UNIVERSITY FOR DEVELOPMENT STUDIES, TAMALE

ASSESSING THE TREND, CAUSES AND CHARACTERISTICS OF FACILITY-LEVEL MATERNAL MORTALITY IN THE UPPER WEST REGION OF GHANA

BY

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FEBRUARY, 2017

DECLARATION

Candidate

I hereby declare that this thesis is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature…… Date…10TH MARCH 2017

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Supervisor's

I hereby declare that the preparation and presentation of this thesis was supervised by me in accordance with the guidelines on supervision of thesis laid down by the University for Development Studies.

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ABSTRACT

Maternal mortality remains a major public health challenge despite numerous strategies devised by the international community to curb it. Globally, maternal mortality is the leading cause of death among females within the reproductive age. The Upper West region being one of poorest regions contribute significantly to the high prevalence rate of maternal death at the national level. However, little attention is paid to the factors that lead to these deaths in the Region. The objective of the study is to assess the trend, causes and the characteristics that contribute to the death of mothers in health facilities in the upper west region. The study was a retrospective and descriptive in nature. All maternal death cases that occurred in Upper West Region from 2009 to 2014 were involved. A review of secondary data of 179 institutional maternal death records from all the 11 districts in the Upper West Region was performed. The data was sorted and coded into Microsoft Excel 2010 and exported into SPSS version 20.0 for statistical analysis. The findings were processed into frequency tables, charts, and graph. The results indicate an unstable maternal mortality trend in the region with a mortality ratio of 193 deaths/100,000 live births. The Wa Municipality and the Wa Regional Hospital contributed majority of the cases of 24.0% and 54.2% respectively. Majority of the deaths were within the age range of 20-29 with a median age of 28 years and among the uneducated. The major causes of the maternal deaths recorded included haemorrhage/bleeding, Sepsis, and anaemia. The Primidgravida and nulliparous women were the majority of the deaths with 56.4% of them dying within or after the 36th week of pregnancy. The trend of the maternal mortality in the Upper West Region is unstable but higher than the Millennium development Goal (MDG) MDG goal 5 targeted to be 150MMR per 100,000 live births by the end of 2015 and resulting from well-known factors. Practical steps must be taken by the Regional Health Directorate (RHD) and the District Health Management

Teams (DHMTS) to increase collaboration with Chiefs' Queen mothers and other stakeholders to prioritize more resources to disseminate information on the importance of early registration and continue ANC attendance in the region to save the innocent lives.

DEDICATION

To my husband Daniel, my son Kenneth and daughter Kasia for sacrificing their comfort for my education.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS/ACRONYMS

ANC	Antenatal Care
BEMOC	Basic Emergency Obstetric Care
CEmOC	Comprehensive Emergency Obstetric Care
CETS	Community Emergency Transport Services
CHPS	Community Health Planning and Services
DDHS	District Director of Health Services
DHD	District Health Directorate
DHMT	District Health Management Team
GHS	Ghana Health Service
GSS	Ghana Statistical Services
HCs	Health Centres
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
IQR	Interquartile Range
JHS	Junior High School
LDHD	Lawra District Health Directorate
MAs	Medical Assistants
MCH	Maternal and Child Health
MDG	Millennium Development Goals
MEP	Maternal Exemption Policy
MMR	Maternal Mortality Ratio
MOH	Ministry of Health
NDHD	Nandom District Health Directorate
NHIS	National Health Insurance Scheme

PNC	Postnatal Care
RHA	Regional Health Authority
RHD	Regional Health Directorate
RHMT	Regional Health Management Team
SAB	Skilled Attendants at Birth
SD	Skilled Delivery
SDG	Sustainable Development Goals
SHS	Senior High School
TBAs	Traditional Birth Attendants
UNDESA	United Nations Department of Economics and Social Affairs
UNDP	United Nations Development Program
UNFPA	United Nations Population Fund
UNICEF	United Nations Children Fund
UWR	Upper West Region
WHO	World Health Organization
WIFA	Women In Fertility Age

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Maternal mortality is defined as the death of a woman while pregnant or within 42 days of termination of the pregnancy (or giving birth) regardless of the gestational age and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes (WHO, 1992). A further introduction of a new category, namely, late maternal death is incorporated in the definition as "the death of a woman from direct or indirect obstetric causes more than 42 days but less than one year after termination of pregnancy" (WHO, 1992).

Maternal mortality remains as a major public health challenge despite numerous strategies devised by the international community to curb it. Globally, maternal mortality is the leading cause of death among females within the reproductive age (WHO, 2005). In 2008, it was estimated that 99% of maternal deaths occurred in the developing countries of Sub-Saharan Africa and South Asia. In Ghana, in 2008, some studies estimated the maternal mortality ratio (MMR) to be 451/100,000 live births (Der et al., 2013) in the Ghana medical journal . Even though this is much lower than many of its neighbours, Ghana's rate is still much higher than the global average and much higher than the target set by the Millennium Development Goal 5 by the end of 2015 (Der et al, 2013) in the Ghana medical journal .

According to WHO, UNICEF, UNFPA and the World Bank, estimates developed suggested that worldwide, about 260 women die per 100 000 live births and most of these deaths occur in sub-Saharan Africa. These estimates also indicate that Africa recorded the highest MMR of 620 per 100 000 live births, whilst Europe recorded the lowest MMR of 21 maternal deaths per 100 000 live births. Globally, Greece recorded the lowest maternal deaths by country with 2 deaths per 100 000 live births compared with an alarmingly high MMR of 1,400 deaths per 100 000 live births in Afghanistan (WHO, UNICEF, UNFPA, & Bank., 2010). In Sub-Saharan Africa the maternal mortality ratio (MMR) has dropped by 41 percent in 20 years. The 1990 ratio of 850 deaths per 100,000 live births declined to a regional average of 500 deaths per 100,000 live births in 2010 (Say et al., 2014).

The problem of maternal mortality has become an everyday phenomenon of the contemporary world. Women of childbearing age all over the world irrespective of race, education, occupation or marital status are faced with the agony of pregnancy's possibility of leading to the death of the mother. Not until two decades ago, women died from pregnancies in silence and pain. Families mourned their dead while husbands hoped for another wife to bear them children. The concentration before this era was argued on the ability to bear children and thus people though sad, were happy should the children survive (Ameyaw, 2011).

Global attention however began to focus more seriously on maternal deaths in the mid 1980's when Rosenfield and Maine published a thought-provoking article in the *Lancet* (Ameyaw, 2011). In an article titled 'Maternal Mortality—a neglected tragedy—where is the Management in MCH?' Rosenfield and Maine warned the world of the fact that many countries were neglecting this important problem and that existing programs were

unlikely to reduce the high maternal mortality rates (Bougangue, 2013). Thereafter, there exists much literature on maternal mortality across the world today. A 1985 analysis of 22,774 consecutive hospital births in Zaria (Northern Nigeria) showed the appalling mortality associated with childbirth. This was followed by another significant input to the campaign against maternal deaths by the WHO (1986) publication, Maternal Mortality: helping women off the road to death (Ameyaw, 2011)

1.2 Problem Statement and Justification

Research indicates that the developed world has been able to reduce maternal mortality through effective and efficient health care services such as provision of ambulatory services. Other care services included accessible and motorable roads to deal with obstetric emergency conditions at all places, and training of qualified personnel for antenatal care and delivery services

(Salifu, 2014)

There have been a number of studies conducted in the rural parts of Ghana that looked at the causes of maternal deaths. Efforts to reduce maternal health problems have resulted in the institutionalization of national policies and programmes in the form of interventions, such as: building of several maternal and child health (MCH) clinics across the country; the training of traditional birth attendants (TBAs); the development of safe motherhood protocol for all levels of health institutions; the institution of free antenatal care (ANC) services; and the establishment of National Health Insurance Scheme (NHIS), among others (Salifu, 2014).In spite of these efforts by the government, non-governmental

organizations and other stakeholders in implementing these policies, maternal health remains a major challenge in Ghana (Salifu, 2014).

Despites all these interventions put in place with the quest of reducing maternal deaths nationwide, the Upper West region with the least population continue to contribute significantly to the high prevalence rate of maternal death annually. Also information as to the causes and characteristics leading to the maternal death in the region has been limited and mainly in the form of figures, there are no empirical analyses as to what the trend, characteristics and causes are. Therefore this study seeks to provide scientific analyses to the causes, characteristic and the annual trend of maternal mortality in the region.

1.3 Research Questions

1.3.1 Main Research question

What are the trend, characteristics and causes of maternal mortality from 2009 to 2014 in the Upper West Region of Ghana?

1.3.2: Specific research questions

1. What are the Socio-demographic characteristics of maternal mortality in the Upper West Region?
2. What is the annual maternal mortality ratio in the Upper West Region from 2009 to 2014?
3. What are the direct and indirect causes of maternal deaths in the Upper West Region?

1.4. Objectives of the Study

1.4.1 General objective

The main objective of the study is to assess the trend, characteristics and causes of maternal mortality in the Upper West Region of Ghana from 2009 to 2014.

1.4.2: Specific objectives

1. To determine the Socio-demographic characteristics of maternal mortality in the Upper West Region.
2. To establish the trend of maternal mortality in the Upper West Region.
3. To determine the obstetric and clinical factors which contribute to maternal mortality in the Upper West Region?

1.5 Relevance of the study

The findings of this study will be relevant to all stakeholders concerned with promoting maternal health in the UWR and the Ghana at large. The outcome of the study will suggest practical ways by which maternal health barriers linked to socio-demographic or clinical factors can be overcome to ensure access to quality maternal health in the Upper West region of Ghana.

Also, it will help the government to make policies concerning maternal mortality in the UWR. It will also provide relevant data on the maternal death situation in relation to health seeking behaviour in the region. Finally, the study will build literature on maternal mortality situation in the region and serve as a basis for further research.

1.6 scope of the study

The scope of study considers only maternal deaths registered in the Upper West Region

of Ghana. Other maternal deaths in the communities that were not captured by the health records were not include in this study.

1.7 Conceptual Framework

Maine & Thaddeus were cited in their 2008 literature to have stated emphatically that The Delay Model is a pioneering framework for maternal mortality. He outlines three delays that lead to maternal mortality. These include; the delay to seek care, the delay to identify and reach an adequate institution, and the delay to receive care (Kumar et al., 2014). This confirms the cultural beliefs held by the people of the Upper West that a woman is not supposed to disclose her pregnancy at the early stage or else she would lose it. This has resulted in women reporting late at the facilities for ANC services, hence resulting in delay in detection of risk and delay in getting interventions (UWR, RHA 2013).

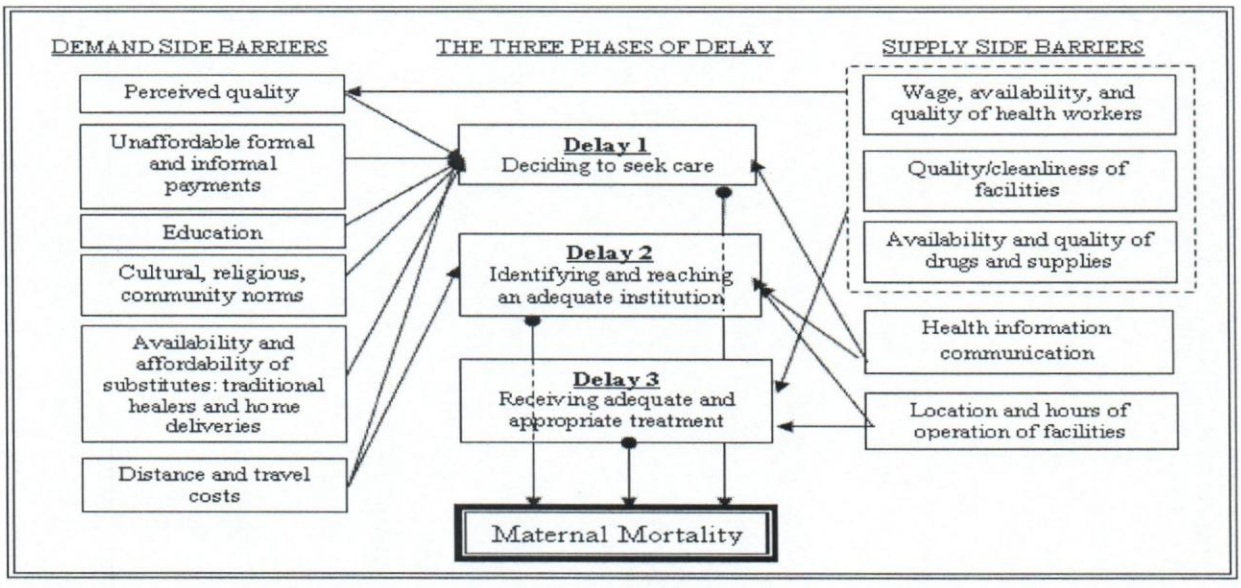


Figure 1.1: Conceptual model depicting both demand- and supply-side barriers that leads to the three delays.
Source: (Chang, 2008)

According to Thaddeus & Maine, 1994, a delay at any phase can leads to maternal death. Figure 1.1 illustrates the conceptual model, depicting both demand- and supply-side barriers that leads to the three delays.

Delay 1, also known as the demand-side factors generally affects decision to seek care. Previous experiences with the health system directly affect the perceived quality and benefits of delivering in institutions or by skilled attendants. Negative encounter deters individuals from future utilization of health services, while, positive experiences usually encourage future use of health services (Chang, 2008).

The model also illustrates that the actual quality of institutions directly impact how individuals perceive health services. For instance, if the health workers treat the poor or disadvantaged patients worse than the rich patients, the poor may be less likely to use the health services in the future. This can lead to differential use of services by socioeconomic status. The cost of healthcare in the form of formal and informal payment affects utilization of health services as well (Chang, 2008)

Chang (2008) also urged that user fees act as barriers to access for those who cannot afford to pay. Hence the main issues with informal payment are that individuals are not able to foretell how much the service is going to cost them. Therefore the unpredictable nature of health care costs in a system where informal payment are common further deters many households from seeking care early or at all. Published prices can however inform households as to how much some services are affordable. The education level of the mother affects how well she can process information about health. Cultural, religious, and community norms affect the appropriateness of women to seek care outside the community. Husbands and family members with decision-making power often dictate

whether women are able to receive care in institutions or not. Those countries that experience high rates of maternal mortality and deaths due to other maternal complications sometimes view it as normal occurrence. Maternal death is an unfortunate, catastrophic, and an unavoidable risk that every woman must face when bearing children. Therefore, women may never comprehend the need for skilled assistance or costly trips to health facilities. The availability and affordability of substitutes also affect the utilization of maternal health services (Chang, 2008).

Delay- 2 talks about distance and travel costs directly influencing women's decision to deliver at home or in an institution. In rural areas, women often do not have access to vehicles, public transportation, and in some cases, proper roads. In cases where public or private transportation are available, women from poorer households often cannot afford the fees. The urban poor must also find ways to overcome travel and distance barriers. The urban poor are usually located in slums, which tend to be located further away from proper healthcare facilities (Chang, 2008).

Delay- 3 talks about receiving adequate and appropriate care. These factors include the wage, availability, and competence of health workers. Birth attendants, nurses, and doctors should be trained to perform Comprehensive Emergency Obstetric and Clinical procedures (CEMOC) especially if based in institutions. Frontline health workers such as village-based midwives should be confident enough to conduct normal deliveries. They should also be trained to identify, manage, and refer complications to CEMOC facilities (Chang, 2008).

Sufficient supply of skilled health workers is essential to improve geographical reach. Likewise, providing these skilled health providers the appropriate wages as motivation is

equally vital in reducing staff absenteeism and prevents them from requesting for informal payments from the clients. The quality and cleanliness of the facilities is also critical, ensuring that there is running water, delivery theatres, and private rooms to meet the cultural needs of women. The availability of supplies, drugs, and blood banks are also crucial to providing appropriate care (Chang, 2008).

1.8 Structure of the Thesis

The thesis is organized into six chapters. Chapter one deals with the introduction which comprises the background, statement of the problem, research questions and objectives of the study. The rationale or significance of the study, conceptual framework and the organization of the chapters are also dealt with in this chapter. Chapter two deals with the literature review on maternal mortality.

Chapter three focuses on the methods of the study. It also covers the study design, data collection techniques and tools, data analysis and ethical considerations. Chapter four describes the study results and chapter five discusses the results and limitations of the study. Chapter six gives the conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

2.1 Theoretical Review, meaning the review of the other people's theories

Maternal mortality refers to the death of a woman while pregnancy or within 42 days after termination of pregnancy, irrespective of the duration and sites of the pregnancy, for any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes (Rakha, Awara, Mahfouz, & Elhawary, 2010). Maternal mortality is expressed as either a rate or a ratio. The maternal mortality rate (MM Rate) refers to the number of maternal deaths within a period over the number of women in their reproductive age during the same period expressed per 100,000 women. The maternal mortality ratio (MM Ratio) on the other hand refers to the number of maternal deaths to 100,000 live births (Rakha et al., 2010).

WHO (2008) report defines maternal health as the health of women during pregnancy, childbirth and the postpartum period. However, Sari, (2009), as well as Ononokpono & Odimegwu, (2014) all argue that increasing attention given to maternal health internationally has been concentrated in reducing maternal mortality. However, global attention on the phenomenon of maternal mortality had been given little or no place until two decades ago. Awareness on maternal mortality began to increase in 1985 upon the publication of a thought-provoking article in the *Lancet*, and also warned that many countries were neglecting this important problem and that existing programs were unlikely to reduce the high maternal mortality rates (Senah, 2003). Ameyaw, (2011)

reports of Harrison's (1985) analysis of 22,774 consecutive hospital births in Zaria (Northern Nigeria) which also gave way to the appalling mortality associated with childbirth. This was followed by another significant input to the campaign against maternal deaths by the WHO (1986) publication as further captured by Ameyaw, (2011). Reports indicate about 500,000 and over women the world over die yearly from pregnancy related complications (Ameyaw, 2011).

Countries pass through three stages of population growth as they advance from an under-developed country to a more developed state. These stages are; (i) high birth rates and high death rates, (ii) high birth rates and declining death rates and (ii) low birth rates and low death rates. The implication of this theory is that at the initial stages of development of a country, couples do not deliberately take steps to control births but give birth to as many children as nature permits in their reproductive years. Out of these numbers, a lot die in their infancy due to high death rate and low life expectancy. At a more advanced stage, while the birth rate is still high, the death rate begins to decline due to improved medical care, access to more nutritious food, people leading more hygienic lifestyles etc. Finally when countries become even more developed, death rates fall to their barest minimum and couples consciously give birth to fewer children leading to low birth rate. Ghana as a lower middle income developing country can be described as in stage two of this theory with high birth rate and declining death rates. The high birth rates has been noted to be as a result of the following reasons; cultural practices of early and polygamous marriages as well as children seen as source of pride and farm hands (Bougangue, 2013).

Further, low acceptor rate of family planning services and high infant mortality rates in Ghana are notable reasons for the high birth rates. However poor nutrition of women, non-accessibility to skilled medical care during the period of pregnancy, delivery and after delivery causes high maternal mortality in Ghana.

2.3 Importance of Maternal Mortality

2.3.1 Clinical Importance

The impact of a mother's death on child outcomes is likely severe but has not been well quantified (Moucheraud et al., 2015). Although maternal death is the tip of the iceberg, thousands more women suffer a "near-miss" but survive to deal with lifelong medical consequences (King, 2012). Maternal mortality remains the leading cause of death and disability for women in their reproductive-age in resource-poor countries. Infant and child mortality is thus only one adverse outcome associated with maternal death, yet it is crucially important. An analysis from Bangladesh found a significantly worse survival trajectory of orphaned children - but cautioned about generalizing the findings, due to contextual factors that may differentially impact orphan survival such as household composition, the role of the father and HIV prevalence (Ronsmans, Chowdhury, Dasgupta, Ahmed, & Koblinsky, 2010). Recent analyses, however, have found similarly negative outcomes in sub-Saharan Africa. Recent research in Kenya found an elevated mortality rate among babies of women who died after childbirth (KEMRI-CDC, 2014, Moucheraud et al., 2015). Similar studies in South Africa also reports that maternal death elevated children's risk of dying and that the associated mortality risks were higher for very young children, (Houle, Clark, Kahn, Tollman, & Yamin, 2015). Children who had

a mother die an early maternal death were at 15 times the risk of dying, and those whose mother died a late maternal death were at 14 times the risk of dying relative to children whose mother survived. Children who had a mother die any other type of death were at approximately 8 times the risk of dying, relative to children whose mother survived (Houle et al., 2015).

2.3.2 Public Health Importance

The importance of quantifying the loss of life caused by maternal mortality in a population is widely recognized. In 2000, the UN Millennium Declaration identified the improvement of maternal health as one of eight fundamental goals for furthering human development. As part of Millennium Development Goal 5, the UN established the target of reducing the maternal mortality ratio by three-quarters between 1990 and 2015 for all national and regional populations (Wilmoth, 2009). Maternal mortality is a key indicator of international development, and its reduction has long been a challenge in low-income countries, despite the existence of effective interventions. The focus on maternal mortality as an important development measure dates back at least to the 1980s, when researchers first highlighted the role of complications related to pregnancy and childbirth in death rates among women of reproductive age and noted the inadequacy of attention paid to addressing these largely preventable deaths (Chou et al., 2013). Also, in the mid-1980s, the World Health Organization (WHO) estimated that approximately half a million women died yearly from maternal causes (Chou et al., 2013). Maternal mortality is a sad event because majority of the factors associated with the deaths are preventable.

It has a follow-up cost to the society and the health of the baby should the baby survive (Biritwum, 2006).

A joint report of UNICEF and the World Health Organization, (1996) stated that some 585,000 women globally die yearly from pregnancy-related problems. A more recent report by the WHO (2007) also speculate an estimated total of 536,000 maternal deaths the world over. Out of these figures, an estimated 99 percent of such women are reported to come from the developing world, especially sub-Saharan Africa, revealing huge global differences and inequalities (Yego et al., 2014; Ameyaw, 2011). This disproportion in countries is also asserts of the average lifetime risk of maternal death of 1 in 76 in the developing world, and 1 in 8000 in the industrialized countries (Ameyaw, 2011). This is affirmed by Yego *et al.*, (2014) who assert that in sub-Saharan Africa, 1 in 16 women dies in pregnancy or from childbirth a risk of 175 times higher than that in developed countries (1 in 2,800) (Yego et al., 2014). Maternal health has emerged as global priority because of a great gap in the status of mother's wellbeing between the rich and the poor countries (Ameyaw, 2011).The *MMR is* a measure of the frequency of maternal death in relation to the number of live births (Wilmoth, 2009) and a high rise is a surrogate for medical care in general and obstetrical care in particular because it is considered an obstetrical tragedy (King, 2012). Both Healthy People 2010 and the United Nations Millennium Goals were aimed at reducing maternal mortality worldwide.

Maternal mortality rates tend to be higher in the lower social classes than in the upper and this has potential relevance to developing countries (Loudon, 2000a; Biritwum, 2006). Hypertensive disease (previously referred to as toxemia and eclampsia, or puerperal convulsions) moved from being the third most prevalent cause of maternal deaths in the

1870s to the number one cause in the 1970s, and deaths from hemorrhage (ante partum and postpartum) moved from being the second most prevalent cause in the 1870s to the sixth most prevalent cause in the 1970s. Although there may be differences in detail, it is probably safe to say that in developing countries with high rates of maternal mortality today, the rank order of causes is reasonably similar to that in Britain in the 1870s. If this is the case, it is a matter of great significance because it suggests that measures taken to reduce maternal mortality in the developed world about 50years ago may be the measures that would work best today in countries or regions with high rates of maternal mortality (Loudon, 2000b). For this reason and despite the practical difficulties in doing so, it is important to assess attributable risk of maternal mortality in developing countries. In other words, it is important to identify the causes of maternal mortality whenever possible and to try to estimate the degree of certainty in the data (Loudon, 2000a). The risk of a woman dying as a result of pregnancy or childbirth during her lifetime is about one in six in the poorest parts of the world compared with about one in 30 000 in Northern Europe. Such a discrepancy poses a huge challenge to meeting the fifth Millennium Development Goal to reduce maternal mortality by 75% between 1990 and 2015. Some developed and transitional countries have managed to reduce their maternal mortality during the past 25 years. Targeting of interventions to the most vulnerable - rural populations and poor people is essential if substantial progress is to be achieved at all (Ronsmans & Graham, 2006).

Impact of Maternal Death

A mother's death is largely viewed as a private tragedy that will grow more than can be managed in time. In many developing countries, a mother's death is most often more than

an emotional crisis, resulting in long-term social and economic breakdown for both the immediate family and the wider community (Tezeta, 2015). A study conducted by Guest blogger Tezeta Tulloch in May 2015, titled "The True Cost of Maternal Death: Individual Tragedy Impacts Family, Community and Nations" focuses exclusively on the immediate and longer-term effects on the surviving children, households, and communities as a whole. The results from the study provided clear evidence that a mother's death can devastate the livelihood, quality of life, and survival chances of those she has left behind (Tezeta, 2015).

The consequences of maternal deaths included the immediate and the long term effects. The death of a mother impacts heavily on the immediate family as it leads to financial instability. Mothers not only act as caregivers in the home, but also contribute significantly to household income. The absence of this income can severely damage a family's ability to access basic necessities, such as food, shelter and health care. Funeral costs alone can destroy a household's economy. Aside the immediate consequences, its long-term effects can also leads to loss of education; where by the older surviving children are more likely to leave school to take care of their younger siblings. For many girls, the only viable options that remain for them are early marriage and early motherhood. Both school dropout and early marriage tend to renew the cycle of poverty for the next generation (Tezeta, 2015).

There is also increased mortality among children whose mothers had died. Research also found that new-borns whose mothers die in childbirth are far less likely to reach their first birthday than those whose mothers do not die, or who die from other causes. Early marriage was linked to higher maternal mortality and therefore to increased infant and

newborn mortality. Another difficulty of managing the household without the woman was also identified as a key effect of maternal death. While fathers and surviving children are often pressed to take on the tasks performed by one woman in order to ease this burden of care, children are usually given out to live with other relatives and this separation can further damage family integrity (Ononokpono & Odimegwu, 2014).

The Epidemiology of Maternal Mortality: A Local Overview

Maternal mortality is often an important indicator for a nation's development, especially as it relates to likelihood of reaching the MDG5, which aims to reduce the MMR by three-quarters from 1990 to 2015. Reduction of maternal mortality is of high priority to the Ghana Government and the international world at large. Despite efforts made to meet MDG 5, Ghana's MMR remains unacceptably high. Consequently, a number of studies have been conducted on maternal mortality in Ghana and around the globe. However, little is known about how the causes of maternal mortality are distributed in different socio-demographic sub-groups. To find out and respond to the distribution of causes of maternal deaths among varied socio-demographic groups, the MDG 5, which aims to improve maternal health, was adopted. The target was to reduce the MMR by three-quarters between 1990 and 2015 and achieve universal access to reproductive health care by 2015. According to Ameyaw, (2011), a 1996 WHO/UNICEF study reported that globally, some 585,000 women die annually from pregnancy-related complications.

2.3 Trend of Maternal Mortality in Global Context

The highest MMRs in 1990 were found in Sub-Saharan Africa, Southern Asia and South-Eastern Asia as already noted. Progress in reducing the MMR has been quite rapid in Southern and South-Eastern Asia, but much more limited in Sub-Saharan Africa. Levels of use of skilled birth attendance and antenatal care were similar in Sub-Saharan Africa and Southern Asia in 2008: A skilled attendant was present for roughly 46% of births in Sub-Saharan Africa and for 45% of births in Southern Asia (UN, 2010). In Sub-Saharan Africa, 76% of women received antenatal care at least once during their pregnancy, compared with 70% in Southern Asia (Chou et al., 2013).

Emerging countries account for 99% (286 000) of the world's maternal deaths with Southern Asia and the region of Oceania accounting for 69 000 and 510 maternal deaths respectively. MMR is considered to be high if it is greater than or equal to 300–499 maternal deaths per 100 000 live births. 'It is considered extremely high if it is ≥1000 maternal deaths per 100 000 live births. The MMR in developing regions (230) was reported to be 14 times higher than that in the highly industrialized regions (16). While none of the MDG regions had extremely high MMR, sub-Saharan Africa was the only MDG developing region with very high MMR (510). The adult lifetime risk of maternal mortality in women from sub-Saharan Africa was the highest at 1 in 38 and in sharp contrast to 1 in 3700 among women reported in the developed countries (Onakewhor & Gharoro, 2008). From January 2001 to 2010 December, a total record of 39704 live births and 120 maternal deaths were reported and the average maternal mortality rate during this period was 302.23/100,000 live births (Murthy, & Prabhu, 2013). The maternal mortality ratio in the 2008 study by Onakewhor and colleague was 2096 per 100,000 live births and the mortality ratio had more than doubled over a period of 3 decades.

Prominent among the clinical causes of death included medical disorders (18.7%), sepsis (17.9%), hypertensive diseases (17.9%), abortion (11.2%), HIV/AIDS infection (11.2%), and haemorrhage (9.0%) (Olamijulo, Olorunfemi, Olaleye, Ogedengbe, & Giwa-Osagie, 2012).

There were 7055 women who gave birth during the 5-year period. There were 32 maternal deaths; Maternal Mortality Ratio (MMR) of 454/ 100,000 live births. The MMR increased progressively from 325 in 1996 to peak at 765 in 1999 ($P < 0.0001$) with an insignificant drop in 1998 ($P > 0.06$). It was lowest in 2000 (241) ($P < 0.0001$). Paradoxically, as the number of deliveries decreased progressively from 1530 in 1996 to 1247 in 2000, the MMR increased progressively from 327 in 1996 to 675 in 1999. Eclampsia (34.4%), hemorrhage (25.0%), Infections (18.8%) and abortions 12.5%) were the four leading causes of death. Puerperal deaths were 56.3%. Five short case scenarios were presented to highlight the tortuous pathway the women passed to end in maternal mortality (Onakewhor & Gharoro, 2008).Maternal mortality is an index of reproductive health of the society. High incidence of maternal deaths reflects poor quality of maternal services, late referral and low socioeconomic status of the community. The mean Maternal mortality rate in the study period was 302.23/100000 births. The current maternal mortality ratio (MMR) in India is 212/100,000 live births. Various studies done in India in the last 15 years have shown wide variation in MMR ranging from 47/100000 to 625/100000 births. For instance one study reported comparatively very high MMR of 2270/100000 which could be due to the fact that, the hospital is a tertiary care hospital and receives a lot of complicated referrals from rural areas of southern Maharashtra and also from North Karnataka at a very late stage (Murthy et al., 2013).

2.4 Trend of Maternal Mortality in Ghana

Ghana's maternal mortality ratio remains high despite efforts made to meet Millennium Development Goal 5 (Asamoah, Moussa, Stafström, & Musinguzi, 2011). The trend of Maternal Mortality in Ghana and for that matter in the Upper West Region has been unstable over the years and published data from the specific regions is rare. The findings from the sparse data available are often referred to as 'the tip of the iceberg' (Abotzabire, 2013).For instance, Ghana's rate of pregnancy related complications was said to be 740 per 100,000 live births while Ghana's Ministry of Health calculates this to be 214 per 1,000 live births (Senah, 2003). A 2011 study cited Witter et al (2009) to have affirmed that, Ghana persistently has high maternal mortality ratios, estimating the range from 214 to 800 per 100,000 live births (Ameyaw, 2011) and724.5 per 100 000 live births in the Tamale Teaching Hospital for the period 2008-2010 (Gumanga et al., 2011).In 2006, the maternal mortality ratio in Ghana was estimated to be 540 deaths per 100,000 live births (Ghana Statistical Service, 2007), 451/100,000 live births in 2008 (Biritwum, 2006) and even possibly as high as 819 deaths per 100,000 live births (Rishworth, 2014). While this was lower than many of its neighbors, Ghana's rate is still much higher than global averages. In addition, the ratio varies by region within Ghana and by the source of data used to make the estimate (Biritwum, 2006).A study conducted in the Upper East Region from 2001 to 2003 and published in 2006 estimated a hospital maternal mortality ratio of 759 per 100,000 live births (Baiden et al., 2006).

Institutional maternal mortality ratio (MMR) in the CR was the highest in Ghana over the period from 1998 to 2000, peaking in 1998 at 656 per 100,000 live births. However, it declined sharply over a 5-year period to about the lowest level in the country (Bosu, Bell, Armar-Klemesu, & Tornui, 2007). In 2004, there were 71 maternal deaths and 55,406

live births yielding an institutional MMR of 128 per 100,000 live births (Bosu et al., 2007). In the Volta Region, institutional MMR was 262 per 100,000 live births in 2004, and remained almost the same at 256 per 100,000live births in 2005.In absolute terms, the maternal deaths increased from 71 in 2004 to 75/100,000 live births in 2005 (Bosu et al., 2007). According to Nchor & Adabire, (2011) and Salifu (2014), the regional maternal mortality ratios per 100,000 live births in Ghana as reported in the GSS 2010 PHC survey were as follows: 435 in Western Region; 520 in the Central Region; 355 in the Greater Accra region; 606 in the Volta region; Eastern Region had 538 whiles Ashanti Region had 421. The Northern and Brong Ahafo Regions respectively had 531 and 421 whiles the Upper East Region had the highest of 802.

2.4.1 Institutional Maternal Mortality Ratio in the Upper West Region

In the Upper West Region in particular, reported maternal mortality ratios have varied from 140.7 per 100,000 to 341.9 per 100,000 live births (Der et al., 2013), indicating a declining ratio (GHS-UWR, 2004). However, subsequent study indicated maternal mortality in the Region record as high as 466 deaths per 100,000 live births (Salifu, 2014).

The Region recorded 39 maternal deaths for the year 2013; 34 institutional maternal deaths and 5 community maternal deaths (Table 1). Maternal mortality for the first half of the year was unacceptably high (31 maternal deaths). Maternal Mortality Ratio in the Region as at 2013 was 196 deaths/100,000LB. This is above the 185 deaths per 100,000 live births of MDG5 by 2015, hence, the need to redouble efforts to reducing maternal deaths per the MDG. It is however notable that the regional maternal mortality ratio does

not include the community deaths since the live births at the community is unknown.

Table 2.1: Total Number of Institutional Maternal Deaths

DISTRICT	2010	2011	2012	2013
DBI	N/A	N/A	N/A	0
Jirapa	1	6	6	3
Lamb	0	0	0	0
Lawra	3	6	1	3
Nadowli	3	2	0	1
Nandom	N/A	N/A	N/A	5
Sissala East	4	1	2	2
Sissala West	0	1	0	1
Wa East	0	1	1	0
Wa Municipal	15	11	18	19
Wa West	0	1	0	0
Reg. Total	26	29	28	34

2.5 Causes of Maternal Mortality

Interventions to reduce maternal mortality rates are likely to be much more effective if the underlying causes are known. This is particularly true when the underlying causes vary in extent, importance, or both among developing countries (Loudon, 2000a). As quoted by Ameyaw (2011), the major causes of maternal deaths according to the WHO in 2008 include bleeding, hypertension, anaemia, unsafe abortions, infections and obstructed labour. Majority of which can be prevented with adequate care. Although these are the easily and most identifiable of maternal deaths by the WHO, there are

several other reasons associated with maternal deaths. This section therefore looks at key factors affecting maternal health and or mortality. These factors for the purpose of this work will be grouped into three: Health Care Delivery explanations, Biological (Medical) explanations and Socio-economic explanations.

2.5.1 Direct and Indirect Causes

A 2013 study revealed bout 73% (1 771 000 of 2 443 000) of all maternal deaths between 2003 and 2009 were due to direct obstetric causes and deaths due to indirect causes accounted for 27·5% (672 000, 95% UI 19·7–37·5) of all deaths. Haemorrhage accounted for 27·1% (661 000, 19·9–36·2), hypertensive disorders 14·0% (343 000, 11·1–17·4), and sepsis 10·7% (261 000, 5·9–18·6) of maternal deaths. The rest of deaths were due to abortion (7·9% [193 000], 4·7–13·2), embolism (3·2% [78 000], 1·8–5·5), and all other direct causes of death (9·6% [235 000], 6·5–14·3). Regional estimates varied substantially (Say et al., 2014).The classical triad of hemorrhage (26.66%), eclampsia (26.66%), and sepsis (18.33%) was the major direct causes of maternal deaths, whereas only one maternal death (0.83%) was due to obstructed labor. In the study period, 27.5% of maternal deaths were due to indirect causes. Anemia, jaundice, and heart disease accounted for 10%, 9.16%, and 3.33% of maternal deaths respectively and miscellaneous cause like acute gastroenteritis accounted for 5% of maternal deaths (Murthy et al., 2013). A 2006 study reported of severe bleeding, hypertensive diseases, and infections as the dominant causes. Although this pattern is common, the under-representation owing to data constraints of some causes e.g., complications of induced abortion or HIV/AIDS—cannot be ruled out. The systematic review also recognized a paucity of data from sub-Saharan Africa; we bring attention to the need for better country-level data for cause of

death in the fifth paper in this series (Ronsmans & Graham, 2006). About 72.5% of maternal deaths were due to direct causes. Hemorrhage (26.66%), eclampsia (26.66%), and sepsis (18.33%) were the major direct causes of maternal deaths. Even today large number of maternal deaths is due to the classical triad of hemorrhage, sepsis, and eclampsia. All these are preventable causes of maternal mortality provided the treatment is instituted on time (Murthy et al., 2013). In developed countries, the most important cause of maternal death is "other direct causes" (21%), which includes largely complications during interventions such as those related to caesarean section and anesthesia, followed by hypertensive disorders and embolism. Some of the direct medical causes of maternal mortality include haemorrhage or bleeding, infection, unsafe abortion, hypertensive disorders, and obstructed labour. Other causes include ectopic pregnancy, embolism, renal failure, cardiac disorders and anesthesia-related risks (Ameyaw, 2011).

2.6 Risk Factors of Maternal Mortality

2.6.1 Socio-demographic Characteristics of Maternal Mortality

Women's education has been found to be the strongest association with the use of maternal health care services. Knowledge and education are factors that determine the behaviour of women in seeking care (Ameyaw, 2011). Findings from a cross-sectional and fixed-effects model, controlling for service availability and the socioeconomic status of the household, confirmed the importance of maternal education on the utilization of both prenatal care and delivery assistance in Peru, confirm formal education of women influences the use of maternal health care services (Elo, 1992 ; Kumar et al., 2014). A similar analysis in Thailand showed that maternal education exerts a significant influence on the use of maternal health care services; the odds of using prenatal care and formal delivery assistance is much greater for women with primary schooling, compared to women with zero years of schooling (Raghupathy, 1996). Educated mothers are also considered to have a greater awareness of the existence of maternal health care services and benefited in using such services, are likely to have better knowledge and information on modern medical treatment and have greater capacity to recognize specific illnesses (Sari, 2009). Aside the formal education exposing women to the ability and knowledge to access health care services, existing research on health outcomes in developing countries shows women's exposure to media provides them information on health related issues (Sari, 2009).

Poverty is a major factor which can inhibit one's access to health care and feminization of poverty is seen to be one of the most hindering factors of women the world over,

especially in developing countries. It inhibits women in their decision making processes and other vital areas of their lives of which maternal health cannot be isolated. To be able to have quality health service, there is the need for a sound financial backing. Even how to be able to take the decision on which service to access depends on your status as an important part of any health system is the mechanism by which health costs are financed and pooled. Women's economic dependence on men for survival however has been a principal barrier to women's control over their reproductive behaviour in developing countries. Women who are in income generating activities have been identified to able to or more likely to access health care services. This can be attributed to the fact of enhanced role in decision making power and control over the resources earned by self-employed women. Empowering women with more economic participation and control in their households and communities might be the key to their achieving control over their own reproductive health (Ameyaw, 2011). A study in Kenya reported that the antenatal care visits tend to start earlier for women in paid employment as they are likely to have greater knowledge about pregnancy and childbirth due to freedom of movement outside the household. They also tend to seek information on services available for pregnancy care during work (Kisuule et al., 2013). However, employment may not necessarily be associated with greater use of maternal health care like in Nepal because non-working women may be better off than working women. In the context of developing countries, women's work is largely poverty induced and is likely to have a negative impact on utilization of maternal health services (Rashmi Sharma, C.L. Sharma, & Ruchi Khajuria, 2004). Maximum maternal deaths (49.16%) were reported in the age group of 20 to 24 years. More deaths were reported in multiparous women (56.66%) as compared to

Primiparous (43.33%). Sixty-five percent (65%) of maternal deaths were reported in illiterate women. Most maternal deaths (83.33%) were reported in women with low socioeconomic status. In the study period, 72.5% of maternal deaths were due to direct causes (Murthy et al., 2013). Kunst & Houweling, (2001) report indicates that the low social status of women especially in developing countries can limit their access to economic resources and basic education, the impact is that they have limited ability to make decisions, including a decision related to their health and nutrition. The third and final point to be discussed is too much physical work together with poor diet. This is believed to also contribute to poor maternal health outcomes.

The Murphy and colleagues' study further found that 70% of maternal deaths were in the age group of 20 to 29 years, as highest numbers of births are reported in this age group. Similarly, 56.66% of maternal deaths were reported in multiparous patients. More maternal deaths were reported in women from rural areas (69.16%), illiterate women (65%), and women belonging to low socioeconomic status (83.33%). Unfortunately, in many cases, patients were referred very late, in critical condition, unaccompanied by health care worker. Many patients had to travel a distance of 70 to 80 kilometers in a private vehicle to reach our tertiary center. Most of these deaths are preventable if patients are given appropriate treatment at periphery and timely referred to higher centers. Training of medical officers and staff nurses working in rural areas by programs like basic emergency obstetrics care (BEMOC) and skilled attendant at birth (SAB) training gives a ray of hope of reducing maternal mortality (Murthy et al., 2013).

In their study, Yego *et al.*, (2014) indicated that there is a higher risk of mortality among illiterate women. This finding is important since it emphasizes the role of education for both the mother and her spouse in obtaining and understanding the benefits of good health and being able to make appropriate decisions during pregnancy. It is important to note that despite the woman's weaker role in decision-making in African settings, education has a strong influence on mortality. In this study, we used mother's education as a proxy for the husband's education. Although there was considerable missing data for spouse's education, there was correlation between these two education variables.

2.6.2 Obstetric and Clinical Factors Influencing Maternal Mortality

The high number of maternal deaths in some areas of the world reflects inequities in access to health services, and highlights the gap between rich and poor. There are also large disparities within countries, between people with high and low income and between people living in rural and urban areas. The risk of maternal mortality is highest for adolescent girls under 15 years old. Complications in pregnancy and childbirth are the leading cause of death among adolescent girls in most developing countries. Women in developing countries have on average many more pregnancies than women in developed countries, and their lifetime risk of death due to pregnancy is higher. Women die as a result of complications during and following pregnancy and childbirth. Most of these complications develop during pregnancy. Other complications may exist before pregnancy but are worsened during pregnancy. The most common clinical causes of maternal death during conception and delivery globally includes; haemorrhage, obstructed labour, anaemia, abortion, hypertensive disorders and others.

Onakewhor *et al.*, (2008) found that more than 76% of the women spent 48 hours or less from time of admission to death and majority of them were of low parity. Nulliparity was 37.5%. The mean parity was one. Young women 20-39 years old accounted for 81.3% with 9.4% teenage deaths due to illegally induced abortions. Results of a 2012 study showed that among 120 deceased, tribal women highest maternal mortality 65 cases (54.166%) was noted in Primigravida (Nullipara) between age group 18 to 35 years, second highest maternal mortality 44 cases (38.333%) was noted in 2nd to 4th Gravida (Multipara) between age group 22 to 42 years, 10 cases (8.333%) were in 6th and 7th Grand Multigravida (Grand Multipara) between age group 27 to 35 years, and 1 case (0.833%) was in 8th Great Grand Multigravida, of 25 years. Total Maternal Mortality among Primigravida (Nullipara) to Great-grand Multigravida (Great Grand Multipara) was noted between 18 to 42 age group (Chauhan, Chauhan, & Shrivastava, 2012). The WHO has provided a summary of three critical factors underlying maternal deaths (Sari, 2009; Kunst & Houweling, 2001). The first of these vital causes of maternal death in the world is lack of access and utilization of essential obstetric services. According to the WHO, there is a negative association between maternal mortality rates and maternal health care utilization. Its estimates suggest that 88 to 98 percent of all pregnancy-related deaths are avoidable if all women would have access to effective reproductive health care services (Kunst & Houweling, 2001). Out of 634 pregnancy-related deaths, 79.5% (504) resulted from direct obstetric causes, including: haemorrhage (21.8%), abortion (20.8%), hypertensive disorders (19.4%), ectopic gestation (8.7%), uterine rupture (4.3%) and genital tract sepsis (2.5%). The remaining 20.5% (130) resulted from indirect obstetric causes, including: infections outside the genital tract, (9.2%), anemia (2.8%), sickle cell

disease (2.7%), pulmonary embolism (1.9%) and disseminated intravascular coagulation (1.3%). The top five causes of maternal death were: haemorrhage (21.8%), abortion (20.7%), hypertensive disorders (19.4%), infections (9.1%) and ectopic gestation (8.7%) (Der et al., 2013). Having no antenatal care during pregnancy was associated with mortality in this study, a finding which corresponds with those of other studies. Antenatal care is important in screening for pre-existing illnesses and complications in the early stages of pregnancy that could impact adversely during pregnancy and childbirth. Since ANC coverage is high in Kenya, there is a need to scale up interventions that empower women to make at least four visits during pregnancy as recommended by international organizations (Yego et al., 2014).

2.7 Global Strategy to reduce Maternal Mortality

2.7.1 Efforts and Achievements

2.7.1.1 Maternal Exemption Policy and Women's Access of Maternal Health Care

The WHO recommends at least four ANC visits for effective antenatal care. In Ghana, ANC visits are supposed to be six (6) visits. To affirm this, a number of studies have indicated the existence of an association between the use of antenatal care and positive maternal outcome. Antenatal care which does not only help women identify complication and potential risks during pregnancy but also gives direction to plan for safe delivery, is a significant component of maternal health. The main impact has been a reduction in severe anaemia, cases of obstructed labour, and treatment of medical conditions (Ameyaw, 2011). Another study in Vietnam found that antenatal care reduced maternal mortality by improved nutrition and screening for high risk pregnancies. Other studies also found that inadequate number of ANC visits is associated with non- identification of higher risk

factors. This is cited by Kisuule *et al.*, (2013) which asserts inadequate ANC visits has a 63% higher risk of intra uterine growth retardation. Although antenatal care alone cannot prevent all obstetric emergencies, the information provided by antenatal service providers go a long way to support for the successful management of pregnancies and the subsequent wellbeing of the mother and child. To the United Nations Economic and Social Commission for Asia and the Pacific, the significance of ANC visits goes beyond pregnancy period because as women who seek ANC generally also tend to seek assistance from a health professional during childbirth (Ameyaw, 2011).

There is a clear need for continuing education of staff in the public and private sectors in order to improve clinical acumen and the management of difficult cases. Vigilance has to be maintained during the postnatal period, and it is important to develop new protocols and to prioritize those that already exist (WHO et al., 1999). The Cochrane review also identified and suggested three medical prevention strategies which were shown to produce significant reductions in maternal mortality. Dexamethasone, a corticosteroid prescribed for HELLP syndrome; Ketanserin and Nifedipine, administered for very high blood pressure in pregnancy; and magnesium sulphate, prescribed for pre-eclampsia or eclampsia, significantly reduced the risk of maternal death. These drugs should be made available in local clinics and referral hospitals given their effectiveness in preventing maternal deaths (Piane, 2009).

Staff should first of all familiarize themselves with the protocols on management of postpartum haemorrhage and hypertensive disorders of pregnancy. Special training is given to the medical and administrative personnel whose cooperation is essential for the

functioning of the investigation system. There is a clear need for fertility regulation in high-risk groups such as grand multiparous and older mothers. However, the absolute numbers of deaths are higher among women who are not classified as being at high risk (WHO et al., 1999).

Ghana is a developing SSA country that has in many ways, dramatically improved national health care access within recent years. In 2003, Ghana established the National Health Insurance Scheme (NHIS) aimed to provide equitable, affordable health coverage, mitigating problems associated with the previous "cash and carry" health system, where patients were required to pay for health care, inherently restricting access for a large portion of the population. Regarded as highly beneficial, the NHIS was created as a "pro-poor" health system, alleviating the need to pay out of pocket at the point of service deliver. However, women who were not enrolled in the NHIS still had to pay for maternal health care services. Between 2005 and 2008, Ghana had in place a "free delivery" policy which functioned separately from the NHIS, and was found to increase maternal facility deliveries, though it was plagued by problems of funding, budgeting and increased workloads as more women attended, (Witter, Arhinful, Kusi, & Zakariah-Akoto, 2007). Even with the "free delivery" policy, women continued to encounter challenges to health services due to communication and management failures (Witter et al., 2007). In order to rectify divergent policies and provide more comprehensive maternal health coverage, the government implemented a Maternal Exemption Policy (MEP) within the NHIS. See Figure 1 for a timeline of NHIS and Maternal Health policy implementations(Asamoah et al., 2011).

Figure 2.1: Timing of Ghana's Health Insurance and Maternal Health Policies

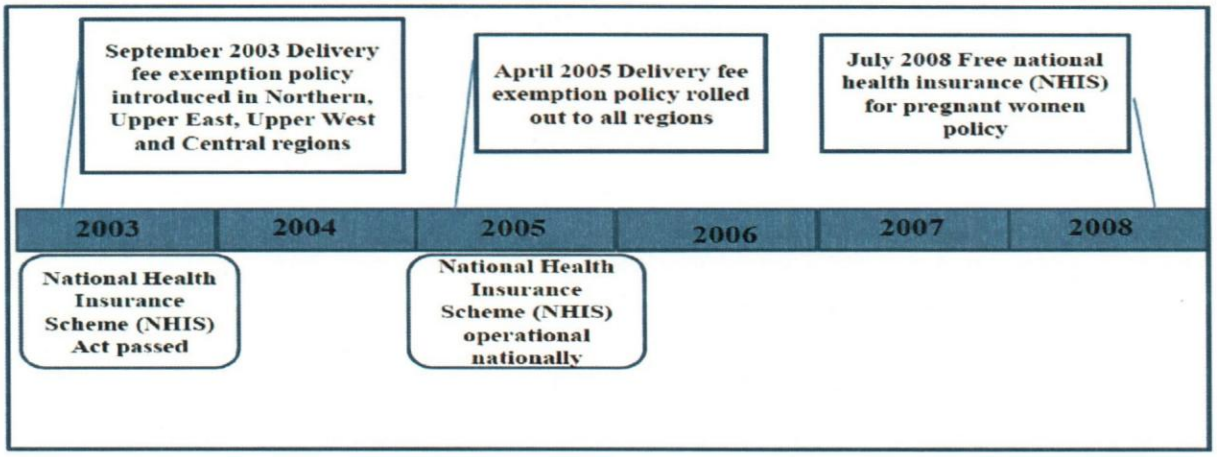


Figure 2. 1: Conceptual model depicting both demand- and supply-side barriers that leads to the three delays.
Source: (Dzakpasu et al., 2012)

The MEP allows all pregnant women to be exempted from paying health insurance premiums and yet receive coverage under the NHIS for a limited period following pregnancy with the incentive that they would join the NHIS (WHO, 2010). Maternal health coverage is extensive, including: a minimum of four antenatal care visits, free delivery (including more expensive procedures such as caesarean sections), management of emergency obstetric conditions, postnatal and neonate care, and applies to all NHIS accredited facilities, both public and private for a coverage period of a year (MOH, 2004; WHO, 2010:18).

Health services in the UWR, as in the rest of Ghana, are organized along a three-tier health system consisting of hospitals; health centres (HCs) and Community Based Health and Planning Services (CHPS) compounds. Hospitals provide the most extensive care, and are commonly staffed with doctors, midwives, and nurses. However, due to shortages of health personnel in the UWR, health centres receive sporadic visits from doctors and are commonly staffed by nurses and few medical assistants and seldom employ a

midwife. CHPS act as lower tier health infrastructure, which are part of the Community Based Health and Planning Services (CHPS) initiative. CHPS provide basic preventive and curative services including services provided under the MEP, and are commonly staffed with nurses who facilitate health care to underserved and rural communities. Nonetheless, they too are often short staffed and managed with limited health personnel and resources.

2.7.2 The Short Falls

Despite recent progress, challenges remain in providing accessible maternal health care. Theoretically, the introduction of free maternal health services for women should reduce maternal mortality rates and alleviate costs associated with pregnancy. With such expansive national health services, together with the proliferation of global maternal health awareness surrounding the importance of skilled delivery, it could be assumed that Ghana would experience significant reductions in maternal mortality rates. Nonetheless, Ghana faces challenges of meeting its MDG5 target of 75% reduction in the mortality rate. Recent studies have estimated Ghana's maternal death rate between 378 deaths to as high as 819 deaths per 100,000 live births based on study design (Kumar et al., 2014).The maternal exemption policy should, in theory, see improvements for women's health and maternal outcomes across the country as coverage and number of women delivering in health facilities has increased (e.g. the Brong Ahafo Region increased from 81.1% to 86.5%). Despite some regional increases, the rate of skilled delivery in the UWR has remained low, with 22.3% of women delivering with a skilled attendant in 2010. Notwithstanding increases, the UWR has one of the lowest rates of skilled delivery compared to the national average of 52.2%. Furthermore, since the implementation of the

MEP, reported regional mortality rates in the UWR have remained inconsistent suggesting the underlying challenges for women seeking skill maternal health services (Ameyaw, 2011).

One of Ghana's greatest challenges is that infrastructural development and economic prosperity are disproportionately shared amongst the population, a problem embedded in Ghana's colonial legacy and continuously reinforced by government policy and harsh environmental conditions. Growing poverty levels have pervaded the northern half of the country creating striking differences in wellbeing and access to health care between rich urban centres and poor rural areas. Together, this means women living in the northern rural areas encounter fundamentally different lifestyles than their southern and/or urban counterparts. As Ghana strives to meet its MDG 5, commitment to reduce maternal deaths in the country, there must be a conscious effort to target rural women in the poorest areas of Ghana (Ameyaw, 2011).

2.7.3 The Wa Forward

In the view of Prata *et al.*, (2010), the world has witnessed significant changes in the topic of 'what should be done' to decrease maternal mortality – from a focus on communities with training of TBAs to an intervention- focused approach. The change in focus is sometimes based less upon evidence and more upon politics; for example, while the focus on community-based programs has been largely neglected, a recent analysis of randomized controlled trials of community-based interventions concluded that those interventions can bring about reductions in maternal mortality (Kidney et al., 2009 ; Prata et al., 2010). Others also suggest that strategies to reduce maternal mortality in resource-poor settings should focus on reducing the risk-pool by decreasing fertility through

contraceptive use and the provision of safe abortion, followed by a focus on the main cause of maternal mortality (Prata, Sreenivas, Vahidnia, & Potts, 2009). Adding to the discussion concerning setting priority strategies in maternal healthcare is the fact that the field has been chronically underfunded (Borghi, Ensor, Somanathan, Lissner, & Mills, 2006; Prata et al., 2010).

Considering the level of illiteracy and the low economic status especially among women in the Upper west region of Ghana, it would be appropriate and crucial to save the lives of expectant mothers and unborn babies by adopting various effective and practical measures to reduce maternal mortality in the region. This could be done by intensifying education on maternal health and to put in measures to improve the midwives situation in the region. Also oreintating community health nurses/community health officers on safe motherhood activities, among others will help curb the issue of maternal mortality in order to meet the MDG 5 goal by 2015 (Salifu, 2014).

2.7.4 Summary of the Chapter

The literature review has shown the importance of a range of characteristics of the trend and causes of maternal death. From the study, the trend and causes of maternal mortality is observed under the following categories: clinical importance, impact of maternal death, trend of maternal mortality in Ghana, institutional maternal mortality ratio, causes of maternal mortality, direct and indirect causes, risk factors of maternal mortality, obstetric and clinical factors influencing maternal mortality, which are assumed to have influence on the death of mothers in the health facilities. It has also shown the effort that is being made to reduce number deaths and the extent of the reduction. However, though several studies of maternal death have been done in the various countries as well as regions, little

is known about the upper west region. Also the information available has not categorically predicted the factors responsible for these deaths.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This Chapter covers the study design, the sample size, research variables, data collection and study instrument, quality control, data analysis and research ethics.

3.1 Study Type

This was a descriptive retrospective hospital based reviewed of maternal death data that occurred in the Upper West Region of Ghana from 1st January 2009 to 31st December 2014. The study also reviews the demographic and clinical factors associated with maternal deaths.

3.2 The Study Area

3.2.1 Location and Population Density

The study was conducted in the Upper West Region (UWR), which is situated in the north-western part of Ghana. It lies between longitude 1° 25'' W and 2° 45''W and latitudes 9° 30'' N and 11°0" N. It is bordered to the south by the Northern region, to the north and West by the Republic of Burkina Faso and to the east by the Upper East region. It has an estimated area of 18,476 km^2, with a population density of 40 persons per square kilometre. There are eleven Districts in the region. The region is found in the guinea savannah vegetation belt. The main economic activity of the people of the region is peasant farming. This is supported by the fact that 72.2% of the economically active groups are engaged in agriculture or related activities, hence have adverse effects on the pregnant women from the region. The hard working farmers of the region cultivate maize, guinea corn, millet, yam, rice, soya beans and cotton in addition to the rearing of

cattle in large numbers. The major occupations in the region are Agriculture and related work (72.0%), Production and Transport Equipment work (12.1%), Sales work (5.2%), Service work (4.0%), and Professional, Technical and related work (4.0%) (GSS, 2012). The regional projected population for 2013 based on the 2010 Population and Housing Census growth rate of 1.9% was 742,896 while that of 2014 was756,882. The specific targets population for children less than one year/expected pregnancies was 2.7% and that of women in the fertile (WIFA) was given 23.7%. The sex composition of the districts favours females. In each district, females form a little over half of the population. The proportion of females in the region is 1.6 percentage points higher than the national average. Women between the ages 15-49 have a literacy percentage of 18.7% and men 36.2% (Ameyaw, 2011).

The Sissala East, Wa East and parts of the Nadowli districts (in the eastern parts of the region) have nucleated communities that are far apart, with a resultant population density of 13 persons per square kilometre. Refer to table 3.1 for the total and target populations of the various districts for year 2011 -2013.

Table 3.1 indicates that as at 2013, the region had a total of 242 health facilities of which 60.7% (147) are CHPS centres, 27.3% (66) Health centers, 4.1% (10) Hospitals, 4.1% (10) Clinics, 2.1% (5) Polyclinics and 1.7% (4) Maternity homes. The Wa Municipality has the majority (36) of all the Health facilities. The Regional Health Management Team (RHMT) oversees the planning and implementation of health services in the region, while the district health management teams plan and supervise health service delivery in sub-districts and CHPS compounds. The Wa hospital has functioned as a regional hospital since the creation of the region in1983 and that has greatly affected the quantum and

quality of work in the hospital, and served as the biggest referral hospital in the region. The hospital receives referrals of all cases including obstetric cases from all health facilities and beyond, including some part of Burkina Faso and parts of the northern region of Ghana.

Table 3.1: Summary of health facilities 2013

District	CHPS	Clinic	Health Centre	Hospital	Maternity Home	Poly Clinic	Grand Total
DBI	8		5				13
Jirapa	14		7	1		1	23
Lambussie-K	10	1	5		1	1	18
Lawra	12		4	1		1	18
Nadowli-	17		10	2			29
Nandom	9		4	1	1	1	16
Sissala East	13	1	6	1	1		22
Sissala West	10		4	1			15
Wa East	14	1	7				22
Wa Municipal	20	6	7	3			36
Wa West	20	1	7		1	1	30
Grand Total	147	10	66	10	4	5	242

Human Resource plays a very vital role in the provision and delivery of quality, comprehensive, and holistic health care services to the population. Therefore, there is the need for adequate and effective workforce to ensure quality service delivery. From table 3.2 below, there has been a widening gap of critical staff to patient ratio from 2010. The worst affected category has been the Doctor-Population ration which has been steeply rising and currently (as 2013) stands at 1 doctor per a population of 79,204.

During the past years the number of doctors and nurses in the region was woefully inadequate, in the year 2013 the region had total staff strength of three thousand, three

hundred and ninety five (3,395) comprising all categories of health professionals and other support staff. The key challenges however facing human resources in the region were inadequate doctors (both general practitioners and specialists), midwives, professional nurses, and some support staff. This inadequacy situation of critical staff in the region very often leads to the frequent occurrence of maternal death. Refer to table 3.2 below for the category of staff in the region.

Table 3.2: Critical Staff/Pop. Ratios 2010 – 2013

Category	2010	2011	2012	2013
No. of Ghanaian Doctors	15	14	12	10
Doctor: Pop Ratio	1:46,807	1:51,104	1:60,753	1:79,204
No. of Nurses	966	1,333	1,250	1,940
Nurse: Pop Ratio	1:727	1:537	1:1583	1:383
No of Medical Assistants	20	23	26	31
MA: Pop Ratio	1:35,106	1: 31,106	1:28,040	1:23,964

The health facilities provide all services including maternal and child health, such as antenatal care (ANC), skilled delivery, (SD) postnatal care (PNC), including post abortion care. Cases of maternal deaths that occurred in the various facilities in the districts were audited within 24 hours, and then the audited forms were sent to the region for further auditing after which the information is stored in the information unit both at the regional and at the facility levels.

3.2: Study Design

This was a descriptive retrospective hospital based maternal death data.

3.3: Study Period

The study was conducted in the UWR of Ghana from January 1to July 15 2015, to review data on maternal death in the region. Data reviewed include maternal deaths that occurred

from January 2009 to December 2014.

3.4 Study Population

The study populations were women who were pregnant or have recently been pregnant or delivered. These were women living within the upper west region and access health services in any of the health facility in the region

3.5 Sample Size

All audited maternal deaths (total=179) which occurred in the health facility from January 2009 to December 31st 2014 in the Upper West Region were included in the study.

3.6 Data Collection and Study Instrument

Data collection actually commenced at the hospital, where most women with obstetric complication came and finally died, and then the cases were traced to the Wa regional health directorate where those women who died from pregnancy related death were audited.

All health facility based maternal deaths were recorded and sent to the regional health information unit. Maternal deaths recorded at the regional health information unit were retrieved for the period under review. The health facilities from which maternal deaths occurred were noted and subsequently visited to crosscheck and validate the data. This information was obtained from the patient folders at departmental monthly reports, midwifery monthly returns, audit reports, maternity, gynecology and the labour ward records.

The type of information collected included; demographic data i.e. patient's name, age, marital status, educational background, occupational status, place of residence, and

address. Obstetric data included; gestational age in weeks, gravidity, and parity. Access to health care whether the woman attended ANC or not, previous complications, mode of delivery, facility of birth, duration of stay in the ward, cause of death and neonatal outcome. All the maternal deaths in this review were tallied from the maternal audit report forms, and recorded in a structured questionnaire form. A specially designed template was used to collect the needed information on each of the audited maternal deaths. Data on the total number of deliveries and number of live births for the study period were also collected.

3.7 Data Analysis

Data was entered into Microsoft excel version 2010, and cleaned for data entry errors. Statistical analysis was carried out using SPSS version 20.0 for Windows.

Descriptive and bivariate data analysis was done. Frequencies of single variables have been summarized and presented in tables and graphs.

3.8 Informed Consent

Permission to conduct the study was prearranged from the Department of Allied Health Sciences of the University for Development Studies before conducting the study. Permission was obtained from the Upper West Regional Director of health directorate of health service to enable me get access to the health information office. Each time, before a health facility was visited, a written permission was obtained from the facility management. At all levels, the rationale and procedure of our study was explained and only facilities who agreed of our study protocol were included.

Anonymity and confidentiality of the actual source of information obtained from the study was ensured by not indicating the names of patients and the persons who gave out the information.

3.9 Limitations

Review of secondary data usually presents with its own strengths and limitations. The major strengths in this study were the large sample size and the representative nature of the study population.

However, this study was limited because the issue of Maternal Mortality and the collection of data in regards to the issue have not been consistent. The data retrieved was a mixture of annual statistics, half year and quarterly reports that one did not have access to complete data for all the years, but fragments of what has been done in order to understand the issue understudy. Also another limitation to the study was that, the study only looked at health facility-based data, but did not consider community maternal mortality which could have made the data analysed all inclusive picture of the maternal mortality in the upper west region.

CHAPTER FOUR

RESULTS

4.0 Introduction

This chapter presents the findings of maternal deaths that occurred within the health facilities of the Upper West Region of Ghana from 2009 to 2014.

4.1 Socio-demographic Characteristics of Maternal Mortality

Table 4.1 shows the distribution of the Socio-demographic characteristics of maternal deaths that occurred during the period under review. In general their ages ranges from 14 to 50 years with a median age of 28 years (IQR=22-33). Age group distribution shows that the majority of 44% (79) of the mothers who died were within the age range of 20–29 years, whereas the minority of 5% (9) were 40 years or older. Majority (76.0%) of them were married, 22.9% were single/cohabiting and 1.1% of them were divorced/widow. In terms of their educational background, the results revealed that 102 (57.3%) of them were uneducated whereas 76 (42.7%) were educated. Of the 42.7% educated, none of them had tertiary level of education; 2.6% was educated up to the SHS level; and majority (56.6%) had up to JHS education whereas the remaining 40.8% had primary level education. By occupation, 67.0% of them were unemployed whereas 32.9% of them were either farmers (17.3%) or private business/traders (15.6%) (Table 4.1)

Table 4.1: Socio-Demographic Characteristics

Category	N	%N
Age		
≤20yrs	27	15.0
20-29	79	44.0
30-39	64	36.0
≥40	9	5.0
Total	**179**	**100.0**
Marital Status		
Single	41	22.9
Married	136	76.0
Other	2	1.1
Total	**179**	**100.0**
Education		
Primary	31	17.3
JHS	43	24.0
SHS	2	1.1
Tertiary	0	0.0
Total	**76**	**42.4**
Occupation status		
Unemployed	120	67.0
Farming	31	17.3
Trade/Business	28	15.6
Total	**179**	**100.0**

4.2 Trend of Maternal Mortality over the period

The findings, as presented in figure 4.2 below, indicate that the trend of maternal mortality in the Upper West Region has been rising and falling for the past six years. Annually, the number of deaths ranged from a minimum of 21 deaths to a maximum of 40 deaths. Over the period under review, the maximum number of deaths occurred in 2009 and the minimum in 2011. The mean yearly number of deaths was 30. From the year 2009 where the maximum number of deaths of 40 deaths per year occurred, the number of deaths reduced steadily to 21 deaths per year in 2011. From then onwards, the

number of deaths increases steadily again to 34 deaths per year in 2013 and then subsequently remains fairly stable in 2014.

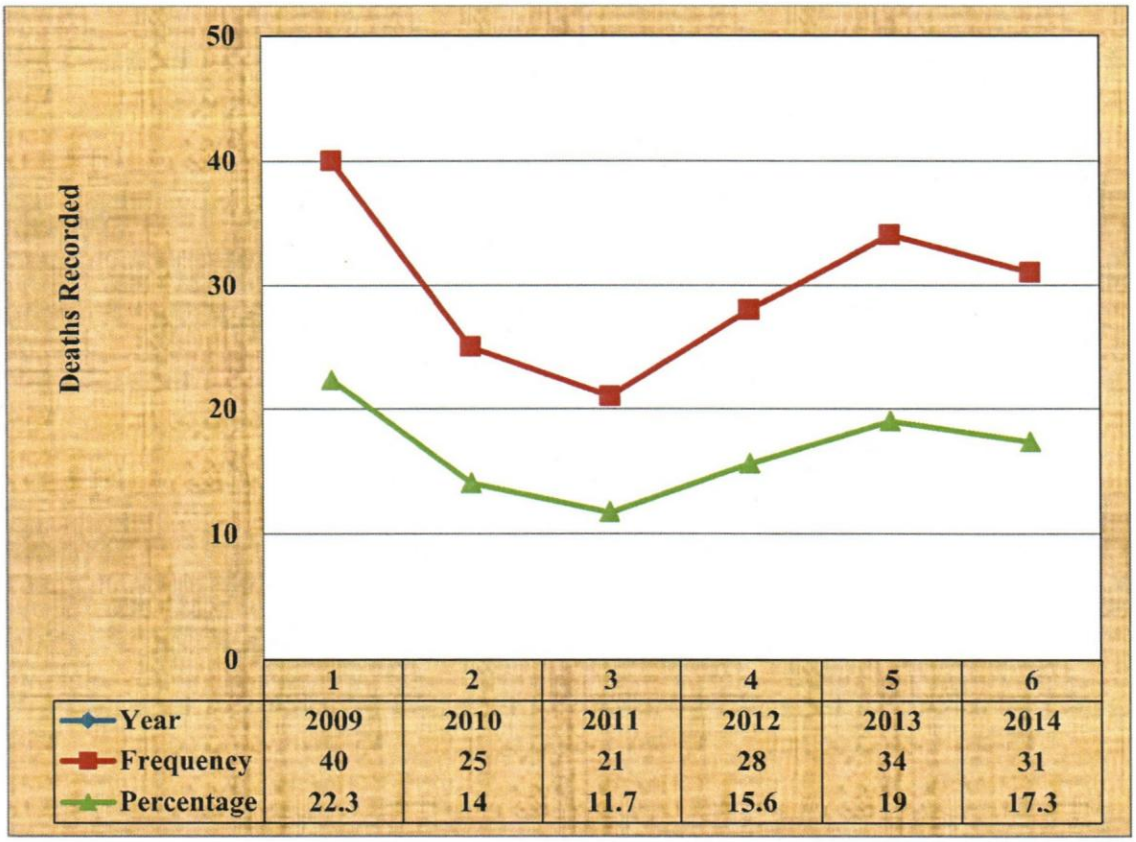


Figure 4. 1: Annual rend of Maternal Deaths from 2009-2014

Figure 4.1 gives the number of live births over the same period. From the figure, the number of live births varies from 12,270 to 19, 243 lives births per year. The highest number of live births was recorded in 2014 (19,243 live births) and the least in 2010 (12,270 live births). In general, the number of live births increased over the years under review. Consequently, the maternal mortality rate (MMR) over the six years was 193 deaths per 100,000 live births. The MMR for the specific years is shown by Table 4.2.

The year-on-year maternal mortality ratio within the period under review ranged from the least of 147 deaths per 100, 000 live births in 2011 to a maximum of 279 deaths per 100,000 live births in 2009. Except in the year 2011, when the maternal death ratio recorded was 3 deaths less than the MDGs target of 150 deaths per 100,000 live births, the ratios for the other years were all above 150 deaths per 100,000 live births.

Table 4.2: Distribution of maternal mortality rates (2009-2014)

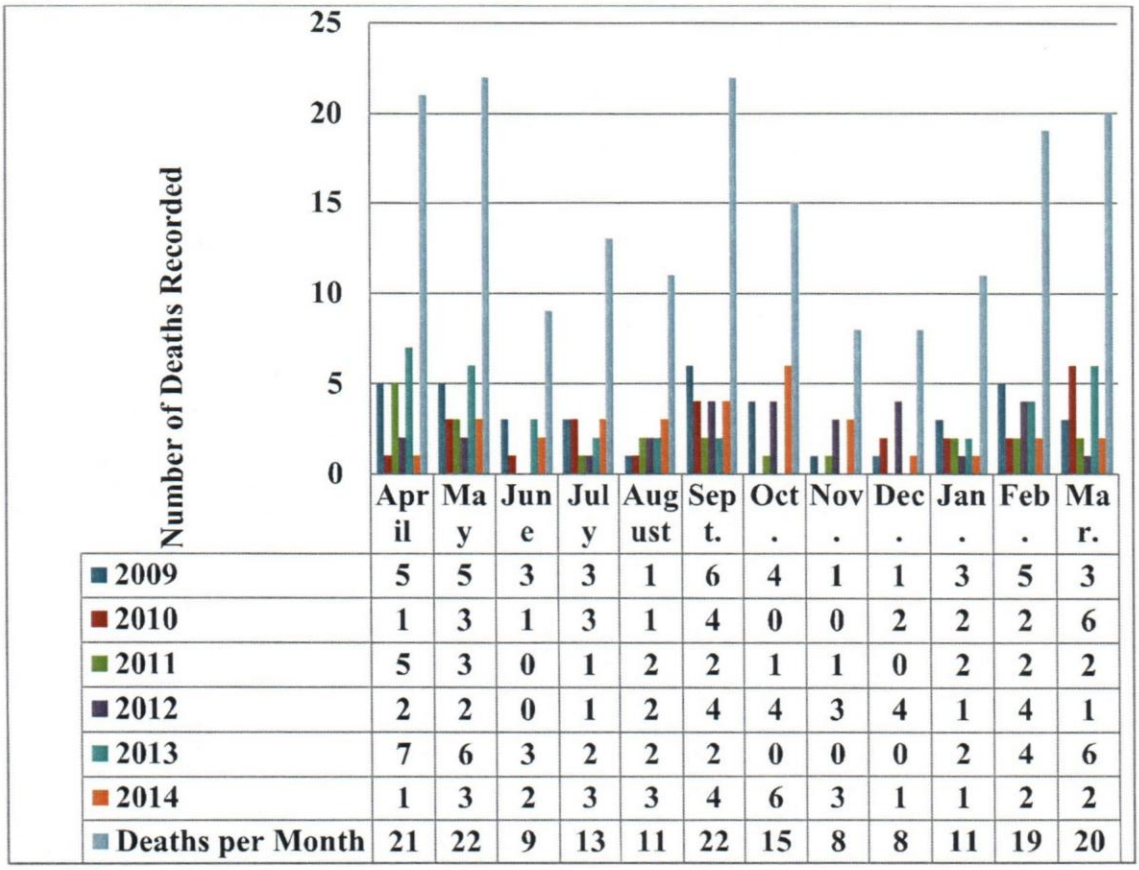
Year	2009	2010	2011	2012	2013	2014	Total
Total Maternal Deaths	40	25	21	28	34	31	179
Total Live Births	14352	12270	14322	15212	17331	19243	92730
Maternal Mortality Ratio	279	204	147	184	196	161	193

The maternal mortality rate was calculated by the mathematical formula below

$$MMR = \frac{\text{Maternal Deaths in a period}}{\text{Live Births in a period}} \times 100{,}000$$

The figure 4.2 below presents the proportion of maternal deaths by months from 2009 to 2014, resulting in overall deaths of 179 mothers over the period. On monthly basis, the cumulative peak of the deaths over the six-year period occurred in the months of March (n=20), April (n=21), May (n=22), and September (n=22). The one-time highest number (n=7) of maternal deaths occurred in the month of April in 2013, followed by 6 deaths in the month of October in 2014. The results further showed that the month of June recorded a total mortality of 9 deaths throughout the period under consideration, while the least of 8 deaths each respectively occurred in the months of November, and December. No death occurred for the months of October and November of 2010 and 2013 respectively. June of 2011 and 2012 also recorded no case of maternal death; likewise December of 2011

and 2013 (figure 4.2).



	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
2009	5	5	3	3	1	6	4	1	1	3	5	3
2010	1	3	1	3	1	4	0	0	2	2	2	6
2011	5	3	0	1	2	2	1	1	0	2	2	2
2012	2	2	0	1	2	4	4	3	4	1	4	1
2013	7	6	3	2	2	2	0	0	0	2	4	6
2014	1	3	2	3	3	4	6	3	1	1	2	2
Deaths per Month	21	22	9	13	11	22	15	8	8	11	19	20

Figure 4. 2: Monthly maternal deaths recorded (2009-2014)

Maternal deaths were generally variable across the districts of the region. The highest number of deaths came from the Wa Municipality (24.0%) followed by the Sissala West (13.4%), Jirapa (11.7%), and the Wa East (11.2%) districts. The Sissala East and the Daffiama-Bussie-Isah districts contributed the least deaths of 0.6% (1 death) and 2.8% (5 deaths) respectively (Table 4.3).

Table 4.3: Distribution of Maternal Deaths by District from 2009 – 2014 per 100, 000live births

District	2009	2010	2011	2012	2013	2014	Totals (N/100, 000)	%N
DBI	1	0	1	0	2	1	0.005	2.8
Jirapa	5	1	5	6	1	3	0.021	11.7
Lambussie-Karni	0	0	3	2	2	2	0.009	5.0
Lawra	4	1	2	2	5	2	0.016	8.9
Nadowli	1	3	0	3	1	2	0.010	5.6
Nandom	3	2	1	1	1	5	0.013	7.3
Sissala West	8	3	3	2	6	2	0.024	13.4
Wa East	4	3	3	2	2	6	0.020	11.2
Wa Municip	12	8	2	6	9	6	0.043	24.0
Wa West	2	4	1	3	5	2	0.017	9.5
Sissala East	0	0	0	1	0	0	0.001	0.6
Totals/100, 000live births	0.040	0.025	0.021	0.028	0.034	0.031	0.179	100.0

In categorizing the deaths by health facility/institution, the findings show that, Han, Kundugu, Naaha, Nabulo H, and the Zinni SW health centers contributed the least deaths below 1.0%. Of those institutions which contributed above 1.0% of the total deaths over the period under consideration, the Wa Regional Hospital had the highest of 54.2% followed by 13.5% from the Jirapa Hospital while the least (1.1%) came from Gwollu H., (see Figure 4.3).

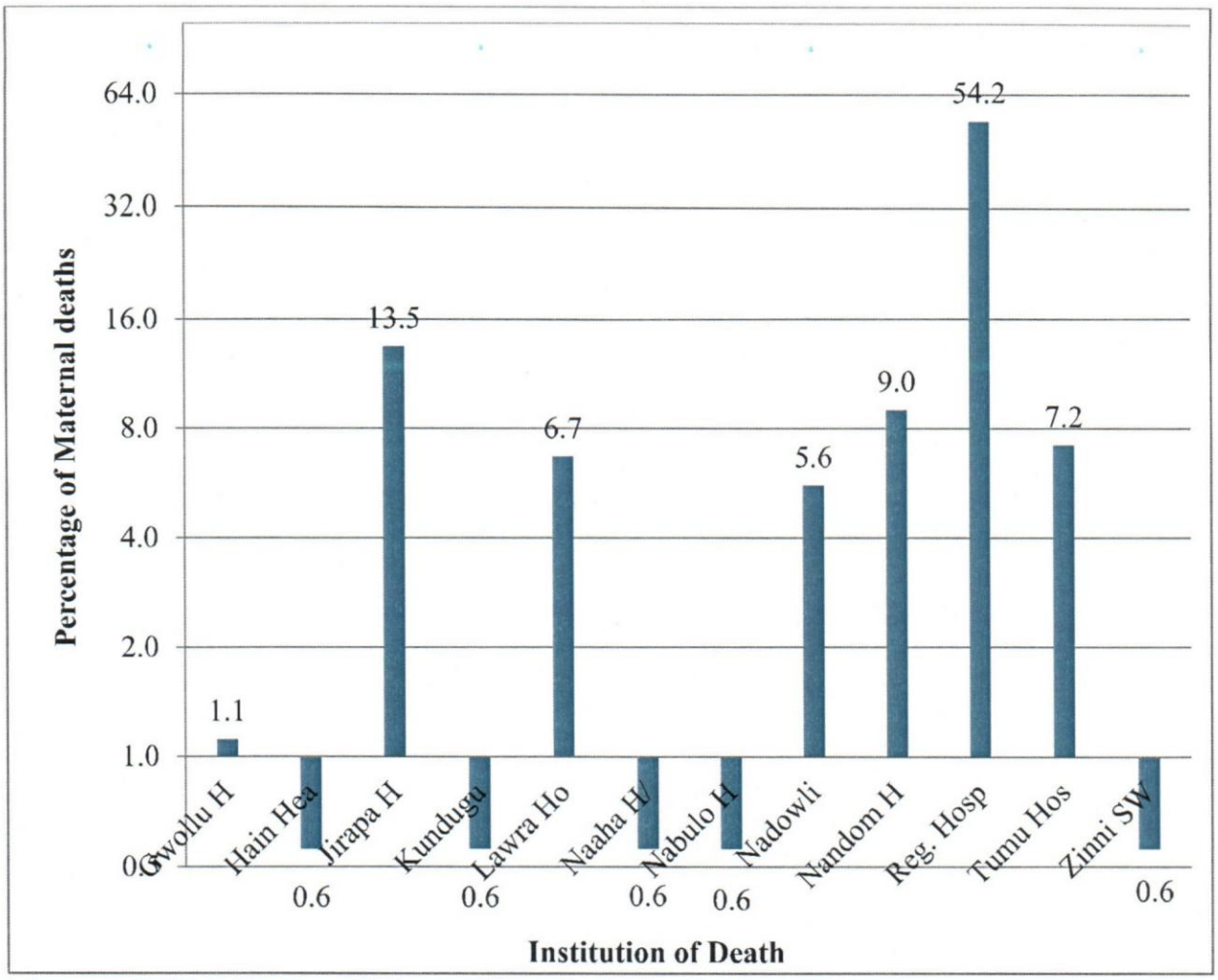


Figure 4. 3: Distribution of Maternal Deaths by Institutions

Plotting of an age of maternal death distribution indicates a normal dome-shape distribution curve with the peak age category falling between 1 to 28years (44%) (Figure 4.4).

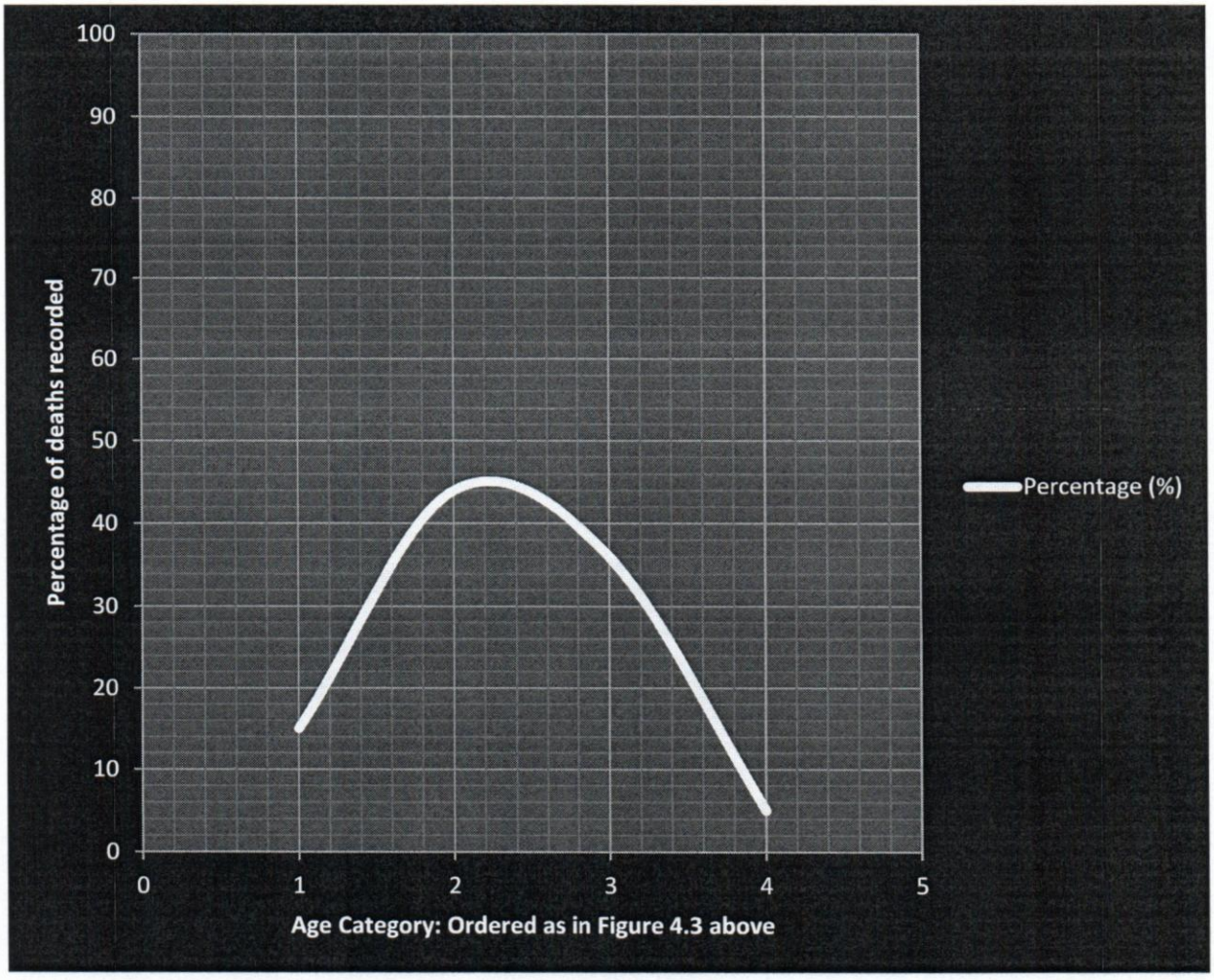


Figure 4. 4: Age of death Distribution curve

4.7 Association of demographic/risk factors and Cause of maternal death

Table 4.4 presents the relationship between the socio-demographic, obstetric and clinical characteristics and cause of maternal deaths. As indicated, none of the demographic/risk factors had significant association with the cause of maternal deaths as all the p-values were greater than the significant level of $p=0.05$.

Table 4.4 Association of demographic/risk factors and Cause of maternal death

Risk factor	Malaria N=20	Anaemia N=23	Haemorrhage N=41	Sepsis N=25	Unsafe abortion N=20	Total N=129	X^2	df	P-value
Age group							14.055	10	0.171
14-34	19	20	27	17	18	101			
Above 34	1	3	14	8	2	28			
Marital status							18.291	20	0.568
Single	6	3	11	7	1	28			
Married	14	19	30	18	19	100			
Others	0	1	0	0	0	1			
Education							34.946	30	0.245
None	13	14	24	18	11	80			
Primary	0	4	11	1	3	19			
JHS	7	4	6	6	5	28			
SHS	0	1	0	0	1	2			
Gravidity							23.034	20	0.287
1-2	12	11	12	11	10	56			
3-4	6	6	9	6	5	32			
>4	1	6	19	6	5	37			
Parity							35.123	30	0.238
Para 0	7	7	4	5	7	30			
Para1-2	8	7	13	5	7	40			
Para3-4	3	7	12	7	3	32			
Para>4	1	2	11	4	3	21			
Gestational age(weeks)							19.022	20	0.520
20-27	3	3	5	1	4	16			
28-35	8	4	9	3	5	29			
>35	8	14	26	20	8	76			
ANC Attendance							12.745	10	0.238
Yes	12	16	27	16	6	78			
No	7	4	14	8	13	46			

4.4 Obstetric and Clinical factors Influencing maternal Deaths in the Region.

The findings indicate that majority (25.7%) of the maternal deaths occurred among primidgravida women, 20.8% of them were gravida 3 and 15.0% were gravida 2. The least of deaths occurred among gravida 9 to 11 women. With regards to parity at death, 22.0% of deaths occurred among mothers who were pregnant for the first time (nulliparous), 19.1% were para2 and18.5% were para 1. Those who were para 4 and above constituted the least (2.9%).

In terms of duration of pregnancy at death, 56.4% of the maternal deaths occurred during the 36th week (or afterwards) of pregnancy whiles few (12.3%) deaths occurred at the 20th to the 27th week of pregnancy. For the factor of ANC attendance, 60.3% of the mothers who die had ever attended ANC before for the index pregnancy while 34.6% of them never attended any ANC for the index pregnancy, (table 4.5).

Table 4.5: Obstetric and Clinical causes of Maternal Deaths in the region

*Gravidity	Frequency	Percentage (%)
1	46	25.7
2	26	15.0
3	36	20.8
4	15	8.7
5	24	13.9
6	14	8.1
7	6	3.5
8	4	2.3
9	1	0.6
10	1	0.6
11	2	1.2
Total	173	100
*Parity		
0	38	22.0
1	32	18.5
2	33	19.1
3	24	13.9
4	19	11.0
5	14	8.1
6	7	4.0
7	3	1.7
8	1	0.6
9	1	0.6
10	1	0.6
Total	173	100.0
*Gestational age of pregnancy		
20 – 27 weeks	22	12.3
28 – 35 weeks	45	25.1
36+ weeks	101	56.4
*No. of ANC attendance		
Attendance	108	60.3
Non-attendance	62	34.6
**percentages do not add up to 100% due to missing values.*		

Table 4.6 indicates the association between obstetric and clinical factors and frequency of maternal deaths over the years. As indicated in table 4.6, all the obstetric and clinical factors of maternal gravidity (X^2=21.633, *p=0.017*), gestational age (X^2=27.332, *p=0.002*), and ANC attendance (X^2=11.262, *p=0.046*) were significantly associated with maternal deaths.

Table 4.6: Association of Obstetric and Clinical factors and maternal deaths in years

Risk factor	2009 N=40	2010 N=25	2011 N=21	2012 N=28	2013 N=33	2014 N=31	Total N=179	X^2	df	p-value
Gravidity								21.633	10	0.017
1-2	19	5	8	10	14	18	74			
3-4	13	14	6	8	5	3	49			
>4	8	5	6	10	12	10	51			
Parity								16.328	15	0.361
0	12	2	4	2	10	9	39			
1-2	17	11	7	11	9	11	66			
3-4	7	7	7	8	6	8	43			
>4	4	4	2	7	7	3	27			
Gestational age(weeks)								27.332	10	0.002
20-27	12	1	1	3	1	4	22			
28-35	9	4	2	11	7	12	45			
>35	19	17	16	11	23	15	101			
ANC Attendance								11.262	5	0.046
Yes	24	17	18	13	15	21	108			
No	15	6	3	13	16	9	62			

CHAPTER FIVE

DISCUSSION

5.1 Trend of Maternal Mortality in the region (2009-2014)

Generally, the trend of maternal mortality in the region is a case for concern. Over the period under review in this study, the mean maternal mortality ratio of 193 deaths per 100,000 live births in this study is comparatively lower than both the global (230),the Sub-Saharan African (510), and the national (380)(WHO, UNICEF, UNFPA, World Bank, & UNDP, 2014). This could be due to factors such as adequacy of technical staffs, better education, and improved access to health care services.

The maternal mortality ratio in the current study is also lower than the 724.5 deaths reported at the Tamale Teaching Hospital by Gumanga *et al.*, in 2011. The results of the current study is far lower and contradictory to findings from a study conducted in Nigeria which reported a maternal mortality ratio of 2,096 (Olamijulo et al., 2012). The most probable reason why our study result is lower than that of Olamijulo *et al.,* (2012) in Nigeria, could be due to factors such as the socio-demographic variations in the study areas, a comparatively smaller sample size in our study, and a better health system in Ghana. Our finding of the MMR in this study is also comparatively lower than the finding by Onakewhor & Gharoro, (2008) in their 5-year retrospective study of some 7055 maternal mortality cases in Nigeria (Onakewhor & Gharoro, 2008). The low MMR in our study as compared to the 2008 study could probably due to the increase in our total live deliveries within this period as a result of the focused ANC practice adopted by the

Ghanaian Health system. A 10-year retrospective assessment of maternal mortality in Western Maharashtra State of India revealed a higher mean mortality ratio of 302.23/100,000 live births. Majority of these deaths occurred in the age group of 20 to 29 years with more than half of the deaths reported among multiparous women (Murthy et al., 2013). Though the mean maternal mortality ratio in our study was lower compared to the finding of Murthy *et al.,* (2013), almost half of our maternal deaths occurred in the same age group of 20 to 29 years. This could be due to factors such as adequacy of technical staffs, health education, easy access to health care services, or possibly the smaller sample size considered in this study.

The trend of maternal mortality in the Upper West Region has been unstable over the years. It recorded the highest mortality cases in 2009 with the lowest in 2011.However, it is still about higher than the WHO's 2015 target of reducing maternal mortality ratio to150 deaths per 100,000 live births (WHO, 2015). It is also higher than the new target of 70 deaths per 100,000 live births as set by the United Nations Sustainable Development Goal 3.1 (UNDESA, 2015). This implies that the situation of maternal mortality in the Upper West Region is far below expectation and the region is not on course to achieving the Millennium Development Goal 5 and worst of all, the Sustainable Development Goal 3.1 if practical steps are not taken to improve the situation.

5.1: Socio-Demographic Characteristics

Our findings on the mean age of maternal deaths conforms to the report of Oladapo *et al.*, (2006), Gumanga *et al.*, (2011) and Der *et al.*, (2013) who also recorded that majority of their reviewed maternal deaths were within the age range of 20 to 29 years of age and minority were either 40years or older. Ujah et al., (2005), in their 17-year retrospective

study reported a similar age range of 15 to 47 years, which falls within our age range, but with a mean age of 26.4. The reasons for these occurrences within this age group in our study are not clear due to insufficient maternal records as equally reported by Ujah et al., in their 2005 study. However, majority of our recorded deaths who were either 24 years or less old were unmarried women and as such were likely to seek abortions.

In terms of literacy, we found that majority of our reviewed deaths had no formal education. This agrees with Yego *et al.*,(2014) and Kisuule *et al.*, (2013) as they reported that more uneducated women are more likely to suffer maternal deaths compared to the educated women. Therefore, education plays a very functional role in helping reduce maternal deaths (Yego et al., 2014; Kisuule et al., 2013). The dominance of maternal deaths among uneducated mothers could be due to the fact that most educated women would likely visit the ANC during pregnancy to be taught some danger signs and symptoms in pregnancy unlike their uneducated colleagues.

5.2: Direct and Indirect Causes of Maternal Mortality

The major causes of the maternal deaths, as discovered by this study, were haemorrhage/bleeding, Septicaemia, anaemia, Malaria, and unsafe abortions. Minor causes included eclampsia, chronic liver failure, meningitis, and HIV/AIDS. These causes identified in this study are quite indifferent from those reported by other studies especially in the less developed countries such as the findings of Gumanga *et al.*, (2011) as well as findings of Kisuule *et al*, (2013) and Yego *et al*, (2014) in their respective studies. The findings of this study further go to support that of Say *et al.*,(2014) who reported that haemorrhage was the leading cause of maternal death among their study

subjects followed by hypertensive disorders and septicaemia. In particular cases, the appreciable proportion of deaths resulting from unsafe abortions in the current study agrees with the finding of a 13-year Ghanaian-based retrospective study which also recounts that abortion played an increasing role in maternal deaths recorded (Geelhoed et al, 2003). Our findings on the major causes of maternal mortality also confirmed the report of a 2011 Ghanaian study which also found haemorrhage to be the leading cause of maternal deaths among others such as abortion and hypertensive disorders (Asamoah et al, 2011). Results of a 5-year retrospective study at Korle-Bu Teaching Hospital also identified haemorrhage as the leading cause of maternal deaths alongside other factors as abortion, hypertensive disorders, uterine rupture and sepsis (Der et al, 2013). Our findings are also comparable to study conducted by Murthy et al, (2013) who reported that most maternal deaths in recent times results from the classical triad of haemorrhage, sepsis and eclampsia. This finding suggests that for a long time now we have watched many of our youthful women die of already known and preventable causes.

We also found that haemorrhage was the leading cause of maternal deaths among our reviews. This finding agrees with the findings of many studies conducted in other developing countries across the globe (Der et al., 2013 ; Asamoah et al., 2011).

Contrary to our finding of haemorrhage as the leading cause of maternal deaths, Oladapo *et al.*, (2006) rather found hypertensive disorders as the major cause of maternal deaths in their study. Consequently, haemorrhage as the major cause of maternal deaths in our study unlike that of Oladapo *et al*, (2006) could be the harsh domestic works associated with married women around our part of Ghana by our socio-cultural norms. This can result into unnecessary bleeding coupled with the fact that they are mostly malnourished

and therefore may be anaemic. Majority of these causes of maternal deaths are preventable and one would expect that they should no longer be major issues of concern as 2015 draws close to an end.

5.3 Obstetric and Clinical factors Influencing maternal Deaths in the Region.

Our findings on the obstetric and clinical factors influencing maternal deaths agrees with Chauhan *et al,*, (2012) who also recorded the highest number of maternal deaths among Primidgravida and Nulliparous women. In contrast to our findings, Ujah et al., (2005) reported that maternal deaths is directly proportional to increasing parity in that as a mother bears more children the higher the chances that she could be a victim of maternal mortality. Ujah et al., (2005) recorded higher maternal deaths among grand multiparous mothers unlike in our study because we found a relatively much younger mean age among our reviewed maternal death cases. Also, due to some socio-cultural reasons, gravid unmarried women may shy away from seeking antenatal care for fear of being seen as 'bad girls' and therefore could have attempt abortions – resulting in their deaths. Significantly, majority of these deaths were noted to have attended their antenatal care (ANC) services and as such it differs from the finding of Yego *et al.,*(2014) who discovered that less or no antenatal attention during pregnancy increases one's risk of becoming a victim of maternal death. In our case, majority had made a number ANC visits, the most probable reasons could be that these women registered as ANC clients and stopped the attendance afterwards; they may have reported late to the health facility when pregnancy set in; or they may not have been referred early enough to the appropriate facilities for the necessary attention they required.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATION

6.1 Introduction

This chapter gives a summary of the result and conclusion drawn from the study. It also gives some recommendations based on the results as presented in chapter 4.

6.2 Summary of findings

6.2.1 Trend of Maternal Mortality in the region (2009-2014)

- A total 179 maternal deaths occurred within the 6-year period under review with an overall maternal mortality ratio (MMR) of 193deaths/100,000 live births.
- The highest MMR of 297/100,000 live births occurred in 2009 and the lowest MMR of 147/100,000 live births occurred in 2011.
- District-wise, the Wa Municipality recorded the highest of 24.0% (43) of the total maternal deaths out of the 11 Districts in the region. The least maternal deaths of 0.6% (1) were recorded in the Sissala East District.
- The highest facility-based maternal deaths of 54.2% was recorded by Wa Regional Hospital while the Hian Health Center, Kundugu, Naaha, Nabulo and Zinni SW respectively had the least institutional maternal deaths of 0.6%
- The highest cumulative monthly maternal deaths of 22 deaths occurred in the months of May and September respectively, 21 deaths in April and 20 deaths in May. The one-time highest number of 7 maternal deaths occurred in the month of April 2013.

6.2.2 Socio-Demographic Characteristics

- In terms of socio-demographics,

- The ages of the maternal mortalities recorded over the period under review ranged from 14years as the youngest to 50 years as the oldest with a median age of 28years. Majority (44%) of the deaths ranged from age 20 to 29 years.
- Majority (76.0%) of the 179 maternal deaths recorded were married,
- 57.3% of them were not formally educated and 67.0% of them were not employed.

6.2.3 Direct and Indirect Causes of Maternal Mortality

- The major causes of maternal mortality in the Upper West Region within the period under review were haemorrhage/bleeding (22.9%), Sepsis (14.0%), anemia (12.8%), unsafe abortions (11.2%) and malaria (11.2%). Other infections such as HIV/AIDS constituted the least cause of 3.4%.

6.2.4 Obstetric and Clinical factors influencing maternal Deaths in the Region.

- From the findings,

- 25.7% of the recorded maternal deaths were Primidgravida women while 20.8% of them were gravida3 women.
- Nulliparous women constituted 22.0% of the deaths recorded while deaths among Para2 and Para1 women constituted 19.1% and 18.5% respectively.
- 56.4% of the maternal deaths occurred within/from the 36^{th} week in pregnancy or onwards whereas 60.3% of the total deaths had ever attended ANC, for at least their index pregnancy.

6.3 Conclusion

In conclusion, from the study the maternal mortality rate for the UWR for the period of 2009 to 2014 was 193/100,000 live of births. Haemorrhage/bleeding; Sepsis and anaemia were the common causes of the mortality. The maternal death in the region mostly affected a relatively very youthful population of our pregnant mothers. Majority of them were not educated and also without any meaningful employment. The main obstetric and clinical factors influencing most of the maternal deaths were first pregnancy, advanced pregnancy and inexperience parity

6.4 Recommendations

1. Though the trend of maternal mortality is observably unsteady, it is still generally high and resulting from well-known factors. The Regional and the respective District Health Management Teams as well as private stakeholders are encouraged to increase collaboration and prioritize more resources to disseminate information on early registration and continues attendance to ANC for early detection and prompt management of risk factors.

2. It is recommended that efforts of educating and empowering women to take control over their general health and maternal issues should employ a community-based approach instead. Informative and educative efforts such as community durbars, community-based WIFA classes, community-based home health and family life education, etc. should especially target the young, uneducated and unemployed women in fertility age. This will provide them an accessible chance to increase a good knowledge base prior to pregnancy and ANC visits.

3. All the major causes of maternal mortality identified in this study are well-known and preventable! Consequently, increased efforts of targeted-driven prevention approach are required to progressively overcome these causes. There is the need for more resources, effective collaboration and efficient coordination among the various Health Directorates in conjunction with other stakeholders towards ending avoidable maternal deaths.

4. The majority of those who suffer maternal death are first-time pregnant women or have either not delivered before or have delivered once, and also had reached their 36th week in their pregnancy. This study recommends that the practice of focus antenatal should be emphasized especially on first-pregnancy cases or inexperienced parity. Health education efforts should equally be intensified with increased focus on high ANC attendance, early reporting, critical clinical assessment and a prompt referral system, most significantly, in critical cases. The various DHDs and their respective District Assemblies should facilitate the establishment of reliable Community Emergency Transport Services (CETS) in areas where there are accessibility challenges of distance and less or poor motorable roads.

6.5 Suggestion for further studies

This study focused primarily on maternal deaths that occurred in the health facilities in all the 11 Districts of the Upper West Region and were recorded and audited from 2009 to 2014. It is therefore recommended that further studies be conducted to capture the community-based maternal deaths that go unnoticed in the region in order to have an all-inclusive maternal mortality rate for the region.

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APPENDICES

Appendix 1

Table 6.1: Upper West Regional Population and Target Populations 2011 -2013

District	2011			2012			2013		
	Total Pop	Chn 1yr	WIFA	Total Pop	Chn 1yr	WIFA	Total Pop	Chn 1yr	WIFA
DBI	NA	NA	NA	NA	NA	NA	32,802	886	7,774
Jirapa	90,082	2,432	21,349	91,793	2,478	21,755	93,537	2,525	22,168
Lambussie	52,635	1,421	12,474	53,635	1,448	12,711	54,655	1,476	12,953
Lawra	102,847	2,777	24,375	104,801	2,830	24,838	50,703	1,369	12,017
Nadowli	96,181	2,597	22,795	98,009	2,646	23,228	67,069	1,811	15,895
Nandom	NA	NA	NA	NA	NA	NA	56,089	1,514	13,293
Sissala E.	57,602	1,555	13,652	58,696	1,585	13,911	59,812	1,615	14,175
Sissala W.	50,515	1,364	11,972	51,475	1,390	12,200	52,453	1,416	12,431
Wa East	73,443	1,983	17,406	74,839	2,021	17,737	76,261	2,059	18,074
Wa Muni	109,251	2,950	25,892	111,327	3,006	26,384	113,442	3,063	26,886

Source: RHD, 2014

Appendix 2

Map of Upper West Region indicating all 11 Districts

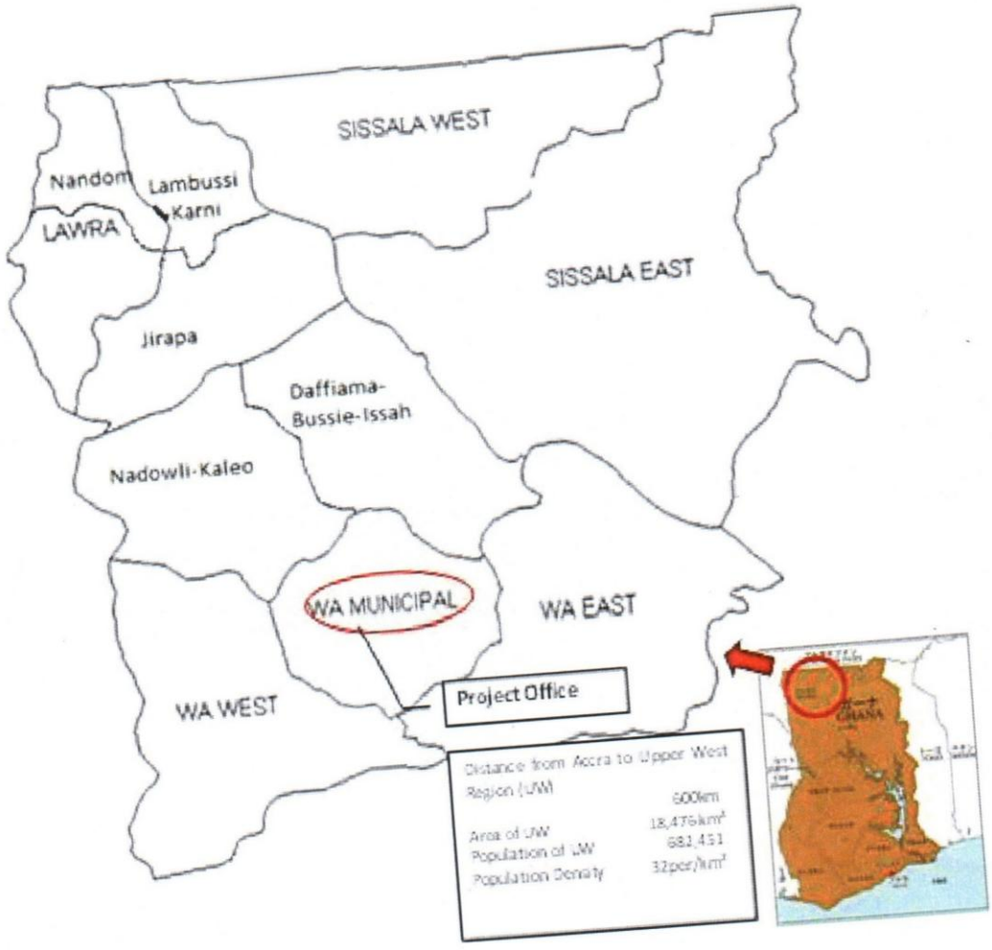

Figure 2: Map of Upper West Region

Source: Google Maps