced by the client and relatives which cannot be directly expressed in monetary terms. It includes the level of pain, fear and the emotional burden that the patient and family go through during the course of illness, and loss of leisure activities. These costs , direct and indirect, sum up to give the total cost - of – illness or the economic burden of hypertensive disorders in pregnancy (Segel, 2006)

Figure 1: Conceptual Framework of the Economic Burden of HDP



CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter discusses the definition, classes and cause of hypertensive disorders in pregnancy. It is then followed by a brief discussion on the concept and component of economic burden of disease and narrows down to a review of the concept and component of cost of illness.

2.2 Hypertensive disorders in pregnancy: definition and causes

Hypertension in pregnancy is defined as blood pressure with a systolic of 140mm/Hg or greater or a diastolic of 90mm/Hg or greater in a pregnant woman. (Mustafa, Ahmed, Gupta and Venuto, 2012a). HDP are characterised by elevated blood pressure where proteinuria is an additional characteristic in pre-eclampsia. They occur in women with pre-existing primary or secondary chronic hypertension, and in women with onset of hypertension in the second half of pregnancy (Mounier-Vehier and Delsart, 2009). They are usually associated with severe maternal obstetric complications and one of the major causes of pregnancy-related maternal mortality (Berg, Callaghan, Syverson and Henderson, 2010).

Even though the underlying causes of HDP are unknown, the risk factors associated with it are well documented (Tuovinen, 2014). Examples of such risks factors include higher maternal age, primiparity, previous pre-eclampsia, family history of hypertension, multifoetal gestation, pre-existing medical conditions, Type 1 diabetes, pre-existing hypertension, renal disease, chronic autoimmune disease, longer time between pregnancies, changing paternity, elevated body mass index, excessive intake of salt, excessive intake of

alcohol, and contraceptive use(Chowa et al., 2011; Owiredu, Ahenkorah, Turpin, Amidu, & Laing, 2012).

Hypertensive disorders in pregnancy do not present any signs and symptoms. However, related signs include severe headache, swollen feet and face, visionary problems, increase in BP and seizures. Hypertensive disorders in pregnancy also carry a risk not only for the mother but for the baby. For the patient, complications such as eclampsia, brain damage, liver conditions, eye problems, preterm delivery, and death. For the foetus, there is Intrauterine Growth Retardation IUGR), preterm baby, stillbirth, neonatal deaths (Donovan, 2012).

Women with gestational hypertension are at low risk for cardiovascular complications during pregnancy and are candidates for lifestyle modification therapy only. Women with organ damage or already on multiple antihypertensive agents should continue medications as needed to control blood pressure. The first trimester is critical because foetal loss rates is 50% and significant maternal mortality have been reported in these patients therefore treatment of severe chronic hypertension is crucial at this stage (Magee et al., 2014). Treatment of pre-eclampsia includes hospitalization for bed rest, control of blood pressure, seizure prophylaxis in the presence of signs of impending eclampsia and timely delivery. No matter the gestational age, delivery is considered when there are signs of intrauterine growth retardation or signs of maternal problems or signs of foetal distress as well as severe hypertension (ibid).

2.3 Classification of Hypertensive Disorders of Pregnancy

The classification of hypertensive disorders in pregnancy is difficult because of limited knowledge about its aetiology and the lack of conformity of definitions. In literature, however, they are generally classified into four categories namely, chronic hypertension, preeclampsia-eclampsia, superimposed on chronic hypertension, and gestational hypertension (transient hypertension of pregnancy or chronic hypertension identified in the latter half of pregnancy). The gestational hypertension terminology is preferred over the older but widely used term "pregnancy-induced hypertension" (PIH) because it is more precise (Donovan, 2012). The four categories are summarised below:

- Chronic hypertension which refers to hypertension occurring before pregnancy or before 20 weeks of gestation and continues for more than 12 weeks postpartum before resolving.
- Pre-eclampsia is hypertension associated with proteinuria (>300 mg/24 hours) developing after 20 weeks of pregnancy. It is more common in first time pregnancies, multiple pregnancies, women with hypertension for 4 years or more, those with a family history of pre-eclampsia, hypertension in previous pregnancy and renal disease. It may progress to eclampsia (seizures) if not managed well.
- Chronic hypertension with superimposed pre-eclampsia is identified by new onset of protein in urine after 20 weeks gestation in a woman with hypertension. In a woman with hypertension and proteinuria prior to 20 weeks gestation, it is recognized by sudden 2–3-fold increase in proteinuria or the development of thrombocytopenia, elevated alanine aminotransferase or aspartate aminotransferase.
- Gestational hypertension is associated with the development of hypertension without protein in urine after 20 weeks gestation. It may represent a pre-proteinuric phase of pre-eclampsia, or the recurrence of chronic hypertension that abated in mid-

pregnancy, and may evolve into pre-eclampsia (Chowa et al., 2011; Donovan, 2012; Hutcheon, Lisonkova and Joseph, 2011; Owiredu et al., 2012; Singh, 2013b). Table 1 describes the diagnostic criteria Hypertensive disorders in pregnancy.

Table 1: Classification of hypertensive disorders in pregnancy

Category	Definition
Chronic hypertension	HT ≥140/90 mmHg present before pregnancy or diagnosed before 20th week of gestation or does not resolve post-partum
Gestational hypertension	HT ≥140/90 mmHg on ≥2 occasions at least 4 hours apart in a women who was normotensive before 20th week of gestation and whose blood pressure returns to normal post-partum
Pre-eclampsia-eclampsia	HT ≥140/90 mmHg on ≥2 occasions at least 4 hours apart in a women who was normotensive before 20th week of gestation with proteinuria ≥300 mg/ 24hours
Pre-eclampsia superimposed on chronic hypertension	HT ≥140/90 mmHg present before pregnancy or diagnosed before 20th week of gestation with (new-onset) proteinuria ≥300 mg/ 24 hours

Source: (Magee, Helewa, Moutquin and von Dadelszen, 2008).

2.4 The concept of economic burden of disease

Economics is a science that studies how people use their scarce resources to achieve maximum satisfaction of their unlimited wants. Relating the framework of economics to the resource allocation to an illness, is important for a number of reasons. First and foremost, treatment of diseases can be costly. Second, devoted resources for the prevention and treatment of diseases could have been used to satisfy other needs instead. Third, the need

for resources will continue to increase because of the increasing prevalence of diseases and the need for comprehensive care and new treatments.

Studies on the economic burden of disease or simply burden of disease (BOD) studies, also known as cost of illness (COI) studies, are types of studies that examine costs associated with the prevention and treatment of diseases. There are several reasons why estimates of economic burden or cost of illness are often useful. Firstly, cost estimates are, often, used to make a case for the reason why policies of certain diseases should be given high priority. Secondly, cost estimates help to evaluate whether a specific disease of interest, in this case the economic burden (or cost) of hypertensive disorders in pregnancy, represents a greater part of medical and/or social costs. Thirdly, cost estimates become baselines for the determination of the efficacy of health policies, programmes, or any types of interventions that are designed to reduce or eradicate the detrimental disease effects

2.5 Cost-of-illness

Studies on the economic impact of disease has been growing since the codification of a 'cost of illness' framework in the mid-1960s (World Health Organization, 2009). For example, various cost-of-illness studies have been conducted in a wide-ranging situations over the past 30 years and in various disciplines such as diabetes, malaria, smoking related diseases, obesity and heart disease and in various field such as psychology and medicine (Behan et al., 2008), all of which have impacted on public policy (ibid).

Most studies of economic burden of disease use a methodology at the microeconomic level, which relate to economic impact on individuals, households, firms or government. At macroeconomic level, studies on economic burden of disease relate to the aggregate impact of a disease on a country's current gross domestic product or its future growth prospects.

They provide estimates for direct, indirect and intangible cost. Although maybe insufficient as a basis for setting micro and macro priorities and allocating resources in health, economic burden studies help to identify possible strategies for reducing the cost of disease such as Hypertensive Disorders in Pregnancy (HDP) via appropriate preventive action or treatment strategies.

Cost of illness (COI) studies measure (as far as possible) and present the economic burden of diseases and encompass various aspects of the economic impact of a disease on the health outcomes in a country, specific regions, communities, and households and individuals. As explicitly indicated in Jo (2014a), "the aim of COI studies is descriptive: to itemize, value, and sum the costs of a particular problem with the aim of giving an idea of its economic burden."

In conducting COI studies, therefore, researchers are expected to recognize, identify, list, measure and value the costs that a disease generates. Further, identifying and analysing COI presents useful opportunities for communicating with the public and policy makers on the relative importance of specific diseases (Tarricone, 2006). Health economics research recognizes four broad categories of costs: direct medical costs, direct non-medical costs, indirect costs and intangible costs. The summation of the direct and indirect costs will give the total costs.

A study conducted in the United States by Campbell, Flood, Choucair, Greenbaun, Finch and Kraczkowsky (2007) gave an overview of costs and complications of pregnancy to employers showed that through job-based health coverage, employers incur high cost of pregnancy – related health care due to the increase in use of expensive diagnostics, increase

in preterm deliveries, and high rate of caesarean section. Employers are faced not only with direct medical costs of pregnancy but also absenteeism, short and long term disability and institutional knowledge loss arising from problems of retention after delivery (Campbell et al, 2007). Other studies have shown that care before pregnancy can save as much as for every US$1.00 invested in preconception care. Again, if clients stick to healthy guidelines during pregnancy. Risk of complications will be reduced thus reducing cost (Campbell et al., 2007). In the same study, employers will be able to save US$3.33 for postnatal care and US$4.63 in long term morbidity cost if they spend money on prenatal care. Caesarean section contributes to high cost of pregnancy care. In 2004, employer - sponsored health coverage incurred US$7,737.00 on vaginal delivery and US$10,958.00 for caesarean section (Ibid). The mean costs of complicated deliveries range between $7.35 in Tanzania (Kowalewski, Mujinja and Jahn, 2002), $355.20 in Bangladesh (Afsana, 2004) and $43.68 in Ghana of which the mean cost for pre-eclampsia was $79.35 (Dalaba et al., 2015).

In Ghana, a study conducted on the cost of households in treating maternal complications in the Kasena- Nankana district in the Northern region of Ghana, showed that the total cost of treating HDP (pre-eclampsia) - one of the maternal complications - was US$317.39 with a median expenditure of US$58.33 (IQR=64.65). (Dalaba et al., 2015). Whereas the study by Dalaba et al. was dedicated to maternal complications due to severe bleeding (haemorrhage), infections, high blood pressure (pre-eclampsia and eclampsia) and unsafe abortion in general, this study focused, principally, on cost of hypertensive disorders in pregnancy. This study, therefore, excluded maternal complications due to severe bleeding (haemorrhage), infections, and unsafe abortion but included pre-eclampsia and eclampsia.

In Ghana, the National Health Insurance Scheme (NHIS) covers most of the antihypertensive drugs and cost of antenatal care and delivery. However, clients pay for drugs not under the scheme by themselves. A COI study on receiving care will provide the basis for cost effectiveness studies that will inform policy makers in the allocation of health resources and will create awareness of the magnitude of the economic burden of care.

2.6 Direct costs of hypertensive disorders in pregnancy

Incurred by the health system, society, family and individual patient, the direct costs of hypertensive disorders in pregnancy consist of direct medical and direct non-medical costs (Jo, 2014a). Medical costs are defined as the medical care expenditures for diagnosis, treatment, and ultrasound scan of hypertensive disorders in pregnancy. Direct medical costs include all types of resource use – private and non-private (not only the monetary exchanges of these) – such as drugs, tests, supplies, health-care personnel, and hospital facilities. In addition, they include the costs of further testing to follow up both false positive and true positive results and the future costs (or savings) associated with the disease such as hospitalization and treatment costs (Jo, 2014a).

Direct non- medical costs are related to the consumption of non-healthcare resources like transportation, household expenditures, relocating, property losses, and informal cares of any kinds (ibid).

According to Dalaba et al. (2015) mean direct medical costs in the management of pre-eclampsia in the Kassena Nankana district in the northern region of Ghana was estimated at US$119.45 whilst direct non - medical costs (food and transportation) are estimated at US$140.00 . A facility based study conducted in Ghana and Benin to evaluate the impact of severe obstetric complications (near – miss events) such as bleeding, eclampsia, infection

and obstructed labour, on total costs of care to clients and their families argues that the total costs of obstetric emergencies poses a significant financial burden for households. In Ghana, total cost of managing HDP was US$136.50. Direct medical cost was estimated at US$106.60 whilst direct non-medical costs was US$29.90. In Benin, the total direct costs was US$181.20. Direct medical costs was US$107.90 whilst direct non-medical costs was estimated at US$73. 60 (Borghi et al., 2003). Storeng et al., indicated that in Burkina Faso, the direct costs of managing pregnancy complications was higher as compared with uncomplicated deliveries in the same hospitals: 29,179 F (£30,05) versus 11,724 F (£12.07) respectively (Storeng et al., 2008).

The total direct costs to households with maternal deaths in three provinces in China was estimated at US$4,199.00. This is ten times higher than costs of those without maternal death (US$390.00). The mean total direct medical costs of households was US$2,248.00 whilst direct non-medical costs amounted to US$217.00. Giving a total direct cost of US$2,465.00. Funeral costs, which represented a greater portion of the direct cost was US$1,654.00 (Ye et al., 2012).

While some key studies have been published on direct cost of hypertension generally, the overall state of knowledge has not expanded to include hypertensive disorders in pregnancy due mainly to the paucity of data. The analysis of the cost of hypertension, however, included both medical and non-medical costs. The opportunity cost of travel time and the time spent at the hospital were not considered. Therefore, further studies to estimate the cost of hypertensive disorders in pregnancy, including intangible costs and the opportunity cost of travel time and the time spent at the hospital are warranted.

2.7 Indirect costs of hypertensive disorders in pregnancy

Indirect costs refer to productivity losses due to morbidity and mortality, borne by the individual, family, society, or the service provider. Indirect costs constitute: (i) costs associated with lost or impaired ability to work or to engage in leisure activities attributable to illness; and (ii) lost economic productivity due to death. (Roux and Donaldson, 2004).

Costs of time include costs of time spent in travelling to and from the health facility, waiting for care as well as in actually receiving the treatment. Informal care is taken to be care that is provided to the ill person by family members and friends who are not paid for the help they provide. The time a family member or volunteer spends to provide care, such as chronic nursing for the ill person, is considered within this cost component (Jo, 2014a).

The total indirect cost to households for treating pre-eclampsia was estimated at US$57.92 in the Kassena Nankana district in the northern region of Ghana (Dalaba et al., 2015). The total productivity loss to households with maternal deaths in was US$154 and the median economic burden of a maternal death represented 37% of the household annual income (Ye et al., 2012).

In contrast, indirect costs attributable to maternal deaths which occurred in 2010 in 45 of 47 countries in the African Region of the WHO, were reported at per capita level. As with cost estimates associated with indirect costs, there was variability in the estimates of the occurrence of the reported maternal deaths. The costs per capita attributable to maternal deaths, on the average, was Int$3.718 with variations from Int$343 in Democratic Republic of Congo to Int$26.792 in Equatorial Guinea (Kirigia, Mwabu, Orem and Muthuri, 2014).

Additionally, much of the extent literature examined productivity loss by clients and caregivers. For example, a cross sectional survey conducted in Nigeria involving 250 rural patients with primary hypertension at a regional hospital revealed that households with patients having hypertension spend more than 11% of their total income on treatment (antihypertensive drugs) (Ilesanmi, Ige and Adebiyi, 2012). Productivity loss due to absenteeism from work due to HTN was RM 176.59, RM 164.73 and RM 164.39 respectively for prehypertension, stage 1 and stage 2 hypertensive patients per month. Total indirect costs were RM 8,078.70, RM6, 654.52 and RM 7,511.41 (Alefan, Ibrahim, Razak and Ayub, 2009).

Time spent by caregivers spanned the time for simply being a companion to facilitating social interaction and reducing social exclusion. Indirect costs associated with both productivity loss by clients and time spent by client and caregivers for hypertensive disorders in pregnancy were, therefore, worth examining.

2.8 Intangible costs

Intangible costs are usually difficult to quantify and are usually related to pain, fear, isolation and suffering and the limitations it imposes on the quality of life of the client and relatives (Jo, 2014a). Few studies have so far estimated the intangible costs incurred during other illness like osteoarthritis (Xie et al., 2008), to reduce the complications in diabetes and for participation in diabetes risk reduction programs (Johnson et al., 2006). However, the degree of impact can be estimated using a standardized Likert scale instrument (Jo, 2014a). Anxiety and fear of costs associated with treating pregnancy complications lead to delay in seeking health care as family members have to go and search for money to pay for costs of managing obstetric complications (Storeng et al., 2008). This current study, therefore,

adopted the use of a standardized Likert scale instrument to estimate the intangible costs of hypertensive disorders in pregnancy.

Conclusion

Incidence of hypertensive disorders in pregnancy have become an issue globally, including Ghana. This is because of the high economic burden in creates on the individual, household, society and the state as a whole. Cost of illness studies are useful in the estimation and highlighting of the direct, indirect and intangible costs attributable to hypertensive disorders in pregnancy.

Many studies, for example, those conducted by Tuovinen (2014), Donovan (2012), Chowa, Lin and Goma (2011) and Owiredu et al. (2012) focused primarily on risk factors, signs and symptoms of hypertensive disorders in pregnancy, Magee et al. (2014) focused on treatment. Donovan (2012) and Mustafa et al. (2012a) referred to chronic hypertension, preeclampsia-eclampsia, superimposed on chronic hypertension, and gestational hypertension as important classes of hypertensive disorders in pregnancy. Even though Behan et al. (2008) and Dalaba et al. (2015) discussed direct and indirect costs, they focused on schizophrenia and emergency complications on pregnancy respectively. Others focussed on diabetes (Johnson et al., 2006), malaria (Ankomah and Asenso-okyere, 2003), smoking related diseases (Scarborough et al., 2011), obesity (Roux & Donaldson, 2004) and heart diseases (Ilesanmi et al., 2012). Most of them omitted intangible costs in their studies. In addition, none of the studies focused directly on the cost-of-illness of hypertensive disorders in pregnancy. The current study seeks to fill these gaps by identifying and estimating the economic burden (direct, indirect and intangible costs) of hypertension in pregnancy in Ghana.

CHAPTER THREE

METHODS

3.1 Introduction

This chapter summarises methods used in this study. It covers the research design, study area, study variable, sample population, sampling arrangements, research instrument, data management and analysis and ethical issues.

3.2 Study design

An exploratory, cross-sectional design was used to recruit pregnant women who had been diagnosed with HDP and were willing to participate. A quantitative data collection approach and cost-of-illness analytic method was used.

3.3 Study area

The study was conducted at Tema General Hospital, located in the Tema Metropolis. The Metropolis is one of 16 districts of the Greater Accra Region, located in the south eastern part of Ghana. Tema Metropolis has an estimated population of to 335,354 (as projected from the 2010 Census), with a growth rate of 3.1% per annum, making it the second most-populated of the ten districts in the Greater Accra Region, after Accra Metropolis.

The Tema General Hospital started operation in 1954 and serves as a referral hospital for both public and private hospitals and clinics in and around the metropolis. It has the following departments, Out-Patient Department (OPD), Maternity, Medical, Surgical, Theatre, Antenatal Care (ANC), Dental, Eye, Laboratory, X-Ray, Family Planning, Prevention of Mother – to – Child Transmission (PMTCT), Voluntary Counselling and Testing (VCT), Pharmacy, Kitchen, Laundry, and Mortuary. The hospital has a bed capacity

of over 300 and runs 24 – hour services. Payment for health service delivery is both by health insurance and out-of-pocket. Attendance at the OPD for 2015 was 136,241, with a mean of 11,553 clients per month. Hypertension cases seen in 2015 were 10, 971, with a mean of 915 cases per month. Hypertension clinics are run every Wednesdays and Thursdays at the OPD. However, for pregnant women who are hypertensive, they are attended to at the ANC clinic on daily bases as and when they report. The Obstetrics and Gynaecological Department, where data was collected comprised of the Antenatal Care unit, Labour Ward, Lying – in Ward, Fourth Stage Ward, Gynaecological Ward, Family Planning Unit and Operating Theatre. The staff strength of the department is 81 and a bed capacity of 92. The department recorded about 9,714 OPD consultation, consisting of 3,174 special cases and 6,540 general obstetrics/ Gynaecological cases. The maternity unit of the hospital reports a lot of cases due to HDP. According to the 2015 annual report of the department, the lying-in ward had 2,650 admissions out of which 323(12.2%) had HDP. The Gynaecological ward also admitted 2,355 cases out of which 86 (3.7%) reported with HDP. Out of 41 maternal deaths recorded in the department, 8 (19.5%) were due to HDP.

The metropolis hosts three public health facilities, namely, Tema General Hospital, Tema Polyclinic, and the Tema Municipal Assembly Maternity Clinic. There are about eighty-four (84) private health facilities, including hospitals, clinics and maternity homes, spread throughout the metropolis.

3.4 Study population

The study population included all the pregnant women diagnosed by a medical doctor of having hypertensive disorders in pregnancy receiving care at the Tema General Hospital within the study period.

3.4.1 Sample size determination

The purpose of the study was to offer new insights into the economic burden (financial, social and psychological) of hypertensive disorders in pregnancy. Thus, an exploratory approach was employed. This was due to paucity of empirical studies on cost of HDP in Ghana. So far, the only empirical study available to this researcher and consequently guided her research, was a three-month cross-sectional study which was conducted in the Kassena-Nankana district in the Northern Region of Ghana by Dabala et al. (2015). The study estimated the cost of maternal complications in pregnant women and their household. Out of the Sixty (60) women enrolled in that study, only 7% of the total cost estimated was due to HDP (pre-eclampsia). This sample was obviously small. Respondents were enrolled purposively over a one – month of study. This purposiveness was due to rareness of HDP during the data collection period and the short enrollment period. At the end of the data collection period, 50 pregnant women diagnosed of hypertensive disorders were interviewed.

Inclusion criteria: Pregnant women with HDP who agreed to participate in the study as well as persons who provided care to the pregnant women diagnosed of having hypertensive disorders within the three weeks of the study and did not receive any financial payment were included.

Exclusion criteria: Pregnant women with HDP who were unwilling to participate in the study during the period of the data collection as well as persons who provided care to the pregnant women diagnosed of having hypertensive disorders within the one month period of the study, or were under 14 years or received financial payment were excluded.

3.4.2 Study variables

The description of the study variables is presented in Table 2. Table 2 further describes the components of the cost that is incurred by the individuals and their household.

Table 2: Description of study variables

Type of Cost	Category of Cost	Description
Direct cost	Medical cost	Cost of drugs Cost of diagnostics Consultation fees Cost of other therapies
	Non-medical cost	Cost of travel for patients and caregivers Cost of food and drinks for patients and caregivers Miscellaneous cost
Indirect cost	Cost of productivity loss	Productivity loss to patient due to absenteeism Productivity loss to patient due to travel time Productivity loss to patient due to waiting time at clinic
Intangible cost	Intangible cost	Physical Pain Depression Stress Loss of social life Anger, etc.

3.5 Data Collection procedure

The structured interview-administered questionnaire was the data collection tool used for this study. It had both open-ended questions that required written responses and closed-ended questions provided with predetermined options. Data was collected from both in – patient and out – patient pregnant women diagnosed with hypertensive disorders in pregnancy.

After meeting prospective respondents, the researcher introduced herself and politely explained the purpose and benefit of the study. Those who could read and comprehend were provided with the consent form. For those who could not read, the consent for was read and explained to them in a language they could understand. (See Appendix II for consent form).

Thereafter, those who agreed to participate in the study were asked to endorse the consent form. Those who declined to be part of the study were respectfully replaced by the next available and consenting individuals.

Data collection was carried out by the researcher herself with the help of two assistants. The questionnaires were administered to pregnant women diagnosed of having hypertensive disorders in pregnancy individually and in a face-to-face situation. At the end of each data collection day, discussions were held with the two research assistants to discuss the filled out questionnaires and cross-check to ensure completeness. On the average, four questionnaires were completed in a day and 50 questionnaires were successfully completed over One month.

3.6 Data collection tool

A structured questionnaire was used for the data collection and it took about 30 minutes to administer each one of them. The questionnaire was divided into five sections and covered a wide range of socio-economic and medical (cost of illness) topics. The sections are described briefly below:

Section 1: Socio-demographic information

Questions under this section dealt with clinic status, age, education, marital status, religion, employment and salary of respondent.

Section 2: Obstetric/Medical history and treatment information

Questions under this section considered the diagnostics, age of pregnancy, number of children, history of hypertension of respondent and family, clinic attendance and admissions, as well as who paid for treatment.

Section 3: Direct cost information

This section enquired about direct medical cost in terms of registration and consultation, drugs, laboratory test, scans and admissions (where possible) and direct non-medical cost in the form of cost of travel, food drinks/water as well as other costs.

Section 4: Indirect cost information

Questions under this section dealt with days of absence from work, time spent to travel to and antenatal clinic as well as caregiving in the form of transport, food, drinks and other expenses.

Section 5: Intangible Costs information

Using the Likert scale technique, this section solicited responses on depression, stress, effect of HDP on family, anger, pain, fear, effect of HDP on social life as well the psychological burden of the illness.

3.7 Quality control

3.7.1 Pilot study

In order to ensure that the questions were clear to participants, the questionnaire was pre-tested at the Atua Government Hospital in the Lower Manya Krobo Municipal which had a similar setting as the study area. Ten questionnaires were administered during the pre-testing period and the responses analysed manually. Feedback on the length of the questionnaire, the clarity of language/expression, the sequence of sections and questions, and the strategy of ensuring high response rate, were elicited during the pilot test. The feedback was positive. A couple of suggestions were made concerning the clarity of expression. These were incorporated into the final questionnaire. The experience gained from the pilot study helped

the researcher to appreciate and plan for the challenges she was likely to face in the field during the final administration of the questionnaire.

3.7.2 Validity and reliability

The questionnaire was evaluated content validity to ensure that it actually measured cost of hypertensive disorders in pregnancy and this was achieved in at least three ways. Firstly, the questionnaire was designed by the researcher after a review of extant literature on cost of illness studies to ensure that it measured exactly that. Secondly, a subject-matter expert such as my supervisor was relied upon to review the content of the questionnaire to ensure that it had captured all essential elements on the subject matter. Thirdly, the two research assistants who helped with the questionnaire administration underwent two hours of training. The purpose of the training was to obtain better clarity, greater familiarity of the questions, experience, adjust content and set ethical norms to elicit the right responses for the study.

In addition, all completed questionnaires were checked for errors and completeness and validated daily before data entry. After data entry process the dataset was cleaned before running the analysis.

The training of the two research assistants to administer the questionnaires did not only ensure better clarity on the subject matter to elicit the right responses for the study, but also ensured the questionnaires and the responses from them could be relied upon. In this way, the questionnaires were expected to produce similar results from different respondents during the survey period.

In addition, ensuring that the content of questionnaire reflected actual constructs for cost of hypertensive disorders of pregnancy would also ensure that similar questions give rise to similar answers.

3.8 Data entry and analysis

The data was serialised and coded within 24 hours of the administration, entered into SPSS version 21 and cross-checked twice for errors before analysis. The mode of analysis was quantitative. However, the analysis did not provide any causal evidence, neither did it attempt to identify significant associations between variables. Categorical variables were summarized as frequencies and percentages while continuous variables were summarized as means and standard deviations. The data was presented using tables, figures, charts and graphs.

Estimation of direct medical cost, direct non-medical cost and indirect cost incurred by pregnant women with hypertensive disorders who attend ANC clinic at the Tema General Hospital during the data collection period was done.

Direct medical costs: This was estimated by summing all the costs incurred by patients and care givers because of hypertensive disorders in pregnancy and its related complications on medical goods and services such as consultation, diagnostic test and drugs. The mean cost was estimated by adding the estimated direct medical costs and dividing it by the number of respondents.

Direct non-medical costs: This was estimated by summing non-medical goods and services e.g. travelling cost, feeding and other incurred costs due to the hypertensive disorders in

pregnancy and its related complications and comorbidities. The mean cost was estimated by adding the estimated direct medical costs and dividing it by the number of respondents.

Total direct costs: This was estimated by summing the estimated direct medical and non-medical costs incurred due to the hypertensive disorders in pregnancy and its related complications.

Indirect costs: This was done based on Human Capital Approach (or Income Approach). This estimated output or productivity losses based on total work hours lost and total lost earnings (using national daily minimum wage of GHS8.00 a day) due to the hypertensive disorders in pregnancy and its associated complications. The mean cost was estimated by adding the estimated indirect medical costs and dividing it by the number of respondents.

Intangible costs: This could not be quantified. Hence, a five point Likert scale which allowed individuals to express how much they agreed or disagreed with specific questions was used to assess the intangible costs. The scale assumed that the strength/intensity of experience was linear and it tapped into the cognitive components of the feelings of respondents. The components were categorized as psychological, social and physical effects of the illness. The five scale of opinions were as follows: "Never", "Rarely", "Sometimes", "Quite Frequently", "Always".

Direct and indirect costs constituted total costs. Since intangible costs are not quantified in monetary terms, they were not added to the total costs. Intangible costs were only described qualitatively. All cost estimated were cost incurred by clients and caregivers for a period of One month.

3.9 Sensitivity Analysis

A sensitivity analysis was undertaken to ascertain the robustness of the results of the results of the study. The sensitivity test was conducted on drug and wage rate due to the uncertainties in the respondents estimated values. Drug and wage rate were varied individually by an increase of 5%, 7% and 10% chosen by the researcher. A multi- variation was carried out by varying both drug and wage rate by an increase of 5%, 7% and 10%.

3.10 Ethical Consideration

Ethical approval for the study was sought from the Ghana Health Service Ethical Review Committee of the Research and Development Division of the Ghana Health Services prior to the commencement of the study.

Introductory letter was collected from the School of Public Health to seek permission and approval from the Medical Director of the Tema General Hospital.

Informed consent was also sought from pregnant women diagnosed of hypertensive disorders in pregnancy who were seeking Antenatal care at the Tema General Hospital and agreed to participate in the study.

Declaration of Conflict of Interest

There were no conflicts of interest as far as this study was concerned.

3.11 Potential risk/benefits and compensation

This research did not pose any risk to either the study population or community. The results was expected to be beneficial to both the population and the community in diverse ways. First and foremost, the study provided the study population information about the estimated cost of hypertensive disorders in pregnancy on patient/household per month. Secondly,

quantifying the cost of HDP would inform policy makers and government about the economic burden associated with this disease. This would aid in planning and budgeting for pregnancy – related complications in various communities.

There was no form of compensation for participants used in the study other than a word of appreciation.

3.12 Privacy and Confidentiality

Respondents were informed that their identity and privacy would be protected, and the purpose of the study was explained to them. The confidentiality of respondents was protected as codes were used to identify them instead of their names. Interviews were conducted in enclosed places. Data was reported in aggregates to minimize traceability of respondents.

Voluntary Consent/Withdrawal

Written informed consent was obtained from study participants before data was collected. Participation in the study was solely voluntary and participants were given the option to opt out at any desired time.

3.13 Data usage and storage

Questionnaires were serialized, coded, entered within 24 hours of collection and kept under lock and key. The principal researcher was the only one having access to the data. The coded questionnaires were entered into SPSS version 21 with a password known by the principal investigator. Soft copies were stored on an external drive. All data collected would be kept by the principal investigator for 3 - 4 years to allow for publication of research. After use of data, all soft copies would be cleaned and hard copies destroyed.

3.14 Limitations of the study

A foremost limitation was the likelihood of recall bias. Some expenditure could either have been overestimated or underestimated. However, since expenditure on health are critical issues for low income families, they tend to recollect as much information on it as possible. To help mitigate the effect of recall bias, the research assistants were adequately trained on how to ask probing questions to facilitate recall.

Intangible costs were not included in the analysis and this could have led to the underestimation of the overall cost. Intangible costs relates to the reduced quality of life due to the illness. It includes stress, depression, pain, anger and reduced joy of life due to the illness. However, this cost component, though important, was difficult to cost and therefore, was not included in cost estimates. They were only described.

CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter presents the findings of the study.

4.2 Socio- demographic characteristics

Table 3 shows the socio-demographic characteristics of respondents.

Table 3: Socio- demographic characteristics

Category	Sub-category	Frequency	Percentage (%)
Age	19 and below years	4	8
	20-24	5	10
	25-29	12	24
	30-34	15	30
	35 and above	14	28
Education	No education	3	6.0
	Primary	8	16.0
	JSS/JHS	26	52.0
	SHS/Vocational/Technical	10	20.0
	Tertiary	3	6.0
Marital status	Married	36	72.0
	Not Married	14	28.0
Income (Monthly)	Less than 199 GHS	9	18.0
	200 – 399	20	40
	400 - 599	13	26
	600 - 799	5	10
	800 and above	3	6
Employment	Unemployed	5	10.0
	Self-Employed (trader, artisan, etc.)	38	76.0
	Formal sector employee	4	8.0
	Student/Apprentice	3	6.0
Parity	0	17	34.0
	1	13	26.0
	2	8	16.0
	3	9	18.0
	4	2	4.0
	5	1	2.0
	Total	**50**	**100.0**

The youngest and oldest respondents were aged 15 and 42 years old respectively. The mean age was 30.6 years with a Standard Deviation of 6.7. The modal age class (30%) is 30-34

years. This is followed by the 35 and above (28%), 25-29 (24%) and 20-24 (10%) and 19 years and below (8%).

In terms of education, 52% (26) of the respondents had junior high school level of qualification, 20% (10) had senior high school/vocational/technical, 16% (8) had primary school and 6% (3) had tertiary or no formal education. Majority of the respondents 72% (36) were married and 28% (14) unmarried.

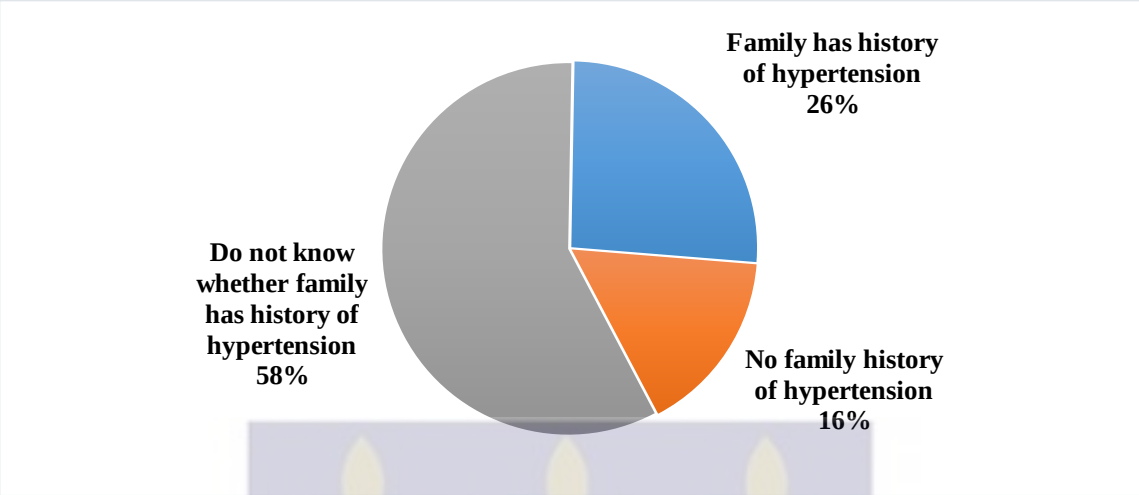
Table 3 further shows that 76% (38) were self-employed, 10% (5) were unemployed, 8% (4) were formal sector workers and 6% (3) were students/apprentices. Thirty four percent (17) of the respondents had no children; 26% (13) had one child and 18% (9) had three children. The rest are 16% (8), two children; 4% (2), four children and 2% (1) five children respectively.

The total mean monthly minimum income from both sources was GHS394.60 (SD GHS225.79) US$101.20). The total monthly income for respondents was GHS19, 730.00 (US$5,058.97).

4.3 History of hypertension in family

There were 14 (28%) out-patients and 36 (72%) in-patients (on admission). Almost 60% (29) of respondents said they did not know whether any of their family members had a history of hypertension. Slightly more than a quarter (26%) knew that their family members had a history of hypertension as against 16% (8) who did not have cases of hypertension in the family.

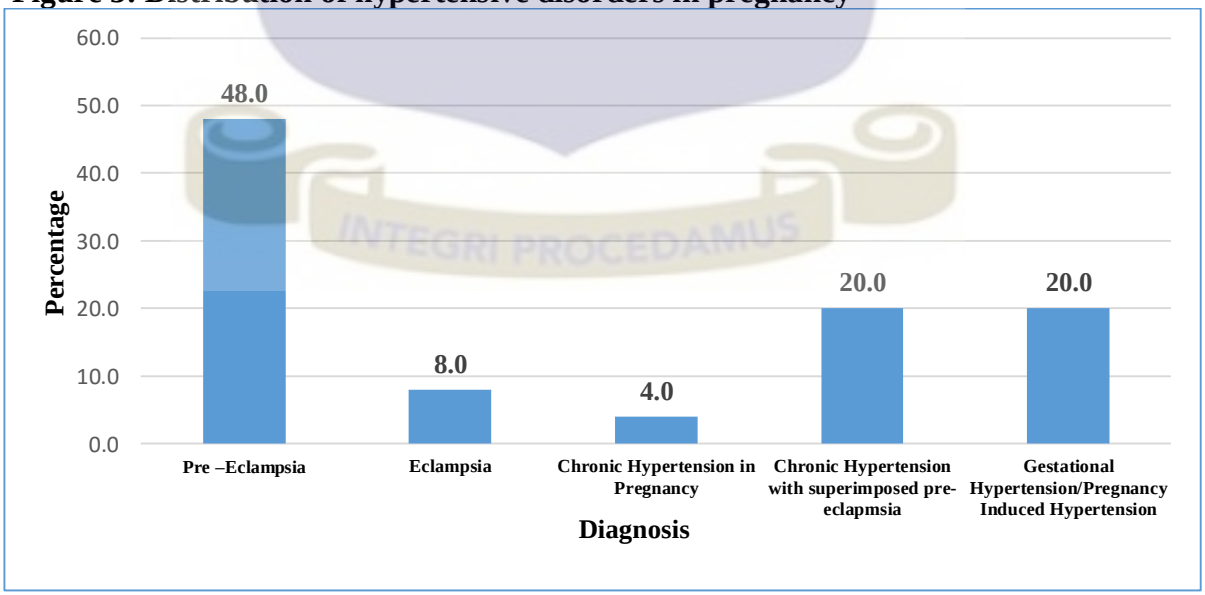
Figure 2: History of hypertension in family



4.4 Distribution of hypertensive disorders in pregnancy

As shown in Figure 3, almost half (48%) of the hypertensive disorders in pregnancy were pre-eclampsia cases. Twenty percent (10) were cases of chronic hypertension with superimposed pre-eclampsia, 20% (10) due to gestational hypertension, 8% (4) due to eclampsia and 4% (2) due to Chronic Hypertension in Pregnancy.

Figure 3: Distribution of hypertensive disorders in pregnancy



4.5 Cost of hypertensive disorders in pregnancy

4.5.1 Direct costs

Table 4 presents the direct medical costs per month on the treatment of hypertensive disorders in pregnancy. The mean direct medical costs was estimated at GHS376.72 (SD GHS148.65). Total direct medical costs for all respondents was estimated at GHS18, 835.90 (US$4,829.72). This constituted approximately two-thirds (67.3%) of the overall total costs.

Table 4: Direct medical cost

	N	Total Cost (GHS)	Mean Cost (GHS)	Standard Deviation	%
Registration/consultation		562.00	11.24	3.05	3.0
Drugs		6,551.00	131.02	59.52	34.8
Laboratory Test		5,180.00	103.60	73.45	27.5
Ultrasound Test		2,205.00	44.10	15.74	11.7
Admission (Services)		4,337.90	86.76	71.64	23.0
Total direct medical cost	50	18,835.90	376.72	148.65	100.0

US$1.00 is equivalent to GHS3.99 (Bank of Ghana, June, 2016)

About 35% of the expenses on direct medical cost was made on drugs. This was followed by expenses on laboratory tests (27.5%), admission (services) (23.0%), Ultrasound Test (11.7%), and Registration/consultation (3.0%)

Table 5 depicts the direct non - medical cost per month on the treatment of hypertensive disorders in pregnancy. The mean total direct non – medical costs was estimated at GHS90.01 with standard deviation of GHS54.68, while the total non – medical costs was estimated at GHS4,500.60 (US$1,153.84). The direct non-medical constituted 16.08% of the overall total cost associated with hypertensive disorders in pregnancy. A total of GHS1, 952.40

(US$500.61) or 43.4% was spent on the client directly and GHS2, 548.20 (US$653.38) or 56.6% on caregivers.

Table 5: Direct non-medical

	Cost (GHS)	Mean cost (GHS)	Standard Deviation	%
Client				
Costs of transportation	867.30	17.35	13.53	44.42
Costs of food	604.00	12.08	6.51	30.94
Costs of drinks/water	289.10	5.78	3.31	14.80
Other costs	192.00	3.84	3.38	9.83
Total	1,952.40	39.05	19.97	100.00
Caregiver				
Cost of transportation	1,825.20	36.50	36.98	71.63
Cost of food	528.00	10.56	10.3	20.72
Cost of drinks/water	195.00	3.90	3.48	7.65
Other costs	0.00	0.00	0	0
Total	2,548.20	50.96	47.40	100
Total Direct Non-Medical costs	**4,500.60**	**90.01**	**54.68**	

The total mean direct costs was estimated at GHS466.73 (SD GHS 174.80) US$119.67). The total direct costs (medical and non-medical) was estimated at GHS23, 336.50 (US$5, 983.72) with. It represents 83.4% of overall total cost. See Table 6.

Table 6: Total Direct costs (Medical and Non-medical)

	N	**Cost (GHS)**	**Mean cost (GHS)**	**SD**
Total direct medical costs		18,835.90	376.72	148.65
Total direct non-medical costs		4,500.60	90.01	54.68
Total direct costs	50	23,336.50 (US$5,983.72)	466.73 (US$119.67)	174.80

4.5.2 Indirect cost

Out of a total productive time of 5,063.4 hours (Mean = 101.27 hours) lost as a result of the disease, about 90% was attributable to absence from work either to receive treatment, recover from illness or to have laboratory test or ultrasound scan done, with the remaining lost through travelling in and out (2.53%) and waiting (7.88%) to receive care. See table 7.

Table 7: Productivity loss – Hours (%)

	N	Absent from work (%)	Travel Time (%)	Waiting Time (%)	Total Productivity Loss (%)
Employed	42	4,224	103.4	319	4,646.40
Unemployed	5	0	19.5	53	72.50
Student/Apprentice	3	312	5.5	27	344.50
Total	50	4,536 (89.58)	128.4 (2.53)	399 (7.88)	5,063.40

Table 8 shows that the mean indirect costs for respondents who were employed (42) was GHS92.93 (SD GHS80.7). The overall total indirect costs was estimated at GHS4, 646.40 (US$1,191.38). Time loss by the unemployed and students/apprentice were not costed.

Table 8: Productivity loss - Indirect costs

	N	Cost (GHS) Travel Time	Cost (GHS) Waiting Time	Total Cost (GHS)	Mean Costs (GHS)	Percentage (%)
Employed	42	103.40	319.00	4,646.0	110.63	100
Unemployed	5	0	0	0	0	0
Student/Apprentice	3	0	0	0	0	0
Total	50	103.40	319.00	,646.40	92.93	100

Minimum wage is GHS8:00

4.5.3 Overall total Cost

Table 9 shows that the estimated overall mean costs of hypertensive disorders in pregnancy was GHS559.65 (SD GHS205.95). The overall total costs was estimated at GHS27, 982.90 (US$7,175.10).

Table 9: Overall Total Cost

Cost component	N	Cost (GHS)	Mean cost (GHS)	Percentage (%)
Direct cost		23,336.50	466.73	83.40
Indirect cost		4,646.40	92.93	16.60
TOTAL COST	50	27,982.90 (US$7,175.10)	559.65 (US$143.50)	100

While the direct cost of treatment and care was estimated at GHS23, 336.50 (US$5,983.72), accounting for 83.4% of the total costs, the total burden of indirect costs was much smaller, at GHS4, 646.40 (US$1,191.38) amounting to 16.6% of overall total costs. The proportions of direct and indirect costs are represented in figure 4.

Figure 4: Proportions of direct and indirect costs

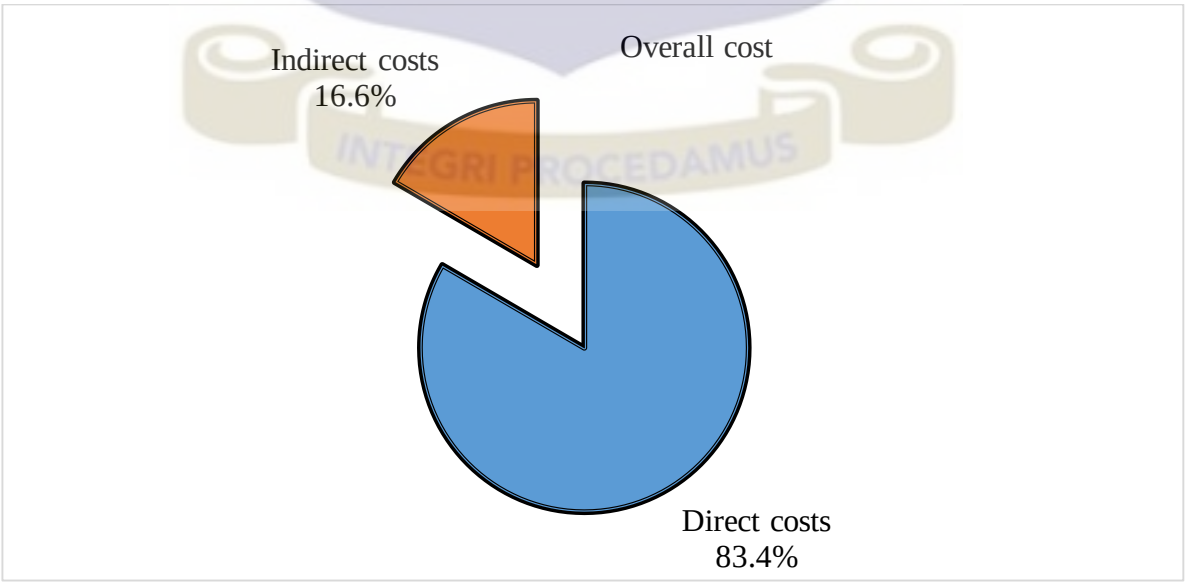


Table 10: Type of diagnosis by Total Cost

			Cost (GHS)			Mean (GHS)		
Diagnosis	N	Percent	Direct	Indirect	Total	Direct	Indirect	Total
Pre –Eclampsia	24	48	11,156.74	2,275.05	13,431.79	464.86	94.79	268.64
Eclampsia	4	8	2,129.63	109.00	2,238.63	532.41	27.25	44.77
Chronic Hypertension in Pregnancy	2	4	923.58	196.00	1,119.31	461.79	98.00	22.39
Chronic Hypertension with superimposed pre-eclampsia	10	20	4468.48	1128.10	5,596.58	446.85	112.81	111.93
Gestational Hypertension/Pregnancy Induced Hypertension	10	20	4658.33	938.25	5,596.58	465.83	93.83	111.93
Total	50	100	23336.50	4646.40	27,982.90			559.66

Disaggregating costs by type of diagnosis, women who had pre-eclampsia spent more (total cost = GHS13, 431.79 (US$3,444.05), with a mean cost of GHS268.64; direct cost of GHS11, 156.74 (US$2,860.70), mean of GHS464.86 and indirect cost = GHS2, 275.05 (US$ 583.35), mean of GHS94.79), than those who had other types of diagnosis.

The total costs due to eclampsia was GHS2, 238.63 (US$574.01) and this can be disaggregated further into direct and indirect cost of GHS2129.63 (US$546.06) and GHS109 (US$27.95) respectively. The rest were chronic hypertension in pregnancy, with a total costs of GHS1,119.32 (US$287.00), direct cost of GHS923.58 (US$236.82) and indirect cost of GHS196 (US$50.26); chronic hypertension with superimposed pre-eclampsia, total costs was GHS5,596.58 (US$1,435.02)), direct cost of GHS4468.48 (US$1145.76) and indirect cost of GHS1128.10 (US$289.26) and gestational hypertension/pregnancy induced hypertension, total cost was GHS5,596.58 (US$1,435.02), direct cost was GHS4658.33 (US$1194.44) and indirect cost of GHS938.25 (US$240.58) respectively.

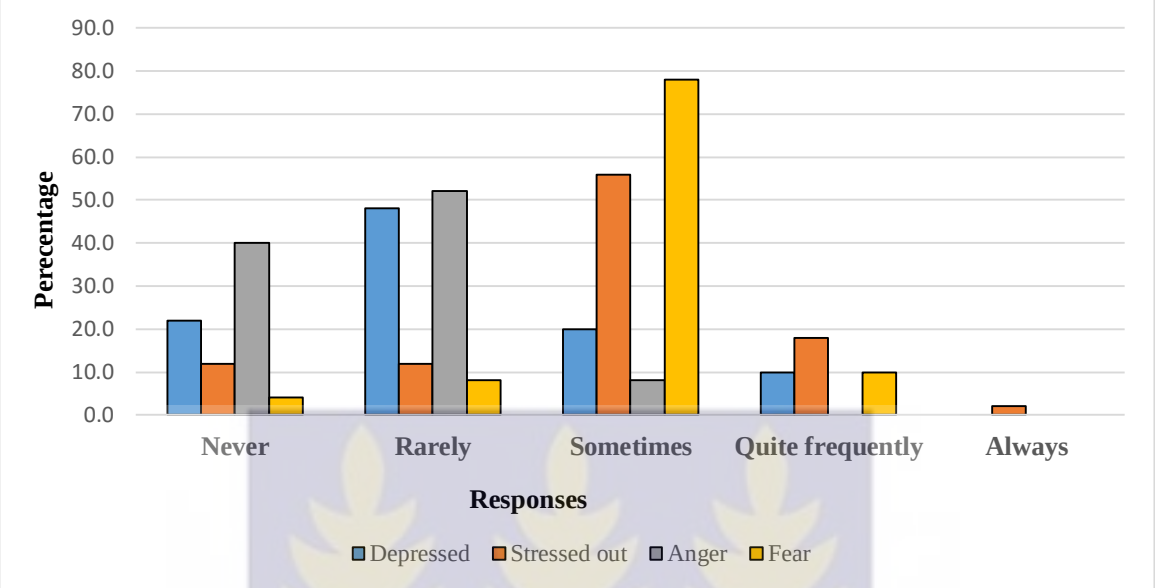
4.5.4 Intangible Costs

The components were categorized as psychological, social and physical effects of the illness on the respondents. The psychological effects of HDP on the respondents were fear, anger, stressed out and depression. The social effects included social life suffered and family members affected by illness. The physical effect was pain.

Psychological effects

More than a third (78%) revealed that they were sometimes afraid what the future holds for them. Other rates in a descending order are as follows: Quite Frequently (10%), Rarely (8%), Never (4%), and Always (0%). About half (52%) of respondents pointed out they rarely felt angry when depending on others for care. Other rates in a descending order are as follows: Never (40%), Sometimes (8%), Quite Frequently (0%), and Always (0%). Majority (56%) of respondents said they sometimes felt stressed out trying to cope with their illness and other household activities. Other rates in a descending order are as follows: Quite Frequently (18), Never (12%), Rarely (12%), and Always (2). Most (48%) respondents indicated that they rarely felt depressed because of their illness. Other rates in a descending order are as follows: Never (22%), Sometimes (20%), Quite Frequently (10%) and Always (0%).

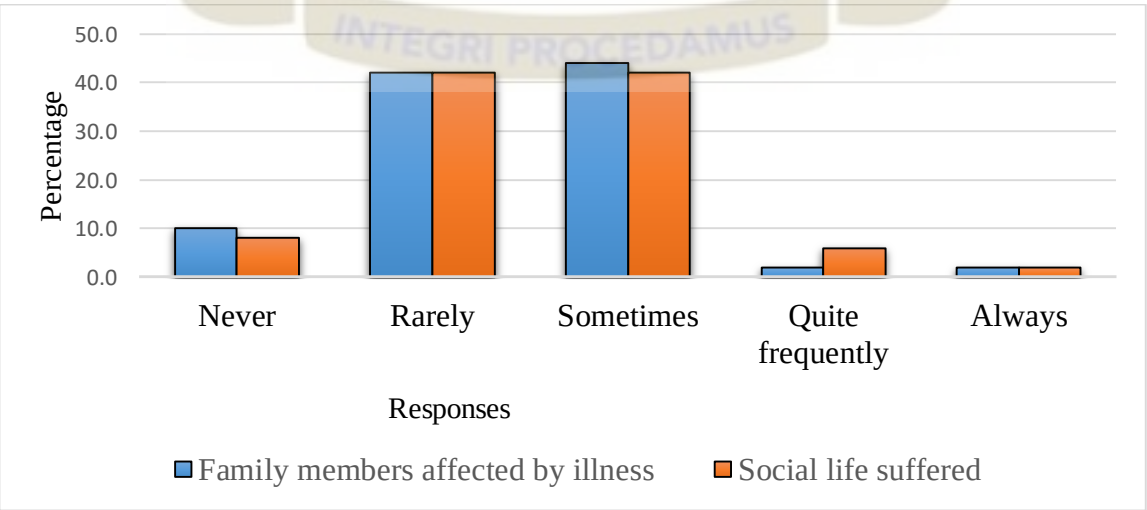
Figure 5: Psychological effect on respondents



Social effects

About 44% of respondents disclosed that they rarely or sometimes felt that their social life has suffered because of your illness. Other rates in a descending order are as follows: Never (8%), Quite Frequently (6%) and Always (2%). About 44% of respondents disclosed that they sometimes felt their illness has affected other family members. In a descending order, this is followed by Rarely (42%), Never (10%), Quite Frequently (2%), and Always (2%).

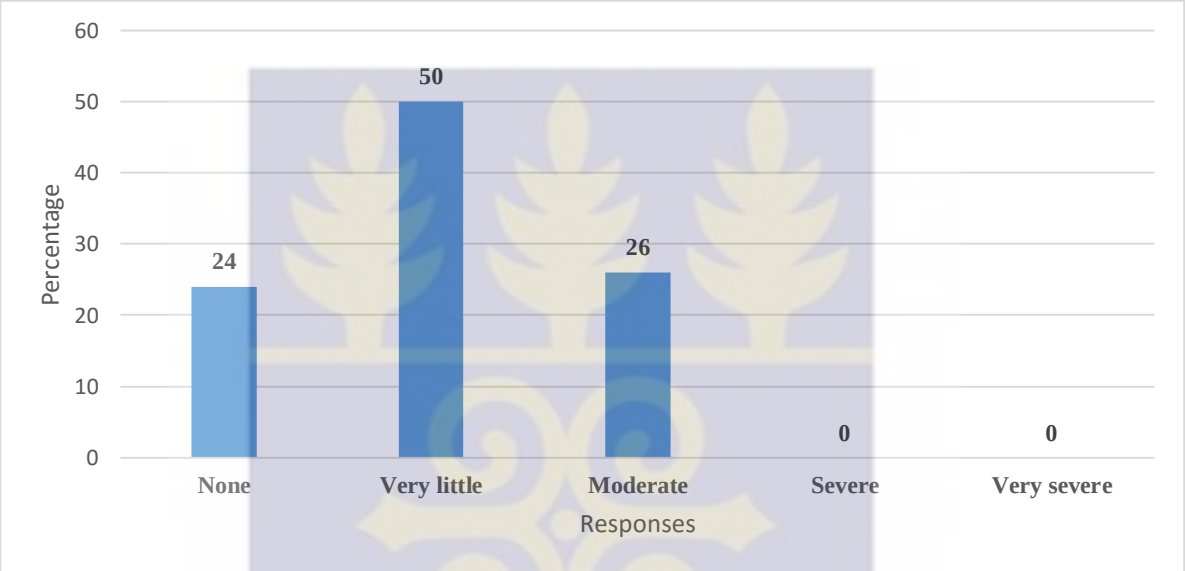
Figure 6: Social effects on respondents



Physical effects

About 50% of respondents indicated that they felt very little pain because of their illness. Other rates in a descending order are as follows: Moderate (26%), None (24%), Severe (0%), and Very severe (0%).

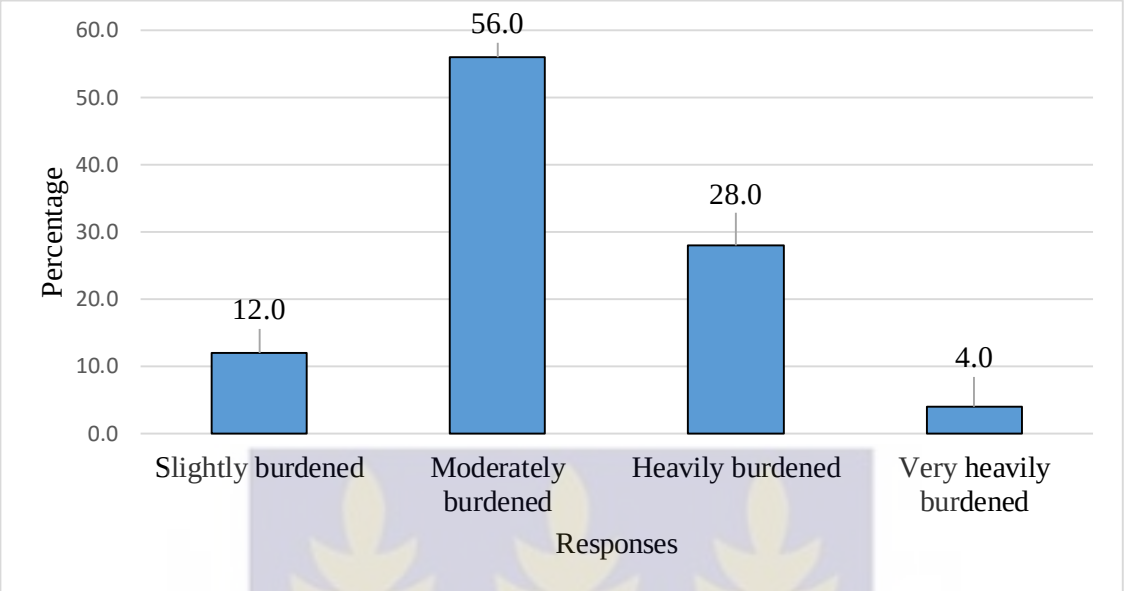
Figure 7: Physical pain



Overall burden

Overall 56% of the respondents felt moderately burdened by their illness (Figure 8). About 32% felt either heavily or very heavily burdened whilst 12% felt slightly burdened.

Figure 8: Overall feeling of burden about illness



4.5.5 Sensitivity analysis of cost of hypertensive disorders in pregnancy

In order to test robustness of costs estimated, one-way (1-way) and multi-way (M-way) sensitivity analysis (SA) were done by varying relevant costs components. The components on which the sensitivity tests were conducted were medication and wage. These components were selected due to the presence of uncertainty associated with those items. The test was conducted by increasing the two cost components by 5%, 7% and 10% respectively.

As shown in Table 11-way SA conducted by varying the cost of medication by 5%, 7% and 10% yielded respectively 1.2%, 19.6% and 20.3% increases in total cost of drugs. However, same analysis conducted on wage rate yielded percentage increases of 122.9, 125.5 and 129.5 respectively in total treatment cost. Also, while the 5%, 7% and 10% variations in medication respectively resulted in 0.2, 2.7 and 2.8 percentage increases in direct cost, same level of variations in wage rate respectively resulted in 46.0, 46.4 and 47.1 percentage decrease in indirect cost. Furthermore, concurrent variations in both medication and wage rate by 5%, 7% and 10%resulted in a percentage fall in direct cost in proportions to total

treatment cost and thus a percentage rise in indirect cost in proportions to total treatment cost. However, there was 124.0, 127.2 and 131.9 percentage increases in total treatment cost respectively. The results of the sensitivity analysis (Tables 11) shows that this study's cost estimates are sensitive to changes in wage and medicine cost variables.

Table 11: Sensitivity analysis of total cost of hypertensive disorders in pregnancy management

Scenario	Cost component	% change in parameter	Total cost		Percentage change in total cost	Proportion of total cost		Percentage change in proportions of cost	
			GHS	USD		Direct	Indirect	Direct	Indirect
Base scenario		0	27,982.90	7,175.10	0.0	83.4	16.6	0	0
Variation (One-way Sensitivity Analysis)	Drug	5	28,310.45	7,259.09	1.2	83.6	16.4	0.2	-0.2
		7	33,468.09	8,581.56	19.6	86.1	13.9	2.7	-2.7
		10	33,664.62	8,631.95	20.3	86.2	13.8	2.8	-2.8
Variation (One-way Sensitivity Analysis)	Wage rate	5	62,366.26	15,991.35	122.9	37.4	62.6	-46.0	46.0
		7	63,109.68	16,181.97	125.5	37.0	63.0	-46.4	46.4
		10	64,224.82	16,467.90	129.5	36.3	63.7	-47.1	47.1
Multi-variation (Two-way Sensitivity Analysis)	Drug and Wage rate	5	62,693.81	16,075.34	124.0	37.7	62.3	-45.7	45.7
		7	63,568.25	16,299.55	127.2	37.4	62.6	-46.0	46.0
		10	64,879.92	16,635.88	131.9	37.0	63.0	-46.4	46.4

*The cost of medication and wage rate was increased by *5%, 7% and 10%* increment respectively.

CHAPTER FIVE

DISCUSSION

This chapter presents the discussions of the study. The outline is based on the objectives of the research. It includes summary and discussion of the key findings of the study and relate it to published literature the economic burden of hypertensive disorders in pregnancy as well as physical and psychological pain associated with the disease.

The mean age of patients were suffering from hypertensive disorders in pregnancy was 30.6 years with a Standard Deviation of 6.7 years. The Ghana Youth Policy defines "youth" as "persons who are within the age bracket of fifteen (15) and thirty-five (35)". This means that the illness was more prevalent among young women, which is similar to a finding by Dalaba et al. (2015) in a study in Northern Ghana.

Almost a quarter of the respondents were aware of any family history of hypertension with about 60% being unaware of same. This finding is similar to the one reported by Addo et al, (2006) who reported that only 26% of hypertensive cases in a study in Southern Ghana were aware of any family history. The low levels of awareness may be attributed to the relatively low level of awareness creation of the disease in Ghana. Nevertheless, 72% of respondents possess either junior high school or senior high school level of education. Most of them might, therefore, possess the basic literacy skills to enable them comprehend and benefit from such an awareness creation endeavour.

5.1 Total costs of hypertensive disorders in pregnancy

Generally, the results of this study show that the economic burden of hypertensive disorders in pregnancy to households at the Tema General Hospital (mean = GHS559.65 (US$143.50)) was high. This was slightly lower than the total cost of generally managing hypertensive disorders in pregnancy, reported by Borghi et al., (2003) and cited by Dalaba et al., (2015) was US$136.50. This, however, constitutes a large expenditure for Ghanaian households, given that the mean monthly income of the respondents was US$101.20 (with 76% being informal sector workers) and the national monthly wage is about US$61 (8% were formal sector (waged) workers). This indicates that the amount spent on the hypertensive disorders in pregnancy is approximately 1.4 times higher than the total mean monthly minimum income of respondents and 2.4 times more than the monthly minimum wage earned by Ghanaians.

5.2 Direct costs of hypertensive disorders in pregnancy

The mean direct cost (comprising direct medical cost for medications, laboratory diagnosis, consultations and treatment and direct non-medical for travel, food and miscellaneous) was estimated at US$119.67. This is lower than the total direct costs of US$181.20 in Benin reported by Borghi et al., (2003) and cited by Dalaba et al., (2015). The difference may be due to free maternal health policy in Ghana which mandates all public and accredited private health facilities to bear such cost. The mean direct cost, which represents 83.4% of overall total cost, is, however, high, and represents more than 2.0 times the monthly minimum wage.

The mean direct cost is higher than the mean monthly income (US$101.20) of respondents. This is indicative of a high financial stress on households. Consequently, expenditure on hypertensive disorders in pregnancy will not only drain household resources, but also limit

their ability to meet other basic needs. Further, high nature of cost for hypertensive disorders in pregnancy may prevent or delay pregnant women from seeking care in a timely manner, leading to deteriorating health, further increased and postponed expenses and possibly death. A study by Berg et al., (2010) has revealed that women who experience hypertensive disorders in pregnancy experience severe maternal obstetric complications and a major cause of pregnancy-related maternal mortality. For the foetus, there is Intrauterine Growth Retardation (IUGR), preterm baby, stillbirth, neonatal deaths (Donovan, 2012). Disaggregating costs by type of diagnosis, women who had pre-eclampsia spent more than those who had other types of diagnostics. This finding was similar to the one reported Dalaba et al. (2015) who found same in a study in Northern Ghana.

With the free maternal health policy, borne out of the National Health Insurance Scheme (NHIS), all direct medical costs incurred in all public and accredited private health facilities are shouldered by the government. Without the NHIS, the cost of hypertensive disorders in pregnancy would be higher and way beyond the means of many pregnant women.

The research findings seem to raise grave concerns about the context within which the NHIS is being implemented. Maternal health services cannot be deemed to be free if cost of some medicines and services are still shouldered directly by patients. Anecdotal evidence, however, seems to suggest that even though maternal services are free, there are usually unofficial or under-the-table payments and buying drugs outside the health facility when health facilities are out of stock.

5.3 Indirect costs of hypertensive disorders in pregnancy

Indirect costs were estimated at a mean of GHS92.93 (US$23.83) and they amounted to about 16.6% of overall total cost. This can be distressing given that indirect costs are not covered by the NHIS. Indirect costs such as cost of transportation, food, drinks and care have been identified in many studies as a major obstacle to utilization of maternal health services (Ofori-Adjei, 2007). The mean indirect costs was about a third of such a cost associated with pre-eclampsia reported by Dalaba et al.,(2015). The contrast could possibly be attributed to contextual differences. At the Tema General Hospital, as in many state health facilities in Ghana, free ambulance services are non-existent and social support schemes for the vulnerable are rare and yet provide the only viable option in the face of persistent inability of government to meet all obligations.

The mean hours spent by respondents was about 101 hours per month or 25 hours per week to seek treatment and care and a greater part of this time was attributed to absence from work. This implies that hypertensive disorders in pregnancy cause considerable loss of household workdays away from primary occupation resulting in income and productivity losses.

5.4 Intangible costs

A good number (56%) of respondents indicated that they felt moderately burdened by their illness. From Table 10, 76% of respondents indicated that they nearly always or quite frequently or sometimes felt stressed about the disease whereas 88% revealed that they nearly always or quite frequently or sometimes felt afraid of the future because of the disease. Fifty percent said they felt quite frequently or sometimes that their social life has suffered because of the disease.

These four overarching themes could lead to depression and feelings of isolation. Several studies mentioned that the fear depression and feelings of isolation surrounding intangible costs lingered on for months and even for years indicating prolonged effects. When unrecognized or untreated, depression and isolation if unrecognized or untreated can lead to self-harm and in some cases, suicide (Cacciatore & Bushfield, 2007; Cacciatore, 2010).

The underlying implication is that, when unrecognized or untreated, the feeling of depression and isolation can reduce the quality of life due to these symptoms and will require long-term therapy and treatment.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

An exploratory study was conducted from the patient perspective the determine the economic burden of hypertensive disorders in pregnancy and to have a better understanding of the financial, social and psychological challenges faced by pregnant women diagnosed of having hypertensive disorders in pregnancy at Tema General Hospital. To reduce the cost of management of HDP, there is the need for early diagnosis of hypertension among pregnant women and prompt commencement of treatment to prevent severe complications that could lead to increase in cost when seeking health care. The findings exposed the high cost patients are faced with in the management of obstetric complications such as hypertensive disorders in pregnancy. This leads to respondents and their families finding ways and means of paying for the costs of healthcare in times of complications at the expense of other family needs. Although, maternal health services is officially free in Ghana, pregnant women incur huge costs in public health facilities in times of complications. The free maternal health policy being implemented currently, though important, is unable to reduce the economic burden of managing obstetric complications within the current health system.

The study concludes that, hypertensive disorders in pregnancy causes considerable economic burden and a significant deterioration in household income. This impacts negatively on welfare of the patient and family.

6.2 Recommendations

In view of the findings of this study, the following are recommended:

1. Generally, there is the need to wage an awareness/education campaign on hypertensive disorders in pregnancy. Heightened public awareness may lead to behavioural changes, a consequent reduction in the risks associated with the disease and adequate preparation, financially and psychosocially, towards pregnancy, delivery and postpartum.
2. Even though the free maternal care policy is being implemented in public health and accredited private facilities, it covers only direct medical costs and excludes non-medical and indirect costs. There is the need for patients and their families to put some money aside as a supplement, especially for emergency cases.
3. There should be a loans and saving schemes within the communities for members to fall on in times of need.
4. The health facility should be stocked with needed drugs and other services for patient care to reduce out- of pocket payment in public health facilities.
5. Psycho-social care and support should be made part of the treatment for hypertensive disorders in pregnancy for both patient and family. This will help to alleviate the level of pain, fear and the emotional burden that the patient and family go through during the course of illness.

REFERENCES

Addo, J., Amoah, A. G. B., & Kwadwo, K. a. (2006). The changing patterns of hypertension in Ghana: A study of four rural communities in the Ga District. *Ethnicity and Disease*, *16*(4), 894–899.

Addo, J., Smeeth, L., & Leon, D. A. (2007). Hypertension in sub-Saharan Africa: A systematic review. *Hypertension*, *50*(6), 1012–1018. http://doi.org/10.1161/HYPERTENSIONAHA.107.093336

Adu-Bonsaffoh, K., Samuel, O. a., Binlinla, G., & Samuel, O. a. (2013). Maternal deaths attributable to hypertensive disorders in a tertiary hospital in Ghana. *International Journal of Gynecology and Obstetrics*, *123*(2), 110–113. http://doi.org/10.1016/j.ijgo.2013.05.017

Afsana, K. (2004). The tremendous cost of seeking hospital obstetric care in Bangladesh. *Reproductive Health Matters*, *12*(24), 171–180. http://doi.org/10.1016/S0968-8080(04)24142-8

Ankomah, F. A., & Asenso-okyere, K. (2003). Economic Burden of Malaria in Ghana. A Technical Report Submitted to the World Health Organization (WHO), Africa Regional Office (AFRO),1 -81.

Baragou, S., Goeh-Akue, E., Pio, M., Afassinou, Y. M., & Atta, B. (2014). [Hypertension and pregnancy in Lome (sub-Saharan Africa): epidemiology, diagnosis and risk factors]. *Annales de Cardiologie et D'angéiologie*, *63*(3), 145–50. http://doi.org/10.1016/j.ancard.2014.05.006

Beaglehole, R., Epping-Jordan, J., Patel, V., Chopra, M., Ebrahim, S., Kidd, M., & Haines, A. (2008). Improving the prevention and management of chronic disease in low-income and middle-income countries: a priority for primary health care. *Lancet*, *372*, 940–949. http://doi.org/http://dx.doi.org/10.1016/S0140-6736(08)61404-X

Behan Caragh, Kennelly Brendan, & O'Callaghan Eadbhard. (2008). The economic cost of schizophrenia in\nIreland: a cost of illness study. *Ir J Psych Med*, *25*(3), 80–87. http://doi.org/10.1017/S079096670001106X

Berg, C. J., Callaghan, W. M., Syverson, C., & Henderson, Z. (2010). Pregnancy-related mortality in the United States, 1998 to 2005. *Obstetrics and Gynecology*, *116*(6), 1302–1309. *http://doi.org/10.1097/AOG.0b013e31821769ed*

Borghi, J., Hanson, K., Acquah, C. A., Ekanmian, G., Filippi, V., Ronsmans, C., … Alihonou, E. (2003). Costs of near-miss obstetric complications for women and their families in Benin and Ghana. *Health Policy and Planning*, *18*(4), 383–390. http://doi.org/10.1093/heapol/czg046

Cacciatore, J. (2010). The unique experiences of women and their families after the death of a baby. *Social Work in Health Care*, *49*(2), 134–148. http://doi.org/10.1080/00981380903158078

Cacciatore, J., & Bushfield, S. (2007). Stillbirth: The Mother's Experience and Implications for Improving Care. *Journal of Social Work in End-of-Life & Palliative Care*, *3*(3), 59–79. http://doi.org/10.1300/J457v03n03

Campbell K P, Flood G, Choucair J, Greenbaun E Finch R A, Kraczkowsky KG, W. A. (2007). *Investing in maternal and child health: an employer's tool kit*.

Chowa, P. E., Lin, C., & Goma, F, S.-P. J. (2011). Prevalence of Hypertension Among Women of Child Bearing Age in Zambia. *Medical Journal of Zambia*, *38*(3), 3 – 8.

Dalaba, M. A., Akweongo, P., Aborigo, R. A., Saronga, H. P., Williams, J., Aninanya, G. A., … Loukanova, S. (2015). Cost to households in treating maternal complications in northern Ghana : a cross sectional study, 1–8. http://doi.org/10.1186/s12913-014-0659-1

Donovan, P. (2012). Hypertensive disorders of pregnancy. *Australian Prescriber*, *33*(2), 209–220. http://doi.org/10.1177/0884217504262970

Hutcheon, J. a., Lisonkova, S., & Joseph, K. S. (2011). Epidemiology of pre-eclampsia and the other hypertensive disorders of pregnancy. *Best Practice and Research: Clinical Obstetrics and Gynaecology*, *25*(4), 391–403. http://doi.org/10.1016/j.bpobgyn.2011.01.006

Ilesanmi, O. S., Ige, O. K., & Adebiyi, A. O. (2012). The managed hypertensive: the costs of blood pressure control in a Nigerian town. *The Pan African Medical Journal*, *12*, 96.

Jo, C. (2014a). Cost-of-illness studies : concepts , scopes , and methods, 327–337.

Jo, C. (2014b). Cost-of-illness studies: concepts, scopes, and methods. *Clinical and Molecular Hepatology*, *20*(4), 327. http://doi.org/10.3350/cmh.2014.20.4.327

Johnson, F. R., Manjunath, R., Mansfield, C. A., Clayton, L. J., Hoerger, T. J., & Zhang, P. (2006). High-risk individuals' willingness to pay for diabetes risk-reduction programs. *Diabetes Care*. http://doi.org/10.2337/dc05-2221

Kirigia, J. M., Mwabu, G. M., Orem, J. N., & Muthuri, R. D. K. (2014). Indirect cost of maternal deaths in the WHO African Region in 2010. *BMC Pregnancy and Childbirth*, *14*(1), 299. http://doi.org/10.1186/1471-2393-14-299

Kowalewski, M., Mujinja, P., & Jahn, A. (2002). Can mothers afford maternal health care costs? User costs of maternity services in rural Tanzania. *African Journal of Reproductive Health*, *6*(1), 65–73.

Lozano, R., Naghavi, M., Foreman, K., Lim, S., Shibuya, K., Aboyans, V., … Memish, Z. A. (2012). Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*, *380*(9859), 2095–128. http://doi.org/10.1016/S0140-6736(12)61728-0

Magee, Laura A, Pels Anouk, Helewa Micheal, Rey Evelyn, von Dadelszen Peter, MacDonell Karen L., Moutquin Jean-Marie, S. I. (2014). Diagnosis , Evaluation , and Management of the Hypertensive Disorders of Pregnancy : Executive Summary. *SOGC Cllinical Practice Guideline*, *2014*(307), 416–438.

Magee, L. a, Helewa, M., Moutquin, J.-M., & von Dadelszen, P. (2008). Diagnosis, evaluation, and management of the hypertensive disorders of pregnancy. *Journal of Obstetrics and Gynaecology Canada : JOGC = Journal D'obstétrique et Gynécologie Du Canada : JOGC*, *30*(3 Suppl), S1–48. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/24927294

Magee, L. A., Pels, A., Helewa, M., Rey, E., von Dadelszen, P., & Group, O. behalf of the C. H. D. of P. H. D. P. W. (2014). Diagnosis, evaluation, and management of the hypertensive disorders of pregnancy. *Pregnancy Hypertension: An International Journal of Women's Cardiovascular Health*, *4*(2), 105–145. http://doi.org/10.1016/j.preghy.2014.01.003

Mounier-Vehier, C., & Delsart, P. (2009). [Pregnancy-related hypertension: a cardiovascular risk situation]. *Presse Medicale*, *38*(4), 600–608. http://doi.org/10.1016/j.lpm.2008.11.018

Mustafa, R., Ahmed, S., Gupta, A., & Venuto, R. C. (2012a). A comprehensive review of hypertension in pregnancy. *Journal of Pregnancy*. http://doi.org/10.1155/2012/105918

Mustafa, R., Ahmed, S., Gupta, A., & Venuto, R. C. (2012b). A comprehensive review of hypertension in pregnancy. *Journal of Pregnancy*, *2012*, 105918. http://doi.org/10.1155/2012/105918

Ofori-Adjei, D. (2007). Ghana's free delivery care policy [editorial] TT - . *Ghana Medical Journal*, *41*(3), 94–96. Retrieved from

http://www.ghanamedassn.org/Journal/September 2007/Editorial Commentary.pdf

Owiredu, W. K. B. A., Ahenkorah, L., Turpin, C. A., Amidu, N., & Laing, E. F. (2012). Putative risk factors of pregnancy-induced hypertension among Ghanaian pregnant women. *Journal of Medical and Biomedical Sciences*, *1*(3), 62–76.

Peters, R. M., & Flack, J. M. (2008). Hypertensive disorders of pregnancy. *Journal of Obstetric, Gynecologic, and Neonatal Nursing : JOGNN / NAACOG*, *33*, 209–220. http://doi.org/10.1177/0884217504262970

RCH/GHS. (2013). 2013 Annual Reproductive and Child Health Report Annual Report, 13–15.

Roux, L., & Donaldson, C. (2004). Economics and obesity: costing the problem or evaluating solutions? *Obesity Research*, *12*(2), 173–9. http://doi.org/10.1038/oby.2004.23

Scarborough, P., Bhatnagar, P., Wickramasinghe, K. K., Allender, S., Foster, C., & Rayner, M. (2011). The economic burden of ill health due to diet, physical inactivity, smoking, alcohol and obesity in the UK: An update to 2006-07 NHS costs. *Journal of Public Health*, *33*(4), 527–535. http://doi.org/10.1093/pubmed/fdr033

Segel, J. E. (2006). Cost-of-Illness Studies — A Primer. *Diabetes*, (January), 1–39. Retrieved from http://www.rti.org/pubs/coi_primer.pdf

Singh, R. (2013a). Hypertensive disorders in pregnancy. *Clinical Queries: Nephrology*, *2*(2), 47–55. http://doi.org/http://dx.doi.org/10.1016/j.cqn.2013.04.001

Singh, R. (2013b). Hypertensive disorders in pregnancy. *Clinical Queries Nephrology*, *2*(2), 47–55. http://doi.org/10.1016/j.cqn.2013.04.001

Storeng, K. T., Baggaley, R. F., Ganaba, R., Ouattara, F., Akoum, M. S., & Filippi, V. (2008). Paying the price: The cost and consequences of emergency obstetric care in Burkina Faso. *Social Science and Medicine*, *66*(3), 545–557.

http://doi.org/10.1016/j.socscimed.2007.10.001

Tarricone, R. (2006). Cost-of-illness analysis. What room in health economics? *Health Policy*. http://doi.org/10.1016/j.healthpol.2005.07.016

Tuovinen, S. (2014). *Maternal hypertensive disorders during pregnancy and the mental health and cognitive functioning of the adult offspring : the Helsinki Birth Cohort Study*, *1 -138*.

Wolde, Z., Segni, H., & Woldie, M. (2011). Hypertensive disorders of pregnancy in jimma university specialized hospital. *Ethiopian Journal of Health Sciences*, *21*(3), 147–54. Retrieved from http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3275872&tool=pmcentrez&rendertype=abstract

World Health Organization. (2009). WHO guide to identifying the economic consequences of disease and injury. *Geneva: World Health Organization*, 136. http://doi.org/ISBN 978 92 4 159829 3

Xie, F., Thumboo, J., Fong, K. Y., Lo, N. N., Yeo, S. J., Yang, K. Y., & Li, S. C. (2008). A study on indirect and intangible costs for patients with knee osteoarthritis in Singapore. In *Value in Health* (Vol. 11). http://doi.org/10.1111/j.1524-4733.2008.00371.x

Ye, C., Ruan, Y., Zou, L., Li, G., Li, C., Chen, Y., … Zhang, W. (2014). The 2011 survey on hypertensive disorders of pregnancy (HDP) in China: Prevalence, risk factors, complications, pregnancy and perinatal outcomes. *PLoS ONE*, *9*(6). http://doi.org/10.1371/journal.pone.0100180

Ye, F., Wang, H., Huntington, D., Zhou, H., Li, Y., You, F., & Li, J. (2012). The Immediate Economic Impact of Maternal Deaths on Rural Chinese Households, *7*(6). http://doi.org/10.1371/journal.pone.0038467

Zibaeenezhad, M. J., Ghodsi, M., Arab, P., & Gholzom, N. (2010). The prevalence of hypertensive disorders of pregnancy in Shiraz, Southern Iran, *4*((Zibaeenezhad, Ghodsi, Arab, Gholzom) Cardiovascular Research Center, Shiraz University of Medical Sciences, Shiraz, Iran, Islamic Republic of), 169–172. Retrieved from http://www.icrj.ir/UI/Pblc/..\..\Files\AuthArts\1222+.PDF\nhttp://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=emed9&NEWS=N&AN=2011183522

APPENDICES

Appendix I: Participant information leaflet

Project Title: Economic burden of Hypertensive Disorders of Pregnancy: A Case Study at Tema General Hospital

Background

My name is Irene M. F. Anuwa-Amarh, a student from the School of Public Health, University of Ghana, Legon. I am conducting a study on the economic burden of Hypertensive Disorders of pregnancy in pregnant women attending Tema General Hospital.

The study will involve answering questions from a closed and open ended questionnaire about the cost incurred as a result of hypertension during pregnancy. 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.

The study will not pose any potential risk to study population or the society. The study population as well as the society will benefit from this study. Study population will know how much they spend receiving care during pregnancy and when hypertensive disorders set in. Furthermore, knowing the economic burden of Hypertensive Disorders of pregnancy will sensitize policy makers and opinion leaders about the economic burden of hypertensive disorders of pregnancy. Cost effective interventions can be introduced to promote good health thus reducing the incidence and prevalence of hypertensive disorders of pregnancy, and the economic burden of the household. Knowledge of the economic burden of receiving care by the society will help them make informed decisions about their health

and lifestyles thus preventing hypertension especially in pregnancy and its associated cost with it. 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 are important to help estimate costs - of – illness.

A durbar, including the hospital staff, patients, their caregivers and other stakeholders will be held at the Tema General Hospital premises to disseminate the findings of the study. A copy of the study will be kept in the hospital as reference.

There will be no costs for participating in this research and there will be no payments awarded for participating clients in this research.

Before taking Consent

Do you have any questions you wish to ask about the study? Yes/No

If yes, please, indicate the questions below

……

……

……

For further questions, concerning the research, you may contact Ms Hannah Frimpong ERC Administrator (+233 24 3235221, +233 05 7041223), Irene Anuwa-Amarh on 0243132703 or Dr. Justice Nonvignon, University of Ghana, School of Public Health.

Appendix II: Consent Form

Statement of person obtaining informed consent:

I have fully explained this research to _____ and have given sufficient information about the study, including that on procedures, risks and benefits, to enable the prospective participant make an informed decision to or not to participate.

DATE: _____ NAME: _____

Statement of person giving consent:

I have read the information on this study/research or have had it translated into a language I understand. I have also talked it over with the interviewer to my satisfaction. I understand that my participation is voluntary (not compulsory). I know enough about the purpose, methods, risks and benefits of the research study to decide that I want to take part in it. I understand that I may freely stop being part of this study at any time without having to explain myself.

I have received a copy of the information leaflet and consent form to keep for myself.

NAME: _____

DATE: _____ SIGNATURE/THUMB PRINT: _____

Statement of person witnessing consent (For non-literate participants):

I (Name of Witness) certify that information given to

(Name of Participant), in the local language, is a true reflection of what l have read from the study Participant Information Leaflet, attached.

WITNESS' SIGNATURE (maintain if participant is non-literate):

_____

Appendix III: Questionnaire

Topic: Economic burden of Hypertensive Disorders in Pregnancy: a case study of Tema General Hospital

Dear respondent,

This is a research carried out on Hypertension in Pregnancy in the Tema General Hospital. I will therefore like to take a few minutes of your precious time to answer these questions. You are assured that the answers you give will be strictly confidential and your name will not be mentioned in my response report. Thank you.

Respondent ID: |___|___|___|

Qn No.	Questions	Response
Section 1	**Socio-demographic information**	
1	What is your clinic status 1. Out Patient 2. In Patient (on admission)	☐
2	Do you have National Health Insurance card? 1. Yes 2. No	☐
3	What is your age at last birthday (in years)	|___|___|
4	What is the highest level of school you attended? 1. No education 2. Primary 3. JSS/JHS 4. SHS/Vocational/Technical 5. Tertiary	☐
5	What is your current marital status? 1. Married 2. Not married	☐

6	What is your Religion? 1. Christianity 2. Islamic 3. Traditional Religion 4. Other (Specify)	☐
7	What work do you do? 1. Unemployed 2. Self - Employed (trader, artisan, etc.) 3. Formal Sector Employee 4. Student/Apprentice 5. Other (please specify) ……	☐
8	What is your Mean monthly income? (salary plus monies from other sources)	
	Salary/income	|__|__|__|__|__|.|__|__|
	Other (husband, relatives, friends, etc.)	|__|__|__|__|__|.|__|__|
Section 2	**Obstetric/Medical history and treatment information**	
9	Diagnosis from client records 1. Pre –Eclampsia 2. Eclampsia 3. Chronic Hypertension in Pregnancy 4. Chronic Hypertension with superimposed pre-eclampsia 5. Gestational Hypertension/Pregnancy Induced Hypertension	☐
10	How old is the Pregnancy? (in weeks)	|__|__|
11	How many children do you have?	|__|__|
12	Do you have a personal history of Hypertension? 1. Yes 2. No 3. Don't Know	☐
13	For how long have you been diagnosed as a hypertensive patient? (in weeks)	|__|__|
14	How old was the pregnancy when you were diagnosed? (in weeks)	|__|__|
	Do any of your family member have Hypertension? 1. Yes	☐

15	2. No 3. Don't Know	
16	How often do you attend clinic? 1. Weekly 2. Twice in a month 3. Monthly 4. Other (please specify)……..	☐
17	How many days have you been on admission? (if applicable)	|__|__|
18	Who pays for your Antenatal care/ hypertension treatment? (multiple answers possible) 1. Self 2. Spouse 3. Relatives 4. Employer 5. National Health Insurance 6. Private Health insurance 7. Other (please specify)	|__| |__| |__| |__|
Section 3	**Direct cost information**	
19	*Direct medical cost information (in last month)* How much money (GHS) did you spend for:	
	(a) Registration/ Consultation?	|__|__|__|__|__|.|__|__|
	(b) Drugs?	|__|__|__|__|__|.|__|__|
	(c) Laboratory tests?	|__|__|__|__|__|.|__|__|
	(d) Ultrasound Test (Scan)?	|__|__|__|__|__|.|__|__|
	(e) Admission? (if applicable)	|__|__|__|__|__|.|__|__|

	Total direct medical cost	|__|__|__|__|__|.|__|__|
20	***Direct non-medical cost information (in last month)*** How much money did you spend for? (GHS)	
	(a) Cost of travel in and out for care	|__|__|__|__|__|.|__|__|
	(b) Costs of food	|__|__|__|__|__|.|__|__|
	(c) Costs of drinks/water	|__|__|__|__|__|.|__|__|
	(d) other costs	|__|__|__|__|__|.|__|__|
Section 4	**Indirect cost information**	
21	How many days have you absent from work (if applicable) in the last month because of hypertension in pregnancy (i.e. treatment, recovery)?	☐☐ days
22	How many minutes did you spend travelling to and from the Antenatal Clinic?	☐☐☐ minutes
23	How many minutes did you spend at the Antenatal Clinic?	☐☐☐ minutes
24	Is somebody taking care of you whilst receiving care? 1. Yes 2. No	☐
25	How much is spent on care taker in respect of the following?	

	Transportation	|__|__|__|__|__|.|__|__|
	Food	|__|__|__|__|__|.|__|__|
	Drinks	|__|__|__|__|__|.|__|__|
	Other expenses	|__|__|__|__|__|.|__|__|
Section 5	**Intangible Costs information**	
26	Do you feel depressed because of your illness? 1. Never 2. Rarely 3. Sometimes 4. Quite Frequently 5. Always	☐
27	Do you feel stressed trying to cope with your illness and other household activities? 1. Never 2. Rarely 3. Sometimes 4. Quite Frequently 5. Always	☐
28	Do you feel your illness has affected other family members? 1. Never 2. Rarely 3. Sometimes 4. Quite Frequently 5. Always	☐
29	Do you feel angry when depending on others for care? 1. Never 2. Rarely 3. Sometimes 4. Quite Frequently 5. Always	☐
	Do you feel pain because of your illness? 1. None	☐

30	2. Very little 3. Moderate 4. Severe 5. Very severe	
31	Are you afraid of what the future holds for you? 1. Never 2. Rarely 3. Sometimes 4. Quite Frequently 5. Always	
32	Do you feel your social life has suffered because of your illness? 1. Never 2. Rarely 3. Sometimes 4. Quite Frequently 5. Always	
33	Overall, how burdened do you feel about your illness? 1. Not Burdened 2. Slightly Burdened 3. Moderately Burdened 4. Heavily Burdened 5. Very Heavily Burdened	

THANK YOU VERY MUCH