

# **Management and Referral of Obstetric Complications: a Study in the Upper East Region of Ghana**

*A thesis submitted in fulfilment of the requirements for the degree of Doctor of  
Philosophy*

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## ABSTRACT

**Background:** Women in West and Central Africa have the highest lifetime risk of maternal death of 1 in 27, compared to a ratio of 1 in 180 globally, and 1 in 2,000 in Central and Eastern Europe. Like many West African countries, Ghana made insufficient progress in efforts to meet the Millennium Development Goals. In 2015, Ghana's maternal mortality ratio was 319 per 100,000 live births with a lifetime risk of maternal death of 1 in 74. This PhD study examined the management and referral of obstetric complications in the Upper East Region of Ghana.

**Methods:** This two-phased quantitative study involved a retrospective cohort review (phase I) of obstetric outcomes (n = 3,963), which provided data on the major causes of obstetric complications and deaths. The second phase comprised a review of obstetric services in health facilities (n = 120) and a survey on management of obstetric complications by maternity care workers (n = 278).

**Results:** Principal causes of maternal deaths were haemorrhage, hypertension/(pre-) eclampsia and sepsis. Late initiation of antenatal care, low haemoglobin levels at registration among pregnant women, low usage of partographs by maternity care workers and a high rate of stillbirth were also reported. The health facility survey showed that approximately 80% of facilities did not meet the criteria for provision of emergency obstetric care. In the service providers' survey, about half of maternity care workers had not received in-service training in the 12 months preceding the study and community health nurses received disproportionately less maternity in-service training than midwives. Among skilled personnel, there were inconsistencies in maternity care practices such as admission processes. Finally, traditional birth attendants continue to assist in a small proportion of births despite current policy directives prohibiting their provision of services.

**Conclusion:** Overall, a combination of health system and household-level factors continue to drive maternal and perinatal morbidity and mortality in the Upper East Region of Ghana. To improve outcomes, it is important to strengthen the maternity care

system by ensuring that health facilities are adequately equipped and that personnel are well trained, monitored and supervised. In addition, challenges that prevent women from receiving the maximum benefits of antenatal, birthing and postnatal services, need to be addressed.

## STUDENT DECLARATION

### Doctor of Philosophy by Publication Declaration

“I, Minerva Kyei-Nimakoh, declare that the PhD thesis by Publication entitled ‘Management and referral of obstetric complications: a study in the Upper East Region of Ghana’ is no more than 100,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work”.

Signature:

A solid black rectangular box used to redact the student's signature.

Date: 14<sup>th</sup> June, 2017

## DECLARATION OF AUTHENTICITY

Part A:

Details of included papers: thesis by publication

Item No.	Paper Title	Publication Status	Publication Title and Details
1	Millennium Development Goal 5: progress and challenges in reducing maternal deaths in Ghana.	Published	Kyei-Nimakoh, M., Carolan-Olah, M. & McCann, TV. (2016). Millennium Development Goal 5: progress and challenges in reducing maternal deaths in Ghana. <i>BMC Pregnancy and Childbirth</i> , 16(1):51, doi: 10.1186/s12884-016-0840-0.  Scimago journal ranking (2015): Q1
2	Barriers to obstetric care at health facilities in sub-Saharan Africa—a systematic review protocol.	Published	Kyei-Nimakoh, M., Carolan-Olah, M. & McCann, TV. (2015). Barriers to obstetric care at health facilities in sub-Saharan Africa—a systematic review protocol. <i>Systematic Reviews</i> , 4(1):54, doi: 10.1186/s13643-015-0045-z.  Scimago journal ranking (2015): Q1
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4	Review of essential emergency obstetric care interventions in health facilities in the Upper East Region of Ghana: a questionnaire survey.	Revised and resubmitted	Kyei-Nimakoh, M., Carolan-Olah, M., McCann, TV. & Awoonor-Williams, JK. (2016). Review of essential emergency obstetric care interventions in health facilities in the Upper East Region of Ghana: a questionnaire survey. Manuscript submitted for publication.  Submitted to <i>BMC Health Services Research</i>  Scimago journal ranking (2015): Q1

5	Obstetric outcomes in the Upper East Region of Ghana: a retrospective cohort study.	Submitted for peer review	<p>Kyei-Nimakoh, M., Carolan-Olah, M., McCann, TV. &amp; Awoonor-Williams, JK. (2017). Obstetric outcomes in the Upper East Region of Ghana: a retrospective cohort study. Manuscript submitted for publication.</p> <p>Submitted to <i>BMC Women's Health</i></p> <p>Scimago journal ranking (2015): Q2</p>
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**Declaration by:**

Minerva Kyei-Nimakoh

**Signature:**



**Date:**

14<sup>th</sup> June, 2017

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### **List of Abbreviations**

ANC:	Antenatal Care
CHPS:	Community-based health and planning services
CHN:	Community Health Nurse
EmOC:	Emergency obstetric care
EPHPP:	Effective Public Health Practice Project
CINAHL:	Cumulative Index to Nursing and Allied Health Literature
GEHIP:	Ghana Essential Health Intervention Program
iMMR:	Institutional Maternal Mortality Ratio
MDGs:	Millennium Development Goals
MMAT:	Mixed Methods Appraisal Tool
MMR:	Maternal Mortality Ratio
PRISMA:	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
SDGs:	Sustainable Development Goals
SERC:	Sustainable Emergency Referral Care
STROBE:	Strengthening the Reporting
TBAs:	Traditional birth attendants
WHO:	World Health Organization.

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Introduction**

Maternal well-being is a public health concern, particularly in sub-Saharan Africa. Ghana, like most sub-Saharan African countries, experiences challenges in its efforts to improve maternal mortality and other health outcomes. Despite ongoing efforts and some improvements, Ghana continues to experience relatively high levels of maternal morbidity and mortality. Part of the difficulty is that maternal health is complex and multifactorial in nature. For this reason, it is important that strategies to reduce adverse outcomes take cognisance of the particular context of care provision for pregnant women. Essential obstetric health services are required before, during and after childbirth and may include antenatal, birthing and postnatal services, each of which is important to the specific stage of pregnancy. However, such services may not be accessible to some women or use of services may be hampered by factors such as poverty. In turn, limited availability and use of obstetric services and the poor quality of services may contribute to adverse maternal health outcomes. The purpose of this study was to examine obstetric care practices and obstetric outcomes in the Upper East Region of Ghana.

In this chapter, the background for the study is presented, followed by the research questions and the aims of the study. Next, terms relevant to the thesis are defined. The justification for the study and its likely contribution to knowledge follow. Finally, an outline of the structure of the thesis is provided.

#### **1.2 Background**

An estimated 800 women die each day due to pregnancy-related causes, with sub-Saharan Africa and southern Asia accounting for 86% of such deaths in 2013 (United Nations, 2015a). Although these figures are alarming, in recent years focused international efforts have led to considerable gains. Reports indicate that maternal deaths declined globally by 45% between 1990 and 2013, from 380 per 100,000 live

births to 210. However, sub-Saharan Africa continues to bear a significant burden of global maternal deaths. For instance, despite a substantial reduction from 990 to 510 deaths per 100,000 live births between 1990 and 2015, 66% of global maternal deaths occurred in sub-Saharan Africa in 2015 (United Nations, 2015a). The magnitude and impact of maternal death has led to its recognition as a development concern. The United Nations Millennium Declaration was drafted in 2000 and sought to improve maternal health as part of the Millennium Development Goal (MDG) 5. The targets of MDG 5 were to “reduce by three quarters, between 1990 and 2015, the maternal mortality ratio” (target 5a) (United Nations, 2015a, p. 38) and to “achieve, by 2015, universal access to reproductive health” (target 5b) (United Nations, 2015a, p. 41). The indicators for target 5a were MMR and the proportion of births attended by skilled personnel (United Nations, 2005). Since the MDG 5 targets were not achieved by most of the worst affected countries, particularly in sub-Saharan Africa and southern Asia, maternal health was included in a new set of global goals called the Sustainable Development Goals (SDGs), introduced by the United Nations in 2015. The third SDG concerns good health and well-being, and its first target is “by 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births” (United Nations, 2015b). To achieve this new target, there needs to be an average decline of 7.5% a year in MMR between 2016 and 2030 (WHO, UNICEF, UNFPA, World Bank Group, & the United Nations Population Division, 2015), particularly in countries with high MMR.

Ghana’s maternal death rate is declining but far more slowly than expected. Trends in access to skilled care for Ghana are similar to those of Africa in general, with respect to rural–urban and socioeconomic disparities (National Development Planning Commission and the United Nations Development Programme, 2015). In 1990, which was the baseline year for measuring progress towards MDG 5, Ghana’s MMR was 634 per 100,000 live births. With an average annual decline of 2.7%, MMR was 319 per 100,000 live births in 2015, a fall of nearly 50% (WHO et al., 2015). On the other hand, institutional MMR, which measures maternal deaths occurring in health facilities fell from 216 per 100,000 live births in 1990 to 187 in 2005 but increased to 201 by 2008 (National Development Planning Commission and the United Nations

Development Programme, 2012). This trend is not well understood because the factors contributing to changes in MMR vary considerably, ranging from challenges at the household level to those within the health system itself, such as inadequate numbers of skilled personnel. Overall, between 1990 and 2010 a total decline of just 24.1% was observed in institutional MMR (National Development Planning Commission and the United Nations Development Programme, 2012). More recently, institutional MMR declined from 164 per 100,000 live births in 2010 to 155 in 2013 (National Development Planning Commission and the United Nations Development Programme, 2015). Considering Ghana's limited success at meeting the MDG target of a 75% decline in maternal deaths by 2015, it is uncertain whether the country will be able to attain the more ambitious SDG target of reducing maternal deaths to 70 per 100,000 live births by 2030. Presently, it is important to build on past successes while addressing emerging challenges with evidence-based strategies.

Worldwide, pregnant women receive specific healthcare services from the time pregnancy is detected until several weeks after birthing. Health services for pregnant women include health checks, antenatal and postnatal counselling, immunisations, and early detection and treatment of illnesses. The ultimate purpose of healthcare services provided during the perinatal period is to prevent complications and ensure safe birth for mother and child. When such care is deficient, consequences include increased maternal and infant morbidity and even mortality. In the case of maternal mortality, most deaths worldwide have been attributed to preventable causes, such as severe bleeding, unsafe abortion, hypertensive disorders, obstructed labour and sepsis (Say et al., 2014). Many of these causes are preventable by adequate antenatal care. The fact that the major causes of maternal death can be prevented or treated underscores the need for quality emergency obstetric care (EmOC) and there are particular junctures where this is critical. Notably, the likelihood of complications of pregnancy heightens during and immediately after childbirth. For instance, in Ghana, about 45% of all maternal deaths occur within 24 hours of birth and up to 65% within one week after birth (Ghana Statistical Service, Ghana Health Service, & ICF Macro, 2009). For these reasons, all women need to have access to EmOC during childbirth and the period

immediately following it. This is essential because, even for women who have normal pregnancies, some obstetric complications will occur (McCarthy & Maine, 1992) and adverse maternal outcomes remain unpredictable and real possibilities. Consequently, in parts of the world where access to EmOC is inadequate, complications of pregnancy may result in preventable maternal death.

One way of improving obstetric outcomes is to increase the proportion of births attended by skilled personnel (United Nations, 2005). However, the challenge for many African countries is ensuring access for pregnant women, particularly those living in rural areas, and across different socioeconomic groups. In African countries, 77% of pregnant women in urban areas are attended by skilled personnel compared with just 42% of rural dwellers who receive skilled care during birth. There are also income disparities. For instance, 83% of women in the highest wealth quintile receive skilled care during childbirth compared with 29% of women in the lowest wealth quintile (African Union Commission, 2013). In Ghana, the proportion of births occurring in a health facility has increased significantly from 42% to 73% between 1988 and 2014, as has the number of births attended by a skilled provider over the same period (40% to 74%) (Ghana Statistical Service, 2015). At the same time, institutional MMR has declined by less than 30% between 1990 and 2013 (National Development Planning Commission and the United Nations Development Programme, 2012, 2015). Notably, there has been limited success in reducing maternal deaths, particularly in rural areas. Therefore, rural and deprived communities, like the Upper East Region, continue to have high MMRs (National Development Planning Commission and the United Nations Development Programme, 2015).

Although attendance by skilled personnel at births has been shown to improve maternal outcomes (World Health Organization, 2009), Ghana's difficulties are not limited to ensuring that all pregnant women use skilled care. In fact, adverse maternal outcomes remain unacceptably high among women who give birth in health facilities (National Development Planning Commission and the United Nations Development Programme, 2015). More importantly, the country faces challenges in safeguarding the health of

women who access care, from preventable morbidity and mortality. Ultimately, improved perinatal outcomes for facility-based births will enhance the reputation of health facilities and in turn, encourage better utilisation by pregnant women. It is important to understand the particular hindrances that contribute to adverse maternal health outcomes in Ghana. This study will contribute to knowledge in this area of obstetric care.

### **1.3 Research questions**

The research questions that are central to this study are:

- What are the maternal outcomes for women in the Upper East Region of Ghana?
- What are the prevalent obstetric complications in the region?
- What major factors are related to adverse obstetric outcomes in the region?
- What obstetric care is provided by health facilities in the region?

### **1.4 Aims of the study**

The broad aim of the study is to investigate the factors influencing EmOC and referral by maternity care workers. The specific objectives are to:

- determine maternal outcomes for obstetric complications;
- examine the availability of essential obstetric care interventions in the region;
- examine the management of obstetric complications by maternity care workers.

### **1.5 Justification for the study**

As noted above, institutional MMR in Ghana has not improved concurrently with the growth in use of skilled maternal health services; however, available knowledge suggests that such skilled care improves birth outcomes for mothers and their babies (National Development Planning Commission and the United Nations Development Programme, 2015). Because this benefit is not fully realised in Ghana, it is important to understand the factors impeding progress. This information will assist with developing strategies to adequately meet the needs of pregnant women. An assessment of existing factors

contributing to the slow pace of achievements will enhance understanding of prevailing challenges and generate new knowledge to help guide obstetric care policy and practice in the country.

Ghana's unmet maternal health targets may be partly attributable to the inadequacy of infrastructure and other facilities, a situation typical of resource-poor settings. Reduction of MMR is also linked to the achievement of other MDGs such as those related to poverty, gender equality, education, and environmental sustainability (Ministry of Health, Government of Ghana, & United Nations Country Team in the Republic of Ghana, 2011). Such inter-sectoral developments take time to become established. A reliance on improvements in amenities such as better road networks and more efficient transportation systems may result in slower improvement. The challenge, however, includes addressing the need for information, to facilitate the advancement of feasible cost-effective systems that will work efficiently before and even after long-term inter-sectoral development goals are realised. The outcomes of this study contribute to research knowledge for strengthening Ghana's EmOC and referral system while taking cognisance of the context within which it must be applied. Results from the cohort study, review of obstetric services and survey will make a valuable contribution to policy development, midwifery education and practice.

A quantitative approach was chosen for this study as the most useful means of amassing the necessary large amount of data, particularly in cohort studies (Gans-Lartey, O'Brien, Gyekye, & Schopflocher, 2013; Majoko, Nystrom, Munjanja, Mason, & Lindmark, 2005; Nkyekyer, 2000). Similar approaches have been used successfully by other researchers and have established its usefulness and informed the methodological choice in this study. This study differs in the sense that it combines a cohort study, a review of obstetric services in health facilities and survey of maternity care workers, to explore various elements vital to obstetric care. In contrast, most other studies have focused on one particular aspect of care. The combination of approaches employed here may provide a broader understanding of the research problem. For instance, a recent study by Oduro-Mensah et al. (2013), on care decision making among frontline providers of maternal and newborn health services in Ghana, concluded that there is a need for effective interventions to address immediate as

well as long-term challenges influencing clinical decision making. In a 6-week prospective study of women referred to a teaching hospital in Ghana, Nkyekyer (2000) identified challenges in the referral system such as poor transport (usually private/public), transfers without staff accompanying patients, and avoidable referrals. Although these studies contributed to knowledge, a fuller picture would emerge if several aspects of obstetric care can be investigated within the same setting in a single study as this will allow inferences to be drawn based on knowledge gained from such analyses. This study was designed to address similar gaps to those described above and provide more insight into obstetric care in Ghana. Consequently, the present study will contribute to greater understanding of the current disparities existing within the Upper East Region and inform maternal health policy and practice in Ghana.

Access to obstetric care is often limited for women living in impoverished communities. This study contributes to an understanding of access barriers to EmOC in the rural and deprived communities of the Upper East Region by examining health records and through interviewer-administered surveys. It is hoped that the impact of potential contributions will be measured in terms of new knowledge generated, and the subsequent practical application of that knowledge.

## **1.6 Definition of terms**

The following are operational definition of terms used in this study.

- Maternity care workers: Skilled and lay health personnel who provide maternal health services to pregnant women during and after childbirth. They include midwives, nurses, community health nurses (CHNs) and traditional health attendants (TBAs).
- Maternal morbidity: ‘any health condition attributed to, and/or aggravated by, pregnancy and childbirth, that has a negative impact on the woman’s wellbeing’(PRE-EMPT, 2015).
- Maternal mortality/death: ‘A maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration 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' (World Health Organization, 2012, p. 9).
- Emergency obstetric care: A set of interventions designed to reduce maternal mortality by providing quality of services for the treatment of complications during pregnancy and childbirth (World Health Organization, 2009).
  - Maternal mortality ratio: 'the number of maternal deaths during a given time period per 100,000 live births during the same time period. It depicts the risk of maternal death relative to the number of live births' (WHO et al., 2015).
  - Institutional maternal mortality ratio: The 'number of maternal deaths among 100 000 deliveries in health facilities/institutions'(WHO, 2015).

### **1.7 Organisation and structure of the thesis**

The thesis consists of seven chapters. Chapter One contains a general background to the study and a description of the organisation of the thesis. A literature review on obstetric health is presented in Chapter Two. It includes an overview of global maternal health and a background to the healthcare system in Ghana. In addition, three peer-reviewed journal articles including a protocol for a systematic review, a systematic review on access barriers to obstetric care in sub-Saharan Africa, and a debate paper specifically focused on the challenges and progress of Ghana in reducing adverse maternal health outcomes, are presented.

In Chapter Three, a description of the theoretical foundation for the study is described, together with its application in this study. The chapter also includes the methodological approach employed in this study and the rationale for the selected methods.

Chapters Four, Five, and Six constitute the results of this thesis. The cohort study is presented in Chapter Four and includes a manuscript submitted to *BMC Women's Health* for publication. The chapter also includes additional analysis, mainly on perinatal morbidity and mortality. Chapter Five comprises another manuscript which has been revised and resubmitted to *BMC Health Services Research* for publication. The paper focused on the results of the review of obstetric services in health facilities in

the Upper East Region. In Chapter Six, the results of the survey of maternity care workers are presented.

Chapter Seven is a discussion of the study in the context of current literature and the theoretical framework guiding the study. The results are integrated and conclusions drawn. The strengths and limitations of the study, as well as the implications of the findings for policy, education, clinical practice, and future research are presented.

### **1.8 Chapter summary**

In this chapter, a brief background to the study was provided by locating the problem under investigation in current literature. Research questions and the aims of the study were identified. An explanation of the justification for this study was provided. Operational definitions for relevant terms were also given. Finally, details of the structure of the thesis were provided.

# GRADUATE RESEARCH CENTRE

## DECLARATION OF CO-AUTHORSHIP AND CO-CONTRIBUTION: PAPERS INCORPORATED IN THESIS BY PUBLICATION

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Title of Paper/Journal/Book:	Millennium Development Goal 5: progress and challenges in reducing maternal deaths in Ghana.		
Surname:	Kyei-Nimakoh	First name:	Minerva
College:	College of Health & Biomedicine	Candidate's Contribution (%):	70%
Status:			
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Published:	<input type="checkbox"/>	Date:	09 March, 2016

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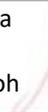
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College:	College of Health & Biomedicine	Candidate's Contribution (%):	70%
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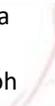
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## CHAPTER TWO

### LITERATURE REVIEW

#### **2.1 Introduction**

In this chapter, a detailed review of literature on maternal health is presented. It commences with information about the definition of maternal deaths and related terms, followed by global maternal mortality trends, and then a systematic review on access barriers to obstetric care in sub-Saharan Africa. A discussion on maternal healthcare in Ghana ensues and a peer-reviewed paper on Ghana's progress and challenges in reducing maternal deaths is presented.

#### **2.2 Definition of maternal deaths and its measures of estimation**

A shared understanding of the meaning of maternal death and its related terms has facilitated the tracking of progress in reducing maternal deaths globally. This common understanding makes possible the implementation and evaluation of interventions as well as comparability of progress in maternal health outcomes across different settings. The International Classification of Diseases (ICD 10) defines maternal death as 'the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration 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' (World Health Organization, 2012, p. 9).

Deaths that do not meet the above criteria (that is, deaths from accidental or incidental causes) but nonetheless occur during the perinatal period are excluded, because the pregnancy is unlikely to have contributed significantly to the death. Such deaths may, for instance, result from co-existing conditions such as malignancies, or accidents. This category is often referred to by more general terms such as 'death occurring in pregnancy, childbirth or the puerperium' (six weeks after birth) or 'pregnancy-related deaths'. A pregnancy-related death is defined as 'the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the cause of death' (World Health

Organization, 2004). This is noteworthy because in low- and middle-income countries<sup>1</sup>, where the greatest number of maternal deaths occur, estimation of these deaths may be particularly challenging (Mba & Aboh, 2010) for reasons such as incomplete births and deaths registration systems and inaccurate recording of causes of death. For instance, beyond the first six weeks after birth and up to one year, maternal causes of death should be recorded as late maternal deaths (World Health Organization, 2012); if this rule is not followed, estimation of maternal deaths could be artificially high.

Common statistical measures of estimating maternal deaths include maternal mortality ratio and maternal mortality rate. Maternal mortality ratio (MMR) is the number of maternal deaths during a given time period per the number of live births (usually 100,000), during the same time period:

$$\text{Maternal mortality ratio} = \frac{\text{number of maternal deaths in a given year} \times 100,000}{\text{total number of live births in same year}}$$

On the other hand, maternal mortality rate is the number of maternal deaths per 1,000 women of reproductive age (women aged between 15 and 49 years). It is calculated as follows:

$$\text{Maternal mortality rate} = \frac{\text{number of maternal deaths in a population} \times 1,000}{\text{number of women aged 15–49 years}}$$

(WHO, UNICEF, UNFPA, the World Bank, & the United Nations Population Division, 2014, p. 6)

The primary difference between these two definitions is that MMR essentially depicts the risk of maternal death relative to the number of live births, that is obstetric risk, while maternal mortality rate captures the risk of maternal death per birth and the level of fertility in the population (WHO et al., 2014). MMR has been used in this study because it is one of the main indicators employed by the World Health Organization and its member countries

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<sup>1</sup> Low-income countries are those with a gross national income (GNI) per capita of \$1,025 or less in 2015; lower middle-income economies have a GNI per capita between \$1,026 and \$4,035; upper middle-income countries have a GNI per capita between \$4,036 and \$12,475; high-income economies are those with a GNI per capita of \$12,476 or more (The World Bank, 2016).

for tracking maternal deaths. Another measure is the adult lifetime risk of maternal deaths, which provides an idea of the risk of maternal deaths throughout the reproductive lifespan of women in a specific population (WHO et al., 2014).

## **2.3 Maternal mortality trends**

### **2.3.1 Global trends in maternal mortality**

An estimate of a country's general performance on maternal deaths may be attained using the World Health Organization's classification of low, moderate or high MMR. According to the classification, high MMR is defined as  $MMR \geq 300$  maternal deaths per 100,000 live births; moderate MMR ranges between 100–299; and low MMR falls below 100 maternal deaths per 100,000 live births (WHO, UNICEF, UNFPA, & The World Bank, 2012). Using this broad categorisation, countries or even larger geographical regions with consistently high or fluctuating maternal death figures can be easily identified for appropriate interventions.

Globally, interest in MMR has increased since the United Nations Millennium Declaration in 2000. The increased attention has been associated with closer monitoring and substantial advances. MDG 5<sup>2</sup> provided a general direction for documented and defined goals in decision-making processes regarding obstetric care. The baseline year for measuring progress towards MDG 5 was 1990. Using this baseline, countries have been able to track and evaluate outcomes, allowing for analyses on what was effective and what could be improved, and make cross-national comparisons. One of the important indicators commonly measured is the MMR. Globally, MMR fell by 44% between 1990 and 2015, a figure that was significantly short of the projected 75% decline. Eastern Asia experienced the greatest decline in maternal deaths from 95 per 100,000 live births in 1990 to 27 in 2015, representing a 72% fall (WHO et al., 2015). Although some improvements have been made, maternal deaths continue to present a real challenge in some parts of the world, particularly in low- and middle-income countries, where 99% of all maternal deaths occur (World Health Organization, 2015a). MMR is highest in sub-Saharan Africa compared with the rest of the world, and a greater decline was required in order to meet the MDG 5.

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<sup>2</sup> See Chapter One, p18

Nonetheless, MMR fell from 430 in 1990 to 239 in 2015, for developing regions as a whole. However, although much progress was made, in sub-Saharan Africa the decline from 987 in 1990 to 546 in 2015 was a much slower decline than expected (WHO et al., 2015). These figures and the relatively slow decline demonstrate the magnitude of maternal deaths in this region and the difficulties in addressing the problem. The trends observed culminated in an actual annual average decline of only 2.3% between 1990 and 2015 in the sub-Saharan African region (WHO et al., 2015) instead of the anticipated 5.5% (World Health Organization, 2015a). Despite the shortfalls, MDG 5 represents a significant marker in the history of obstetric healthcare, because it created a shift in reproductive health priorities by emphasising target-driven strategies. This is demonstrated by the fact that global decline in MMR was greatest at an annual rate of 3% between 2000 and 2015 when the MDGs were in place, compared to a 1.2% annual decline between 1990 and 2000 (WHO et al., 2015).

To assess progress in improving maternal health, countries that had MMR of 100 or more in 1990 were categorised into four groups, ‘achieved MDG 5a’, ‘making progress’, ‘insufficient progress’ or ‘no progress’. Countries with MMR of less than 100 in 1990 were not categorised because further reduction is often challenging. The focus, therefore, was on 95 countries with MMR of 100 or higher. A country was considered to have achieved MDG 5a if it had an MMR reduction of 75% or more between 1990 and 2015. If there was a reduction of 50% or more, the country was categorised as ‘making progress’. Countries making ‘insufficient progress’ were those with an MMR reduction of 25% or more. Countries with MMR reduction of less than 25% were categorised as making ‘no progress’ (WHO et al., 2015). By 2015, only nine countries with previously high MMR had achieved MDG target 5a, and only two of these were in Africa, Cabo Verde and Rwanda. On the whole, 58 countries had a fall in MMR while progress for 26 countries was inconclusive (22 likely had a decline and 4 likely experienced an increase) (WHO et al., 2015). Table 1.1 shows the different stages of progress made towards reducing MMR by sub-Saharan African countries between 1990 and 2015. Several sub-Saharan African countries were unable to meet MDG 5. Similarly, the general trend in Ghana was of insufficient progress towards reducing maternal deaths.

**Table 1.1: MMR trends in sub-Saharan African Countries**

Country Progress		MMR/100,000 live births by year				
		1990	2000	2015	Average annual change (%) (1990–2015)	
<b>Achieved MDG 5a</b>	Rwanda	1300	1020	290	6.0	
	Cabo Verde	256	83	42	7.2	
<b>Made Progress</b>	Angola	1160	924	477	3.5	
	Djibouti	517	401	229	3.3	
	Eritrea	1590	733	501	4.6	
	Ethiopia	1250	897	353	5.0	
	Equatorial Guinea	1310	702	342	5.4	
	Madagascar	778	536	353	3.2	
	Mozambique	1390	915	489	4.2	
	Sao Tome and Principe	330	222	156	3.0	
	South Sudan	1730	1310	789	3.1	
	Sudan	744	544	311	3.5	
	Uganda	687	620	343	2.8	
	United Republic of Tanzania	997	842	398	3.7	
	Zambia	577	541	224	3.8	
	<b>Insufficient Progress</b>	Burkina Faso	727	547	371	2.7
		Burundi	1220	954	712	2.2
		Chad	1450	1370	856	2.1
		Comoros	635	499	335	2.6
Ghana		634	467	319	2.7	
Guinea		1040	976	679	1.7	
Guinea-Bissau		907	800	549	2.0	
Liberia		1500	1270	725	2.9	
Mali		1010	834	587	2.2	
Niger		873	794	553	1.8	
Senegal		540	488	315	2.2	
Sierra Leone		2630	2650	1360	2.6	
Somalia		1210	1080	732	2.0	
Togo		568	491	368	1.7	
<b>No Progress</b>	Botswana	243	311	129	2.5	
	Benin	576	572	405	1.4	
	Cameroon	728	750	596	0.8	
	Central African Republic	1290	1200	882	1.5	
	Congo	603	653	442	1.2	
	Côte d'Ivoire	745	671	645	0.6	
	Democratic Republic of the Congo	879	874	693	1.0	
	Gabon	422	405	291	1.5	
	Gambia	1030	887	706	1.5	
	Kenya	687	759	510	1.2	
	Lesotho	629	649	487	1.0	
	Malawi	957	890	634	1.6	
	Mauritania	859	813	602	1.4	
	Namibia	338	352	265	1.0	
	Nigeria	1350	1170	814	2.0	
	Swaziland	635	586	389	2.0	
	Zimbabwe	440	590	443	0.0	
	South Africa	108	85	138	-1.0	

Source: WHO et al. (2015)

In many sub-Saharan African countries, adverse maternal health outcomes persist because of inadequate and poor quality maternal healthcare services (Kruk et al., 2016). Most maternal deaths are a result of preventable obstetric complications that could be prevented if women had access to emergency obstetric care during pregnancy, childbirth and the

postpartum period (World Health Organization, 2015a). The major causes of maternal deaths are severe bleeding, hypertensive disorders (pre-eclampsia and eclampsia), sepsis, unsafe abortion, and other complications such as embolism. Together, these direct causes account for about 73% of all maternal deaths (Say et al., 2014).

## 2.4 Provision of Emergency Obstetric Care

The United Nations Population Fund has set standards for EmOC by identifying the pertinent components of basic and comprehensive EmOC capabilities necessary to protect women from preventable deaths. The standards also include the categories of healthcare staff required to offer obstetric services. This is important because skilled attendance at all births is highly regarded as one of the key factors in reducing maternal deaths from direct and indirect causes. The availability of skilled attendants facilitates the efficient management of life-threatening complications (United Nations Population Fund, 2014b).

Generally, depending on the type and level of a health facility, particular categories of obstetric services called 'signal functions' should be available. Likewise, trained health personnel competent in the delivery of these obstetric services must be available to operate the facilities (United Nations Population Fund, 2014b). Hence, at the heart of a successful EmOC intervention are well trained personnel complemented by adequate and appropriate equipment and medical supplies. The composition of basic and comprehensive EmOC is summed up in Table 1.2 below.

**Table 1.2: Composition of basic and comprehensive EmOC**

	<b>Basic EmOC</b>	<b>Comprehensive EmOC</b>
<b>Signal functions</b>	Parenteral antibiotics Parenteral oxytocics Parenteral anti-convulsants and anti-hypertensives Manual removal of placenta Removal of retained products Assisted vaginal delivery (forceps, vacuum extraction)	All 6 basic functions plus: Blood transfusion Caesarean section
<b>Settings</b>	Health centres and hospitals	Hospitals with an operating theatre and surgical capacity

<b>Skilled attendants</b>	Midwives and nurses with midwifery skills Supporting staff	A team of doctors, clinical officers, anaesthetist, midwives, nurses and supporting staff
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Source: UNICEF, WHO, and UNFPA (1997)

UNICEF et al. (1997) recommend that, for every 500,000 people, there should be at least four facilities offering basic obstetric care and one facility offering comprehensive essential obstetric care. In addition, for every facility, there should be at least two skilled attendants on duty 24 hours a day, seven days a week, assisted by trained staff and with a functional operating theatre. It has been a challenge to meet these recommendations in most low- and middle-income countries. A systematic review of literature by Dogba and Fournier (2009) highlighted some of the difficulties and revealed that staff shortages, women’s dissatisfaction with birthing services and the technical quality of EmOC combined to pose challenges to maternal healthcare in low- and middle-income countries. Dogba and Fournier (2009) added that the technical quality of EmOC had not been studied adequately, pointing to a research/knowledge gap. To address this gap, a systematic review has been conducted as part of this PhD study. The following review provides a comprehensive overview of access barriers to obstetric care in sub-Saharan Africa with a focus on health system and household level factors.

# Barriers to obstetric care at health facilities in sub-Saharan Africa - a systematic review protocol

Minerva Kyei-Nimakoh\*, Mary Carolan-Olah and Terence V McCann

## Abstract

**Background:** Since the launch of the Millennium Development Goals (MDGs) by the United Nations in 2000, the global community has intensified efforts to reduce adverse maternal health outcomes, especially, in sub-Saharan Africa. Despite these efforts, there is an increasing concern that the decline in maternal deaths has been less than optimal, even for women who receive birthing care in health facilities. High maternal deaths have been attributed to a variety of issues such as poor quality of care, inadequate resources, poor infrastructure, and inaccessibility to healthcare services. In other words, even in settings where they are available, many women do not receive life-saving obstetric care, when needed, despite the fact that basic and comprehensive obstetric care is widely recognized as a key to meeting maternal health goals. It is important to understand the common challenges that this developing region is facing in order to ensure a more rapid decline in adverse maternal health outcomes. The aim of this review is to synthesize literature on barriers to obstetric care at health institutions which focuses on sub-Saharan Africa, the region that is most affected by severe maternal morbidity and mortality.

**Methods:** This review follows guidelines by the preferred reporting items for systematic reviews and meta-analyses (PRISMA) checklist. An electronic search of published literature will be conducted to identify studies which examined barriers to health facility-based obstetric care in sub-Saharan Africa. PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Scopus databases will be searched. Published articles in English, dated between 2000 and 2014, will be included. Combinations of search terms such as obstetric care, access, barriers, developing countries, and sub-Saharan Africa will be used to locate related articles, and eligible ones retained for data abstraction. A narrative synthesis approach will be employed to synthesize the evidence and explore relationships between included studies.

**Discussion:** Information on the barriers to obstetric care is needed to inform policies for the improvement of maternal health. This review will contribute to providing related vital evidence to facilitate removal of barriers to maternal health services and interventions.

**Systematic review registration:** PROSPERO 2014:CRD42014015549.

**Keywords:** Obstetric care, Maternity care, Access, Barriers, Facility-based deliveries, Maternal deaths, Institutional maternal mortality, Sub-Saharan Africa, Developing countries, Systematic review

## Background

Sub-Saharan Africa has the world's highest adverse maternal health outcomes. The designation sub-Saharan Africa as employed in this paper refers to its usage as given in the United Nations (MDGs) regions' groupings, where it is used to indicate all of Africa except northern Africa (that is, Algeria, Egypt, Libyan Arab Jamahiriya, Morocco, Tunisia, and Western Sahara) [1]. The lifetime

risk of maternal death in sub-Saharan Africa is 1 in 38 compared to 1 in 160 for developing regions in general and 1 in 3,800 in developed regions [2]. Between 1990 and 2013, there has been a 45% decline in global maternal mortality ratio (MMR), that is, from 380 to 210 deaths per 100,000 live births. Despite this decline, sub-Saharan Africa had a high MMR of 510 per 100,000 live births, compared to Northern Africa which generally had an average MMR of 69 per 100,000 live births in 2013. As a consequence, sub-Saharan Africa accounted for 62% of global maternal deaths in 2013 [2].

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Several sub-Saharan African countries have made significant progress in reducing MMR, but maternal death trends are variable. An estimated 15% (and possibly more) of all pregnant women in the world develop serious obstetric complications [3,4], most of which are treatable [4]. The majority of these complications occur during, before, or shortly after birth [5]. This knowledge about when most of these deaths occur provides an excellent window for interventions that could improve outcomes. In order to minimize related threats to life and improve outcomes for mother and child, skilled care in a supportive environment is essential [6,7]. This is supported by the World Health Organization's recommendations on basic and comprehensive emergency obstetric care (EmOC), which outlines essential services, level of health-care delivery, and related skilled attendants required for safe care [3].

However, most sub-Saharan African nations are faced with a diverse range of individual/household problems as well as health system challenges. Challenges may include sociocultural barriers [8], poor maternity referral systems [9-11], shortage of skilled health personnel [12], and poor transport infrastructure coupled with long distances to health facilities [13-15]. Ultimately, these problems impact on access to skilled care at birth, which is integral to improved obstetric outcomes.

Basic and comprehensive EmOC is often not equitably distributed in many sub-Saharan African countries, in terms of its availability, accessibility, and acceptability [5,16,17]. Additionally, countries with the worst maternal healthcare outcomes also have the least number of health workforce per population [7]. As reported in the 2014 *State of the World's Midwifery Report*, 73 countries have 78% of births worldwide, 96% of global maternal deaths, and less than 42% of the world's midwives, nurses, and doctors [7]. Not surprisingly, the rate of skilled care at birth in Africa is low, at about 51%, with considerable rural/urban and socio-economic disparities [18]. Even among those who receive skilled care at birth, adverse obstetric outcomes remain higher than expected. Given substantial efforts invested in encouraging women to use formal birthing services, end users may find obstetric care services more appealing if outcomes are significantly improved. In fact, institutional (health facility-based) maternal deaths and other adverse outcomes are significantly higher in developing regions, such as sub-Saharan Africa and South East Asia [5].

This situation points partly to challenges regarding access to timely and appropriate obstetric care within health facilities. Of equal significance is safeguarding the trust of healthcare service users in facility-based care, without which maternal health outcomes are only likely to worsen. This is important because skilled care in sub-Saharan Africa is generally available in health facilities.

Nonetheless, a larger than average number of deaths occur in healthcare facilities. Institutional maternal deaths may occur before or after receiving obstetric care. The former may be accounted for by delays in seeking care by women/families or a poor referral system; and the latter raises concerns about the nature of care provided and possible challenges [5].

#### Significance

In light of these maternal health challenges, this systematic review will focus on gathering evidence from peer-reviewed literature on barriers to timely and appropriate obstetric care in sub-Saharan Africa. Apart from potentially improving obstetric care received by women in health facilities, identifying and removing barriers in healthcare settings could ultimately help boost skilled care attendance. This is because observable improvement in maternity outcomes may be a strong motivation for other women to choose healthcare facilities for birthing services. In other words, given the pivotal role of basic and comprehensive EmOC, synthesis of related literature will provide evidence to help strengthen policies aimed at improving obstetric care practice and also facilitate efforts in promoting the use of birthing services. Considering the strategic role of skilled care in reducing maternal deaths and on-going efforts to encourage healthcare facility-based births, it is crucial to ensure that scarce resources allocated to these efforts yield intended outcomes. This review will help assess the extent, strength, and implications of evidence across countries in sub-Saharan Africa.

#### Scope of the systematic review

This review aims to examine literature on barriers to obstetric care at health institutions in sub-Saharan Africa. It will focus on barriers or challenges that emerge after pregnant women have decided to seek obstetric care. It will also consider such barriers from the perspectives of maternity care workers (supply-side barriers) and service users (demand-side barriers) accessing formal maternity care services. Demand-side barriers are independent of service delivery or price and occur at the household and community level, such as transport costs to health facilities and lack of health awareness. Supply-side barriers, on the other hand, are constraints at the service delivery level and are beyond the control of health service users, such as long waiting times and high service costs [19]. Articles of interest will be quantitative studies targeting maternity care workers and pregnant women accessing care and addressing any of the following:

- barriers to accessing obstetric care and referral services,

- barriers/challenges to receiving timely and appropriate care while utilizing maternity services, and
- barriers encountered by maternity care workers in providing obstetric care and referral services.

## Methods

### Data sources

We will search the online databases PubMed, (CINAHL), and Scopus. Reference lists from located papers will also be checked and papers assessed for eligibility.

### Search strategy

The search will be conducted using combinations of the search term 'obstetric care' with 'access,' 'barriers,' 'developing countries,' 'pregnancy,' 'morbidity,' 'mortality,' 'hemorrhage,' 'hypertensive disorders of pregnancy,' 'sepsis/infection,' 'obstructed labor,' 'abortion-related complications,' and 'sub-Saharan Africa' to locate relevant articles. Also, a combination of the key terms with each individual country of the region will be used. Based on eligibility terms developed in consultation with experts, relevant studies published in English, between 2000 and 2014, will be retrieved. The year 2000 was selected as a starting point because that was when the MDGs were launched and many developing countries began tracking maternal health issues more closely. The search strategy for this review will be as follows:

1. Journals indexed in PubMed, CINAHL, and Scopus will be extensively searched using pre-identified key search terms and relevant synonyms.
2. A preliminary screening of articles in the search results will be conducted by checking the titles and abstracts, in order to appraise their eligibility.
3. Potentially relevant articles will be extracted for further examination, and those that do not meet the eligibility criteria will be excluded.
4. Reference lists of retrieved articles will be searched for additional papers and possible inclusion.
5. Full texts of all studies meeting the inclusion criteria will be retained for detailed review and analysis.

### Eligibility criteria

The following criteria will guide data abstraction.

### Inclusion criteria

1. Peer-reviewed studies which report barriers to accessing, receiving, or providing obstetric care services at healthcare facilities (from the perspectives of service users and maternity caregivers) will be included. Barriers will be limited to those encountered after the decision to seek

formal maternity care services has been made by pregnant women.

2. Only studies using quantitative methods will be considered, provided the study was conducted in sub-Saharan Africa.

### Exclusion criterion

1. Studies must have been published in English and report results of obstetric care barriers between 2000 and 2014.

### Selection of studies

We will assess studies for possible inclusion using the criteria outlined above by an initial screening of titles and abstracts. The review will consider quantitative studies conducted in community and hospital settings covering research objectives that coincide with those within the scope of this review.

### Quality assessment

This review is guided by the preferred reporting items for systematic reviews and meta-analyses (PRISMA) checklist by Moher D. *et al.* [20]. As a measure of quality, two investigators will independently review all full-text articles deemed eligible. If any differences arise, discussions will continue until consensus is reached. Quality of selected studies will be assessed using the Quality Assessment Tool for Quantitative Studies by the Effective Public Health Practice Project (EPHPP) [21,22] (See Additional file 1). Assessment of individual studies for methodological quality is an essential step in systematic reviews, as it imposes some rigor in minimizing bias. The Quality Assessment Tool for Quantitative Studies by the EPHPP [21] was considered as an appraisal tool for this review as it is useful for the assessment of clinical and observational studies. Its components are also consistent with the checklist of items outlined by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement [23]. Based on an initial scoping exercise, the types of studies which will be included in this review are mostly observational, such as cross-sectional and cohort studies. The EPHPP tool assesses internal and external validity of such studies and has been demonstrated to yield excellent inter-rater agreement [24], as well as acceptable content and construct validity [22]. Compared to the Cochrane Collaboration Risk of Bias Tool, EPHPP's tool was found to perform better on inter-rater agreement for individual domains and inter-rater agreement for the final grade [24]. The tool was developed for use in systematic reviews of public health interventions and has since been widely cited in several published reviews [25-27]. The tool is accompanied by a supplemental document (Quality Assessment Tool for Quantitative Studies Dictionary) which

explains the terms in the instrument and provides clear guidance on how to grade eligible studies [28]. The EPHPP Quality Assessment Tool assesses six domains which include selection bias, study design, confounders, blinding, data collection methods and withdrawals, and dropouts. The tool ranks methodological quality for each component, and then globally. Based on the rating of each component, an overall quality rating of weak, moderate, or strong is assigned to the study under review. Studies are categorized as 'strong' if it receives no weak rating, 'moderate' if given one weak rating, or 'weak' if given two or more weak ratings. The tool also includes two other domains, which are intervention integrity and analyses. These additional elements are assessed but not graded. At the end of the quality assessment process, reviewers will discuss and reach a consensus on results which will improve inter-rater reliability.

#### Data abstraction

We will abstract data from retained articles using a data abstraction form (See Additional file 2). Data will include publication information such as author, journal, year of publication, and location of study. The study design used will be noted. Specific details on the study, such as sample size, response rate, and population characteristics, will also be captured. Data on phenomena of interest reported as barriers/challenges to obstetric care will be collected.

#### Synthesis of data

Considering the nature and likely diversity of the outcomes, summary of data will be carried out using narrative synthesis of the barriers to obstetric care. In order to ensure a robust and transparent synthesis of the evidence, the guidance on the conduct of narrative synthesis in systematic reviews by Popay J. H. *et al.* [29] will be used in conducting the narrative synthesis. The guidance offers four elements, along with several related tools and techniques that may be applied in the synthesis process. The four elements include the following:

1. developing a theory,
2. developing a preliminary synthesis,
3. exploring relationships within and between studies, and
4. assessing the robustness of the synthesis.

The preliminary plan for this review is explained below.

1. Developing a theory: The basic theory underlying the review is that by identifying barriers from both service user and provider viewpoints, policymakers and healthcare workers can match expectations from both sides to enhance maternity care access. Jacobs and colleagues' [30] analytical framework

regarding barriers to healthcare is of particular interest and will later form the basis of comparison across the studies. The framework is based on four broad categories (that is, geographic accessibility, availability, affordability, acceptability). Under these broad categories, the barriers are further grouped as supply-side or demand-side. Where theories underlying the work are described in primary studies, these will be included in the discussion to facilitate interpretation of their findings.

2. Developing a preliminary synthesis: The tools/ techniques selected for application include drawing of tables, groupings and clusters, textual descriptions of studies, and transforming data into a common rubric. This stage of the process will set the stage for further analysis. Due to possible wide variations in the studies, they will be laid out in tables to provide an initial overview of the relationship between the studies. The table(s) may be organized according to the setting/context (community or health facility-based), type of subjects involved (health workers or service users), study design, results of study quality assessment, and outcome measures. Since the review broadly examines two different populations (health service users and providers), studies will naturally be sorted into these clusters in order to facilitate comparison and interpretation. Any other groupings will be dependent on the nature of data extracted, as reflected in the table(s). Subsequently, textual descriptions will help draw out and report vital aspects of the studies shown in the table(s). Summary tables using crude data on barriers will be generated from included papers. Where possible, results of studies that have undertaken significance testing will be summarized and pooled to arrive at a common statistic. In order to assess effects, statistical measures such as odds ratio will also be computed.
3. Exploring relationships within and between studies: The tools/techniques which will be of value at this stage are sub-group analyses and qualitative case descriptions. The processes described above will help assess similarities and differences between studies. Differences in obstetric care barriers will be discussed by location, type of facility, types of maternity care workers, and other relevant sub-categories. By comparing and contrasting, we will explore how factors such as the study design, population characteristics, and context may explain the study results. The analytical framework [30] on selecting appropriate interventions for barriers to health services will further contribute to sub-group analysis at this stage of the narrative synthesis process. Building upon the initial textual descriptions, vital aspects of the included studies will be qualitatively

described more comprehensively and interpreted to enhance understanding of any discrepancies between studies.

- Assessing the robustness of the synthesis: Validity assessment and critical reflection on the synthesis process will be employed. As explained above, assessment of the methodological quality of the primary studies included in the review forms part of the data extraction process and therefore occurs at an earlier stage. Additionally, the narrative synthesis process will be critically reflected upon. At the end of the review, the exact process applied will be reported in the final paper.

## Discussion

In this review, we will conduct a critical appraisal of literature on barriers to obstetric care in sub-Saharan Africa in order to make comparisons across countries in the last 14 years. As the deadline for meeting the MDGs is approaching, it is becoming more apparent that the sub-Saharan Africa region will be unlikely to meet set targets. The findings will contribute to greater understanding of challenges in providing obstetric care and also offer evidence needed to improve maternal health outcomes in a region, where the need for such evidence is greatest.

## Additional files

**Additional file 1: Effective Public Health Practice Project (EPHPP) Quality Assessment Tool for Quantitative Studies.**

**Additional file 2: Data abstraction form.** Description of items included in the abstraction of data from eligible studies.

## Abbreviations

emOC: basic and comprehensive emergency obstetric care; EPHPP: Effective Public Health Practice Project; MDGs: Millennium Development Goals; MMR: maternal mortality ratio; PRISMA: preferred reporting items for systematic reviews and meta-analyses; STROBE: Strengthening the Reporting of Observational Studies in Epidemiology.

## Competing interests

The authors declare that they have no competing interests.

## Authors' contributions

All authors (MKN, MCO, and TVM) made substantial contributions to the conception of this paper. MKN wrote the first draft of the manuscript. MCO and TVM provided substantive feedback, critically reviewed, and contributed to the intellectual content of this paper. All authors read and approved the final manuscript.

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# Access barriers to obstetric care at health facilities in sub-Saharan Africa—a systematic review

Minerva Kyei-Nimakoh\*, Mary Carolan-Olah and Terence V. McCann

## Abstract

**Background:** Since 2000, the United Nations' Millennium Development Goals, which included a goal to improve maternal health by the end of 2015, has facilitated significant reductions in maternal morbidity and mortality worldwide. However, despite more focused efforts made especially by low- and middle-income countries, targets were largely unmet in sub-Saharan Africa, where women are plagued by many challenges in seeking obstetric care. The aim of this review was to synthesise literature on barriers to obstetric care at health institutions in sub-Saharan Africa.

**Methods:** This review was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist. PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Scopus databases were electronically searched to identify studies on barriers to health facility-based obstetric care in sub-Saharan Africa, in English, and dated between 2000 and 2015. Combinations of search terms 'obstetric care', 'access', 'barriers', 'developing countries' and 'sub-Saharan Africa' were used to locate articles. Quantitative, qualitative and mixed-methods studies were considered. A narrative synthesis approach was employed to synthesise the evidence and explore relationships between included studies.

**Results:** One hundred and sixty articles met the inclusion criteria. Currently, obstetric care access is hindered by several demand- and supply-side barriers. The principal demand-side barriers identified were limited household resources/income, non-availability of means of transportation, indirect transport costs, a lack of information on health care services/providers, issues related to stigma and women's self-esteem/assertiveness, a lack of birth preparation, cultural beliefs/practices and ignorance about required obstetric health services. On the supply-side, the most significant barriers were cost of services, physical distance between health facilities and service users' residence, long waiting times at health facilities, poor staff knowledge and skills, poor referral practices and poor staff interpersonal relationships.

**Conclusion:** Despite similarities in obstetric care barriers across sub-Saharan Africa, country-specific strategies are required to tackle the challenges mentioned. Governments need to develop strategies to improve healthcare systems and overall socioeconomic status of women, in order to tackle supply- and demand-side access barriers to obstetric care. It is also important that strategies adopted are supported by research evidence appropriate for local conditions. Finally, more research is needed, particularly, with regard to supply-side interventions that may improve the obstetric care experience of pregnant women.

**Systematic review registration:** PROSPERO 2014 CRD42014015549

**Keywords:** Obstetric care, Maternity care, Access, Barriers, Facility-based deliveries, Maternal deaths, Institutional maternal mortality, Sub-Saharan Africa, Developing countries, Systematic review

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## Background

The primary concern of a healthcare system is to efficiently provide evidence-based services that meet the clinical/medical needs of clients, as well as meeting their expectations for receiving good quality care. Ideally, healthcare services should be accessible, available, affordable and acceptable to clients at all times. This is particularly important for vulnerable populations with specific needs, such as pregnant women and their infants. Pregnancy is a particular case in point as it requires defined healthcare services, and at least 15% of all pregnancies (possibly more in sub-Saharan Africa) are complicated by potentially life-threatening conditions [1]. Maternal deaths remain lamentably high, and worldwide, 289,000 women are estimated to have lost their lives to maternal deaths in 2013 alone, approaching two thirds (62%) of these deaths occurred in sub-Saharan Africa. Although complications related to childbirth and pregnancy are not always predictable, most maternal deaths are from preventable or treatable causes [2]. Major contributors to maternal deaths are haemorrhage, hypertensive disorders, sepsis/infections, abortion-related deaths and obstructed labour [3].

Sub-Saharan Africa is currently the world region with the worst maternal health outcomes. In 2013, the maternal mortality ratio (MMR) for this region was 510 per 100,000 live births. By comparison, Eastern Asia, also a developing region, had an MMR of only 95 per 100,000 live births, making it a relatively rare event [2]. High MMRs are not uniformly distributed across sub-Saharan Africa, and it is also unlikely that barriers are evenly distributed. For instance, for every 100,000 live births in 2013, Sierra Leone had an MMR of 1100, Central African Republic had 880, South Sudan had 730, Nigeria had 560, and Ghana had 380 [2]. There is also evidence of substantial disparities in maternal health indicators, by place of residence (rural/urban), socioeconomic status and others, which are indicative of inequities in access to healthcare [2].

The key to averting pregnancy-related ill-health and associated adverse outcomes is ensuring regular and holistic care for women throughout pregnancy and, particularly, during child birth and 24 h after, the critical period with the highest incidence of adverse maternal health events [4]. In order to make such care possible, it is crucial to first identify and eliminate any factors that hinder healthcare access and utilisation. In the presence of adequate healthcare services, there is an opportunity to improve maternal health outcomes [5]. The concept of 'access' is better explained using three interrelated dimensions; availability, affordability and acceptability. Hence, efforts aimed at promoting equity of access need to be considered in the wider context of these dimensions. This is because the degree to which a population

can gain access to services is not solely dependent on the availability of such services but also on such factors as poverty, organisational and sociocultural barriers [5, 6]. Given the contextual influences on barriers to access, it is best to examine healthcare access from the perspectives of different groups, which may have varying needs, interests and expectations. This notion is reflected in the fact that equity of access may be measured as the availability, utilisation or outcomes of services [5].

There is substantial research and literature on barriers to obstetric care services, as it is an important international public health issue. Similar reviews [7–9] have not specifically focused on demand- and supply-side factors or have more broadly examined facilitators and barriers in low- and middle-income countries [7, 9]. In a systematic review by Bohren and colleagues [9], a qualitative evidence synthesis of factors influencing the decision-making process for place of delivery in low- and middle-income countries was conducted. CA Moyer and A Mustafa [8], on the other hand, focused on only quantitative studies that assessed factors associated with facility-based delivery in sub-Saharan Africa. Other researchers adopted a much broader methodology by including reviews and primary studies, regardless of whether a qualitative or quantitative approach was used [7]. The scope of included studies was, however, global. Given that sub-Saharan Africa bears a disproportionately high burden of adverse obstetric outcomes, particularly maternal deaths [2], it is important to identify and consolidate information on trends contributing to the poor outcomes. This mixed-methods review adds to existing knowledge by examining barriers from a more comprehensive viewpoint of providers and service users. It also includes studies with varied methodological approaches. The aim of this review was to synthesise current evidence on barriers to obstetric care at health institutions in sub-Saharan Africa.

## Methods

In this study, we systematically reviewed published quantitative research on barriers to obstetric care utilisation in sub-Saharan Africa and employed a narrative synthesis approach to summarising the findings. The study protocol was registered in PROSPERO, CRD42014015549 ([http://www.crd.york.ac.uk/PROSPERO/display\\_record.asp?ID=CRD42014015549](http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42014015549)) and published in systematic reviews [10]. The analytical framework for barriers to healthcare access developed by Jacobs et al. [11] was employed in the data synthesis. The framework has two overarching categories; demand-side and supply-side barriers. Under each of these categories, there are four principal themes with sub-themes—geographic accessibility, availability, affordability and acceptability—which are based on the dimensions of access. Factors identified in

the studies were grouped under the themes, and any factors that did not belong to the pre-defined themes (emergent themes) were listed under 'other barriers' and examined further. In order to obtain comprehensive data for the review, we considered studies focusing on the perspectives of health workers (supply-side factors) and health service users (demand-side factors). This approach enabled us to capture the multiple factors that may be at play in impeding efficient maternity care usage. Data from the review revealed similarities and differences across countries in the sub-Saharan African region and provided lessons for future policy planning, practice and research.

#### Search strategy

We searched the online databases PubMed, CINAHL, and Scopus. Search terms used to locate relevant articles included 'obstetric care' with 'access,' 'barriers,' 'developing countries,' 'pregnancy,' 'morbidity,' 'mortality,' 'haemorrhage,' 'eclampsia,' 'sepsis/infection,' 'obstructed labour,' 'abortion-related complications' and 'sub-Saharan Africa' (Additional file 1). Articles that met the inclusion criteria were primary research studies that examined barriers to obstetric care, targeted women/service users accessing such care as well as maternity care workers. Studies were also published in a peer reviewed scientific journal in English between 2000 and 2015 and conducted in sub-Saharan Africa. Studies which employed quantitative, qualitative or a mixed-methods design were included. Articles were excluded if the reports were based on secondary data analyses or if data regarding obstetric care barriers is not extractable from the text.

#### Study selection

The study selection stage, which involved screening of titles and abstracts and retrieval of full texts, was carried out by one author (MKN). Full-text articles were extracted and assessed against the inclusion and exclusion criteria. Selected full-text articles were re-evaluated for data extraction and assessed for quality.

#### Data extraction and evidence synthesis

The quality of included studies was assessed using the mixed methods appraisal tool (MMAT) by Pluye and colleagues [12]. The tool was suited for this review as it was specifically developed for quality appraisal in systematic reviews involving qualitative, quantitative and mixed-methods designs. MMAT is reported to have an inter-rater reliability score ranging from moderate to perfect [13] and has been applied by other researchers [14–16] in mixed-methods systematic reviews. There are five sections in the criteria which include qualitative, randomised controlled, non-randomised, descriptive and mixed-methods studies. Qualitative and quantitative sections have four criteria each, and studies are scored by

dividing the number of criteria met by four to arrive at a value ranging from 25 to 100%. For studies with mixed-methods designs, the overall quality score is the lowest score of the study components [17]. All studies were included regardless of their quality ranking since the focus of the review was to examine the context in which barriers to obstetric care occurs (Additional file 2).

Given the range of the outcomes in the studies, identified barriers to obstetric care has been summarised using narrative synthesis. The Popay et al. guidance on the conduct of narrative synthesis in systematic reviews was employed in the synthesis [18]. The elements of the narrative synthesis process are developing a theory, developing a preliminary synthesis, exploring relationships within and between studies, and assessing the robustness of the synthesis. No new theory was developed as part of this review; instead, a pre-existing analytical framework [11] was adopted to facilitate organisation and interpretation of the data. The subsequent step involved the creation of a large table for the extraction of relevant data such as author, year of publication, country, study design, sample characteristics, study objectives, data analysis, major findings and quality assessment (Additional file 3). This important stage was iterative and involved studying the articles, taking notes and making initial comparisons so as to gain familiarisation with the data. Quality appraisal of studies was concomitantly carried out. From the table, the study findings were further examined and using thematic analysis, major themes were coded under pre-defined categories in the analytical framework by Jacobs et al. [11] (Table 1). Emergent themes were also aggregated under the label 'other barriers'. The underlying methodology applied within the thematic analysis approach was the essentialist or realist method, which is based on the experiences, meanings and the reality of participants [19]. Subsequently, relevant information was drawn out and relationships between the studies were more comprehensively described under the discussion, to enhance interpretation of the review data. Greater attention was paid to differences and similarities between studies as regards the settings, populations, outcomes of interest, methodological approaches and how these might have been reflected in the results. Finally, a critical reflection on the narrative synthesis process was undertaken as regards the quality of the primary studies reviewed and strengths and limitations of this systematic review. In addition, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist was followed to enhance the quality of reporting [20] (Additional file 4).

The current review was conducted as part of a PhD (by publication) study by MKN. While MKN conducted the data screening and extraction, quality assessment and data synthesis, she did so under the supervision of

**Table 1** Analytical framework for demand- and supply-side barriers to obstetric care

Demand-side barriers (service users)	Countries of study
Geographic accessibility -Indirect costs to households (transport) <sup>1</sup> -Means of transport available <sup>2</sup>	Ethiopia <sup>1, 2</sup> ; Zimbabwe; Nigeria <sup>2</sup> ; Tanzania <sup>1, 2</sup> ; Sierra Leone <sup>2</sup> ; Malawi <sup>2</sup> ; Zambia <sup>1</sup> ; Kenya <sup>1, 2</sup> ; South Africa <sup>1, 2</sup> ; Uganda <sup>2</sup> ; Mali <sup>1</sup> ; Ghana <sup>1, 2</sup> ; Gambia <sup>2</sup> ; Burkina Faso <sup>1, 2</sup> ; Senegal <sup>2</sup>
Availability of services -Information on health care services/providers <sup>3</sup> -Health education <sup>3</sup>	Ethiopia <sup>3</sup> ; Nigeria <sup>3</sup> ; Zimbabwe <sup>3</sup> ; Malawi; Kenya <sup>3, 4</sup> ; Ghana <sup>3, 4</sup> ; Uganda <sup>3, 4</sup> ; South Africa <sup>3</sup> ; Gambia <sup>3</sup>
Affordability of services -Household resources and willingness to pay <sup>5</sup> -Opportunity costs (often expressed as being too busy to attend/access services) <sup>6</sup>	Nigeria <sup>5, 6</sup> ; Ethiopia <sup>5, 6</sup> ; Tanzania <sup>5</sup> ; Sierra Leone <sup>5, 6</sup> ; Burkina Faso <sup>5</sup> ; Kenya <sup>5</sup> ; Ghana <sup>5</sup> ; South Africa <sup>5</sup> ; Uganda <sup>5</sup> ; Zambia <sup>5</sup> ; Mali <sup>5</sup> ; Malawi <sup>5</sup> ; Democratic Republic of Congo <sup>5</sup> ; Angola <sup>5</sup> ; Zimbabwe <sup>5</sup> ; Cameroon <sup>5</sup> ; Gambia <sup>5</sup>
Cash flow within society <sup>7</sup>	
Acceptability of services -Households' expectations <sup>8</sup> -Low self-esteem and assertiveness (women's low status in society and a lack of decision-making autonomy) <sup>9</sup> -Community and cultural preferences <sup>10</sup> -Stigma <sup>11</sup> -Lack of health awareness <sup>12</sup>	Nigeria <sup>9, 10, 12</sup> ; Ethiopia <sup>8, 9, 10, 11, 12</sup> ; Zimbabwe <sup>10, 11, 12</sup> ; Burkina Faso <sup>9, 10</sup> ; Tanzania <sup>9, 10, 11, 12</sup> ; Malawi <sup>9, 10, 11, 12</sup> ; Kenya <sup>8, 9, 10, 11, 12</sup> ; Zambia <sup>8, 9, 10, 12</sup> ; South Africa <sup>9, 11</sup> ; Ghana <sup>9, 10, 12</sup> ; Uganda <sup>9, 10, 11, 12</sup> ; Gambia <sup>9, 12</sup> ; Zambia <sup>9</sup> ; Mozambique <sup>10</sup> ; Senegal <sup>10</sup> ; Angola <sup>9, 10</sup> ; Cameroon <sup>10</sup> ; Mali <sup>9</sup> ; Liberia <sup>9</sup>
Other barriers -Religious affiliation/beliefs <sup>13</sup> -Lower maternal age (teenage/adolescence) <sup>14</sup> -Low level of formal education (woman, couple or household head) <sup>15</sup> -Higher parity <sup>16</sup> -Fear of surgery, episiotomy, HIV testing or other procedures <sup>17</sup> -Higher maternal age <sup>18</sup> -Marital status (married, divorced, separated, single, widowed, polygamous marriage) <sup>19</sup> -Unintended pregnancy <sup>20</sup> -Rural residence <sup>21</sup> -Non-attendance/low attendance of antenatal clinic (as barrier to institutional delivery or postnatal services) <sup>22</sup> -Agricultural occupations (of women or their partners) <sup>23</sup> -Household access to telephones or mobile phones <sup>40</sup> -Lack of birth preparation <sup>41</sup> -Delayed decision-making within family <sup>42</sup> -Low media exposure <sup>44</sup> -Higher levels of household wealth <sup>45</sup>	Nigeria <sup>13, 14, 15, 16, 17, 21</sup> ; Ethiopia <sup>13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 41, 42, 44</sup> ; Burkina Faso <sup>13, 15, 45</sup> ; Sierra Leone <sup>15</sup> ; Tanzania <sup>14, 15, 16, 18, 22, 41</sup> ; Malawi <sup>15, 16, 19, 21, 41, 42</sup> ; Ghana <sup>13, 15, 16, 17, 20, 22, 41, 44</sup> ; Kenya <sup>15, 16, 17, 19, 22, 23, 41, 42</sup> ; South Africa <sup>14, 15, 18, 19, 21</sup> ; Uganda <sup>15, 16, 21, 22, 41, 42</sup> ; Rwanda <sup>15, 16</sup> ; Democratic Republic of Congo <sup>15, 16, 20</sup> ; Gambia <sup>41</sup> ; Senegal <sup>16, 19</sup> ; Zambia <sup>15, 16, 41, 42</sup> ; Liberia <sup>17</sup>
Supply-side barriers (maternity care workers/health system factors)	Country
Geographic accessibility -Service location <sup>24</sup>	Nigeria <sup>24</sup> ; Ethiopia <sup>24</sup> ; Tanzania <sup>24</sup> ; Burkina Faso <sup>24</sup> ; Malawi <sup>24</sup> ; Kenya <sup>24</sup> ; Ghana <sup>24</sup> ; South Africa <sup>24</sup> ; Zambia <sup>24</sup> ; Rwanda <sup>24</sup> ; Uganda <sup>24</sup> ; Burkina Faso <sup>24</sup> ; Senegal <sup>24</sup>
Availability of services -Unqualified health workers, staff absenteeism, inadequate staff, opening hours <sup>25</sup> -Waiting time <sup>26</sup> -Motivation of staff <sup>27</sup> -Equipment, drugs and other consumables <sup>28</sup> -Non-integration of health services <sup>29</sup> -Lack of opportunity (exclusion from services) <sup>30</sup> -Late or no referral (Poor referral practices/systems) <sup>31</sup>	Nigeria <sup>25, 26, 27, 28, 31</sup> ; Tanzania <sup>25, 26, 27, 28, 31</sup> ; Ethiopia <sup>25, 26, 30</sup> ; Sierra Leone <sup>30</sup> ; Malawi <sup>25, 26, 28, 30</sup> ; Kenya <sup>25, 26, 27, 28</sup> ; Uganda <sup>25, 28, 30, 31</sup> ; Ghana <sup>25, 26, 28, 31</sup> ; Gambia <sup>26</sup> ; (Burundi and northern Uganda) <sup>25, 27, 28, 31</sup> ; Cameroon <sup>22, 28</sup> ; South Africa <sup>25, 26</sup> ; Zambia <sup>28</sup>
Affordability of services -Costs of services, including informal payments <sup>32</sup> -Private-public dual practices <sup>33</sup>	Zambia <sup>32</sup> ; Ethiopia <sup>32</sup> ; South Africa <sup>32</sup> ; Kenya <sup>32</sup> ; Malawi <sup>32</sup> ; Nigeria <sup>32</sup> ; Ghana <sup>32</sup> ; Tanzania <sup>32</sup> ; Angola <sup>32</sup> ; Burkina Faso <sup>32</sup>
Acceptability of services -Complexity of billing system and inability to know prices beforehand <sup>34</sup> -Staff interpersonal skills, including trust <sup>35</sup>	Ethiopia <sup>35</sup> ; Malawi <sup>35</sup> ; Zambia <sup>35</sup> ; Ghana <sup>35</sup> ; South Africa <sup>35</sup> ; Kenya <sup>34, 35</sup> ; Democratic Republic of Congo <sup>35</sup> ; Uganda <sup>35</sup> ; Benin <sup>35</sup> ; Nigeria <sup>35</sup> ; Tanzania <sup>34</sup> ; Liberia <sup>35</sup>
Other barriers -Poor clinical skills/non-adherence to clinical protocol (perceived or experienced) <sup>36</sup> -Poor staff knowledge about emergency obstetric care and the contents of antenatal care counselling services <sup>37</sup>	Ethiopia <sup>36, 37, 38, 39, 50</sup> ; Zimbabwe; Tanzania <sup>36, 38, 39, 50</sup> ; Nigeria <sup>36, 37, 38, 39, 50</sup> ; Uganda <sup>36, 38, 39, 50</sup> ; Malawi <sup>37, 38, 50, 51</sup> ; Kenya <sup>36, 38, 50</sup> ; Ghana <sup>36, 37, 38, 50</sup> ; Cameroon <sup>36, 37, 39</sup> ; Senegal <sup>50</sup> ; Benin <sup>50</sup> ; Gambia <sup>50</sup> ; Zambia <sup>38, 39, 50</sup> ; Angola <sup>50</sup> ; Burkina Faso <sup>50</sup> ; South Africa <sup>50</sup>

**Table 1** Analytical framework for demand- and supply-side barriers to obstetric care (Continued)

-Poor/inadequate facilities/services <sup>28</sup>
-Inadequate/lack of professional development/support (in-service training and supervision); non-availability of guidelines and clinical protocols <sup>30</sup>
-Unsatisfactory quality of care <sup>30</sup>
-Lack of empowerment of health workers to enforce change/decisions <sup>51</sup>

Adapted from Jacobs et al. (2012) [11]

The numbered superscripts represent pre-identified barriers in the analytical framework and additional ones derived from the review. In the second column, the numbers have been matched against the countries where such barriers were reported

MCO and TVM, two experienced researchers. All authors had primary responsibility for the development of research questions and study design, and for the intellectual content of the paper. MCO and TVM provided direction and supervision for all aspects of the work and ensured that questions relating to the accuracy or integrity of the work were investigated and resolved. They critically reviewed the methods and made revisions, as required. They also reviewed and discussed the findings and reviewed and edited each draft of the final document.

## Results

Overall, 2974 references were initially located through searching the databases, and an additional 63 located through other sources such as checking the reference lists of located papers. After exclusion of duplicates, 2766 remained, of which 385 were retrieved for full-text review. Of these, 225 studies were excluded for reasons such as using secondary data, country of study being outside sub-Saharan Africa and having primary outcomes that fell outside the scope of the present review. The number retained for further analysis was 160 as shown in the PRISMA 2009 flow diagram [20] (Additional file 5: Figure S1).

Based on the MMAT scoring guide, 160 studies were assessed. Of the total number, 87 studies met all the quality criteria (100%) applicable to the study types, 60 studies fulfilled three criteria (75%), 11 fulfilled two (50%) and two met only one (25%) (Additional file 2).

### Characteristics of included studies

Overall, about 51% ( $n = 82$ ) of included studies employed a quantitative design, 28% ( $n = 45$ ) were qualitative and 21% ( $n = 33$ ) were mixed-methods studies. Most of the studies were population- or facility-based cross-sectional surveys, and a few were a combination of both. There were a minority of case-control and cohort studies (Additional file 3). Nearly two thirds (61%) of included studies were conducted in the Eastern African sub-region, about 32% were in Western Africa, 4% were in Southern Africa and 2% in Middle (central) Africa. The studies explored the use of antenatal care, delivery care, postnatal care or a combination of these categories. More than 70% of studies examined access barriers to

obstetric care with outcomes relating to the health service users' perspectives. Study populations identified as service users include females in their reproductive age, pregnant women, postnatal women and, in a few cases, their partners, household heads, mothers-in-law or community leaders. A minority of articles focused on either maternity care workers only or maternity care workers and service users. These studies with a main outcome measure relating to access barriers from maternal healthcare providers' perspectives assessed the providers' knowledge and competencies, quality of care, as well as gaps in training and supervision.

### Demand- and supply-side barriers

Overall, the analytical framework by Jacobs and colleagues [11] was a valuable tool for organising the wide range of barriers often encountered by obstetric healthcare service providers and those they serve. The framework captured themes and sub-themes that are generally applicable to most healthcare systems/settings. With regards to the findings of this review, most challenges (sub-themes) that were not captured were those specific to the context of care (such as religious beliefs, requiring permission from family/spouse to seek care, rural residence) or to obstetric healthcare provision (unintended pregnancies, non-attendance/low attendance of antenatal clinic, parity, maternal age). Generally, the framework was suited to this review as it provided an effective means of summarising complex and varied data without losing vital aspects of the information gathered. The results are broadly organised under geographic accessibility, availability, affordability and acceptability of services. The main results are summarised in Table 1.

### Demand-side barriers

Demand-side barriers include factors that influence health service users as individuals, households or at the community level [21] and include geographic accessibility, availability of health services, affordability and acceptability.

### Geographic accessibility

Under geographic accessibility, two main sub-themes are identified; indirect transport costs and means of

transport available. Challenges with geographic access at individual or household levels were reported by several studies as lack of transport/difficulty organising transportation or lack of money for the costs associated with transportation [22–76]. These difficulties may delay or prevent women from seeking appropriate obstetric care, when required.

#### **Availability of services**

Ideally, health service users should have the opportunity to utilise health care whenever the need arises; hence, the care available must be suited to the needs of clients, provided by qualified personnel, and equipped with relevant supplies [77]. As a demand-side element, availability encompasses information on health care services/providers and health education. Jacobs et al. [11] explain that services such as counselling and provision of consumer information on health services could help address barriers related to availability. Availability barriers were expressed in various forms, such as perceiving health facility-based care which was not different from other options/alternatives [78]; being unaware of care, type and nature of services [22, 28, 47, 78–83] and having limited media exposure [22, 79, 84].

#### **Affordability of services**

Affordability includes household resources and willingness to pay, opportunity costs (that is, other benefits lost as a result of seeking care) and cash flow within society. Studies which identified demand-side affordability as a barrier reported primarily on household resources and willingness to pay rather than cash flow within society [22, 23, 25, 26, 31, 32, 34, 36–38, 40, 41, 46–48, 50, 52, 61, 66–71, 73–75, 78, 79, 83, 85–112]. Some studies cited reports by pregnant women of being too busy or having no time as reasons for non-use of maternity care services [22, 26, 63, 86, 100, 113, 114], which represent opportunity costs.

#### **Acceptability of services**

From the service users' perspectives, acceptability of health services encompasses a range of variables including the households' expectations, women's self-esteem and assertiveness, community and cultural preferences, stigma and a lack of health awareness. Household expectations included service users' minimal expectations of cleanliness and non-interference during labour and delivery at health facilities, ability to meet cultural expectations [30] and a perception that health workers were too busy [91]. Social problems related to women's low self-esteem and assertiveness were highly reported and manifested in various forms such as the husband's denial of permission, the need for the husband's/relative's permission, women's low decision-making power/autonomy

[22, 23, 27–29, 33, 39, 46, 49, 51, 60, 62, 64, 66, 68, 69, 71, 73, 78–80, 94, 97, 104, 110, 111, 114–122] and delayed/ineffective decision-making within the family [47, 56, 65, 123, 124]. Shyness, fear or shame were also reported [28, 113], particularly among sub-groups like teenagers who were possibly afraid of being reprimanded. In an isolated instance, a study by Anyait et al. [38] indicates that women's autonomy in decision-making promoted antenatal attendance but reduced the likelihood of delivery in health facilities. Also, Kabakyenga et al. [98] found that decisions made together with a husband increased the use of skilled birth attendants as opposed to women making the decision alone.

Community and cultural preferences [59, 121] covers a range of issues and include the following: home delivery being usual practice or feeling more comfortable at home [25, 27, 33, 46, 48, 54, 59, 80, 85, 113, 114]; cultural beliefs/customs [23, 36, 49–51, 59, 62, 64, 67–69, 71, 75, 78, 108–111, 125]; having relatives nearby to provide closer attention [22, 27, 80]; ethnicity [75, 90, 92, 126, 127]; unwillingness to see a male doctor [23, 57, 128] and not being afforded the freedom to assume preferred birthing positions [43, 51, 66, 104, 110, 129].

Additionally, a lack of health literacy among health service users was found to significantly impede access to obstetric services [53, 66–68, 70, 106, 111, 123, 129–131]. This barrier is often highlighted as a lack of perceived need [23, 45, 86, 121] and may be described in diverse ways, including women reporting an absence of illness or indicating that they are 'doing fine' [22, 27, 80, 86, 117, 132]; unexpected labour or being unprepared for birth [25, 27, 36, 39, 42, 45, 47, 55, 63, 64, 75, 80, 83, 85, 98, 100, 107, 117, 132, 133] and being unaware of the need to use available services [30, 33, 46, 86, 87, 95, 96, 100, 113, 134].

Stigma perception is another important sub-theme related to acceptability of health services to pregnant women and households. Link and Phelan [135] explain stigma as a phenomenon which involves labelling, stereotyping, separation, status loss and discrimination. Stigma is often associated with particular groups of people in society who may feel vulnerable or have negative attitudes/perceptions about specific social, medical or other problems. For instance, among adolescents, stigma may lead to fear of disclosing pregnancy [28] or non-use of services as a result of feeling shame [49]. Others include fear of HIV-related stigma in pregnancy [83, 94, 136, 137]. In Ethiopia, Fikre and Demissie [39] reported that the social stigma of being considered weak by family members was an important obstacle to utilising health care facilities for delivery.

#### **Other demand-side barriers**

Religious reasons for not using obstetric services were cited in some studies [60, 73, 79, 90, 97, 99, 111, 125, 128].

People belonging to Muslim religions [90, 99, 128] and African Traditional Religions (a general term for traditional African beliefs and practices) [79] tended to use services less often. This may be due to cultural restrictions on women within certain households or communities preventing them from leaving their homes or seeking care. Fear of medical procedures such as surgery, episiotomy and blood transfusion hindered access to maternity services in a number of studies [43, 66, 74, 81, 83, 89, 97, 122].

Generally, a low-level of formal education of a woman, husband, couple or household head was a significant barrier to using antenatal, delivery or postnatal services, whereas secondary school and above level of education was associated with better utilisation of maternity services [28, 34, 39, 58, 67, 70, 73, 75, 78–82, 84, 85, 88, 90, 92, 94, 95, 99–101, 103, 106, 108, 113, 117, 124, 127, 130, 132, 134, 138–144].

Several studies showed that obstetric services use decreased with increasing parity, that is, mothers with higher number of children used maternity services less often than nulliparous women and those with two or less children [22, 31, 38, 45, 57, 79, 81–84, 90, 92, 100, 101, 106, 113, 140, 141, 145–148]. Additionally, Nwameme et al. [89] reported that for referred obstetric clients, women with higher parity tended to be associated with greater delays between the time referred and compliance with referral.

Some studies reported that comparatively, older women tended to favour home births and utilised health facilities for birthing less often than younger women [32, 45, 58, 75, 80, 84, 106, 132, 146]. Only a few studies reported lower maternal age or teenage motherhood as a barrier [46, 82, 143]. A woman's marital status, particularly, divorced, separated, single and widowed marital statuses were reported to be associated with lower or non-use of maternity services [57, 82, 101, 113, 117, 136, 145, 149], possibly due to stigma. Women with unplanned or unintended pregnancies made less use of obstetric care services [79, 84, 95, 99, 100, 148], as did women living in rural areas [39, 45, 58, 80, 98, 101, 118, 150]. Late initiation, fewer or non-attendance of antenatal clinics prior to birthing [46, 79, 80, 83, 94, 98, 100, 117, 130, 132, 142, 148] or not receiving counselling at antenatal clinic on facility birthing during pregnancy [118, 149] were important barriers. Women or their partners who were unemployed [82, 143] or employed in agricultural occupations or whose husbands/partners worked in agriculture were also reported to make less use of maternity care services [94, 134].

#### **Supply-side barriers (health system factors)**

Supply-side barriers are inhibiting factors that function at the service delivery level and are beyond the control of health service users, for instance, inadequate skilled

personnel [21]. Similar to demand-side barriers, they include geographic accessibility, availability, affordability and acceptability of health services.

#### **Geographic accessibility**

Service location was widely reported to deter health facility utilisation, since women were often unwilling or unable to cover the distances required to access services [22, 23, 25, 27, 28, 31–33, 36, 45, 48, 51–54, 57, 58, 64–66, 68, 69, 71, 72, 76, 78, 82, 83, 85, 88, 89, 91, 92, 95, 96, 98, 104, 106, 107, 113, 114, 121, 123, 124, 130, 137, 139, 140, 142, 146, 151–156]. From the health system perspective, this constraint is related to poorly located obstetric health facilities and insufficient number of required facilities.

#### **Availability of services**

Women who used or intended to use maternity care services faced challenges such as inadequate facility opening hours [25, 157]; non-availability of services [111, 129, 158], poor (perceptions of) providers' competence or clinical skills [64, 74, 76, 110, 111, 123, 151, 158–160] and knowledge [76, 158, 160–162]; inadequate staffing levels [48, 59, 67, 76, 82, 104, 106–108, 111, 153, 155, 157, 162–165] as well as previous experiences of unskilled birthing care from maternity care providers [29]. Generally, women expect to receive care promptly on reaching a health facility; therefore, long waiting times present a significant challenge to accessing health facility-based services [22, 29, 31, 53, 82, 87, 97, 107, 115, 123, 154, 155]. A shortage or absence of drugs and other essential supplies in health facilities were reported in other studies [31, 48, 56, 67, 76, 111, 115, 150, 155, 157, 163, 165–168], and poor referral practices/systems [104, 105, 159, 165] such as referred clients being transported unaccompanied by healthcare staff [89], lack of feedback mechanisms on referred patients [152], and late or no referral [29] hinder efficient patient care and may result in adverse outcomes.

#### **Affordability of services**

Costs of services were a deterrent to obstetric care utilisation for some service users [30, 33, 43, 55, 56, 65, 72, 74, 76, 83, 91, 100, 112, 114, 118, 121, 129, 134, 153], as was informal payments for services [110, 155]. Service costs is a particularly significant barrier for poorer rural populations which tend to be socioeconomically disadvantaged across sub-Saharan Africa.

#### **Acceptability of services**

Jacobs et al. [11] identify factors such as complexity of billing system, inability of patients to know prices beforehand and staff interpersonal skills as supply-side elements under acceptability. Poor staff interpersonal skills,

either perceived or from previous experiences [53, 65, 68, 74, 75, 103, 111, 121, 128, 129, 133, 154], impacted negatively on service use. Significant issues included a lack of respect for service users [66, 108, 131, 158, 167, 169, 170], a lack of trust/confidence in health professionals or more trust in alternative care [50, 60–62, 106, 114, 122, 156, 167] and mistreatment by health workers [22, 27, 28, 30, 33, 41–43, 55, 56, 83, 87, 89, 91, 103, 104, 106, 153, 170, 171]. Other negative attitudes of staff, which discourage service users from using maternity services, include a lack of commitment/motivation to work [31, 119, 165, 167], or for instance, expressing a desire to work abroad [152].

#### **Other supply-side barriers**

Experiences and perceptions of poor quality of health services also presented challenges for women using obstetric care services [22, 25, 43, 45, 57, 63, 69, 71, 72, 97, 100, 110, 119, 129, 144, 150–152, 154, 156, 171, 172]. A lack of supportive care, neglect and poor assessment of labour was reported by Mselle et al. [29] as was a lack of supervision among healthcare workers [29, 44, 160, 167, 173]. Poor staff knowledge about emergency obstetric care (EmOC) and the contents of antenatal care counselling services [173–176], non-availability of guidelines and clinical protocols [160, 163], and inadequate pre-service and in-service training [160, 168] were additionally reported.

Poor/inadequate facilities and infrastructure [62, 67] such as poor laboratory and ambulance services [115], inadequate health facilities providing essential EmOC [29, 65, 134, 150, 152, 172, 176], lack of cleanliness in facilities [31, 155], overcrowding, [44] and an absence of a reliable power [152, 157, 163] and water supply [157, 163] were other challenges encountered.

#### **Discussion**

This review provides a cross-sectional description of published literature on barriers to obstetric care in sub-Saharan Africa between 2000 and 2015. The discussion follows the major themes in the analytical framework employed, which incorporates different dimensions of access and their determinants; geographic accessibility, availability, affordability and acceptability of services [11]. These themes are considered from service–user and service–provider perspectives. The major findings are discussed below and include financial difficulties, transportation-related barriers and sociocultural issues related to service acceptability and availability. Although these barriers are discussed separately, they are not mutually exclusive; hence, interventions have to be considered holistically.

#### **Affordability of services**

Health financing policies have received significant interest in recent years, especially in low- and middle-income countries, in a bid to promote equitable financial access to healthcare services, particularly, for the poor. For instance, different forms of user fee abolition have been implemented in Ghana, Kenya, South Africa and Uganda [177]. Reduction or elimination of user fees for maternity services has been reported to increase utilisation [79, 126]. Notwithstanding, this review indicates that limited household resources/income present a substantial barrier for service users across several sub-Saharan African countries, as is demonstrated in the broader literature [112, 178, 179]. Even in countries where maternity services are free, indirect costs, such as transport, may remain a significant barrier for the poor.

In South Asia, a number of countries including Nepal, India, Bangladesh and Pakistan have implemented cash transfer and voucher schemes, which are demand-side financial interventions, to improve maternity care access [180]. These interventions take the form of cash incentives, vouchers, reimbursement of transport cost or free delivery of services. Apart from India, the schemes were at least partly donor-funded. Generally, increased utilisation of maternity services was observed, despite the country-specific challenges encountered, such as corruption, unclear guidelines and inadequate plans for sustainability [180]. With available empirical evidence from other low- and middle-income countries, cash transfer and voucher schemes could be a feasible system for increasing maternity care utilisation in sub-Saharan Africa. The challenge remains to develop models/schemes which are founded on equity and transparency, and rely on state funds rather than donor funds to ensure sustainability.

#### **Geographic accessibility**

When obstetric complications are present, a delay in reaching and receiving EmOC can contribute to high MMR and perinatal mortality [181, 182]. Limited geographic access to care were linked to physical distance between health facilities and service users' residence on the supply side and the availability of means of transportation and indirect costs incurred in order to reach the required facility on the demand side. This is similar to findings in related studies [7, 9]. It has been suggested that the minimum acceptable number of EmOC facilities is at least five facilities per 500,000 population (including at least one comprehensive facility); however, in dispersed settlements/populations, the minimum may need to be exceeded [1]. This review showed that while coverage of EmOC services was inadequate in several sub-Saharan African countries, especially in remote/rural areas, poverty remains a major constraint in accessing

obstetric care, due to inability to afford transport costs. Some studies indicated that the poorest women travelled longer distances to reach health facilities. According to D Maine [183], the estimated average time between the onset of the most common major obstetric complication (postpartum haemorrhage) and death is 2 h and 12 h for antepartum haemorrhage, in the absence of medical interventions. It is, therefore, recommended that pregnant women should ideally live within 2 h of a basic EmOC facility and within 12 h of a comprehensive care facility [184].

Healthcare planners must bear in mind the nature of the terrain, means of transportation available to women and levels of health facilities when developing strategies to increase obstetric care coverage. There is a growing body of literature using geographic information system as a means to measure accessibility to health care and geographic coverage in sub-Saharan African countries [185–187]; however, most studies are small scale studies, suggesting the need to develop linked national data to support implementation decisions.

#### Availability of services

The principal demand-side concern related to health service availability was a lack of information on health care services/providers [22, 78, 79, 81, 84], which limits women's choices. Knowledge about health services is important in decision-making regarding its utilisation. Hence, this deficit suggests the need for extra efforts to make services known to users, especially, through mass media like radio and television, which is associated with better use of health services in Ghana and Ethiopia [22, 79, 84]. On the supply-side, the most significant barriers were long waiting times at health facilities [22, 29, 31, 81, 87, 97, 115] and, to a lesser extent, poor referral practices [29, 89, 152]. Delays in seeking and receiving obstetric care have been studied extensively and cited frequently. Thaddeus and Maine's 3-delay model [188] refer to delay in the decision to seek care, delay in arrival at a health facility and delay in the provision of adequate care. The third delay—delay in receiving care upon reaching a health facility—points to gaps in health service delivery [188], as reported by other authors [159, 182, 189]. A systematic review of the third delay reported problems such as under-resourced facilities, non-availability of essential drugs, equipment and blood, inadequate clinical guidelines, shortage of power and water, and referral-related issues such as inadequate emergency transport [181], contributing to adverse maternal outcomes [181, 182].

#### Acceptability of services

Acceptability encompasses the degree to which health service provision is responsive to the social and cultural

expectations of service users [190]. Although the focus of the review literature varied with regard to this dimension of access, major concerns were a lack of health awareness, issues related to stigma and women's self-esteem/assertiveness. These factors may be difficult to measure, or even anticipate, and may vary by context. Lack of health awareness was prominent in the review literature and may be summarised as showing ignorance about required obstetric health services, for instance, among some pregnant women, an absence of any physical illness meant no need to use maternity services [22, 86]. Stigma or fear of being shamed has been reported by Moyer and Mustapha [8] in a related study. Data from this review suggest that vulnerable populations, such as those with HIV/AIDS and teenagers/adolescents, require targeted approaches to eliminate stigma during their care. The Convention on Elimination of All Forms of Discrimination against Women adopted in 1979 by the United Nations General Assembly is an important document in the history of women's rights and opportunities [191]. The convention upholds women's reproductive health rights and, among other things, seeks to establish women's equal access to good quality healthcare regardless of individual circumstances. Given that most United Nations member countries have ratified the convention, it is important that maternal health is given the attention it requires to reduce adverse outcomes.

Another key finding of this review was that women's ability to make decisions regarding healthcare is generally weak, with a reliance on husbands/partners and other family members to make such decisions. Conversely, a study in Nepal shows that couple communication and shared decision-making strategies contribute to improvements in pregnancy health practices [192]. In sub-Saharan Africa, approaches to making obstetric care services more acceptable should involve partners and other influential family members like mothers-in-law and encourage joint decision-making. In addition, women should be made aware of their own health needs and taught assertive skills.

On the supply-side, poor interpersonal relationships by staff and associated lack of confidence/trust in services provided presented the most barrier. Poor staff attitudes, whether perceived or experienced, is known to hinder use of obstetric services [9, 193], as these directly influence perceptions of quality of care.

#### Transferability of findings

Central to the context of sub-Saharan African countries is the fact that healthcare systems mostly function within poor-resource settings, which contribute to several inequities in access to maternal healthcare. These inequities partly set the conditions for differing challenges identified as barriers. Given the similarities found, it appears

that the results of this current review are transferable across the region, in a broad sense, since major barriers were common to most of the countries of publication. However, differences in cultural perspectives, values, and organisation of individual healthcare systems mean that detailed attention to the divergent ways and settings in which service provision and utilisation occur is essential to ensuring more meaningful outcomes.

### Strengths and limitations

The aim of this review was to synthesise evidence on access barriers from obstetric care provider and service user perspectives. The methodological approach employed was a major strength of the review. By integrating articles with quantitative, qualitative and mixed-methods study designs, a broader cross section of findings was represented. In addition to other factors, quantitative studies were more likely to report socio-demographic-related barriers such as parity, birth order, educational level, place of residence, maternal age and marital status. Qualitative studies provided information on more contextual or descriptive factors such as cultural expectations and beliefs, perceptions, experiences with the health system and health decision-making processes within societies. Similar to the methodology adopted in this review, articles with a mixed-methods approach were more wide-ranging in the scope of obstetric care barriers captured. Generally, the barriers identified within the sub-themes of the analytical framework were from differing study designs rather than a homogeneous source.

Over 70% of studies identified focused on barriers from the perspectives of health service users only. Although the comparatively fewer number of studies on the providers' perspective may result in less frequently reported health system-related barriers, some were captured through the reports of the service users.

Another limitation of the review should be noted. Data extraction and evidence synthesis in systematic reviews are ideally conducted by at least two reviewers in order to strengthen the reliability of the study outcomes. This is important in systematic reviews of effectiveness; it is critical in qualitative and mixed-method systematic reviews where data extraction and synthesis are even more prone to subjective interpretation. Single-person data extraction and evidence synthesis, as was the case in this study, therefore has implications for the study's rigour, and the findings reported here must be considered in this context. A team-based process may have affected the reporting of findings in a number of ways, for example by retrieving additional findings, modifying specific findings or changing the relative emphasis on different findings. Nonetheless, efforts were made to ensure that the review process was systematic, with strict adherence to the inclusion and exclusion criteria, as well

as the guidelines for quality appraisal for mixed methods [17]. MCO and TVM critically reviewed and discussed the study findings.

Also, the data sources used for this review were limited to primary research published in English and indexed in PubMed, CINAHL, and Scopus databases. Hence, we cannot exclude the possibility that some potentially relevant studies may have been missed as a consequence of being indexed elsewhere or being published in a language other than English. However, the search was comprehensive enough to provide insight into major barriers to obstetric care utilisation in sub-Saharan Africa.

Finally, it is note-worthy that even though an analytical framework provides an easy-to-use tool for analyses, it also has the potential for oversimplification or overfitting of information/data gathered. In order to maximise the technique's usefulness, an additional generic label—'other barriers'—was created under supply- and demand-side barriers, respectively, so as to accommodate variables that were not captured under the pre-existing themes.

### Implications for research and practice

Previous reviews have helped consolidate knowledge on common barriers to obstetric care in African countries. Insights from the current review build on that knowledge by drawing attention to the significant number of studies reporting the barriers (and facilitators) to obstetric care utilisation and the possibility that the scope and focus of current research may be skewed. The felt needs of service users need to be prioritised and catered to by service providers and those of service providers addressed by policymakers and employers. However, given the relative dearth of research focusing on supply-side barriers, future research should focus on this issue. In particular, intervention studies may offer stronger evidence on workable implementation strategies and shed more light on supply-side issues that are often reported by service users (such as undignified or disrespectful care) but not by providers. This is because service provision characteristics that are frequently cited by service users as barriers may not be identified by providers and may remain largely unresolved. Providers need to address these issues in the same way they address more common barriers like a lack of equipment and supply or inadequate training. Additional research may help service providers understand or clarify why change is needed and to identify potential strategies for improving women's experiences and expectations. Intervention studies may also assist the development of tools for the training and evaluation of service providers in this regard.

In this review, we highlight the need for greater attention to address barriers to obstetric services. It appears that a common thread between the deterrents to all the

dimension of access is poverty/low socioeconomic status. Sub-Saharan African countries will have to more actively pursue interventions targeted at poorer populations, if MMR and other associated adverse outcomes are to be reduced. Although reduction/elimination of user fees for maternity care is gaining popularity in sub-Saharan Africa [177], more needs to be done to reduce indirect costs of care due to widespread poverty. Innovative approaches, such as cash incentives and voucher schemes discussed earlier, seem promising but may require research to test their feasibility and appropriateness for specific contexts. Development of country-level geospatial data on obstetric facilities and services is critical to improving geographic access, as is regular follow-up audits to reassess population changes and associated shifts in obstetric needs.

Additionally, greater focus on human resources for health as regards their knowledge, practical skills and interpersonal relationships is important, as these affect availability and acceptability of services. It appears that the unequal power dynamics between health service providers and service users negatively impacts interpersonal relationships with clients, which in turn influences clients' willingness to utilise services or comply with health information. Disrespectful care (perceived or experienced), which was frequently reported across several countries, is an important deterrent for clients requiring obstetric care services. Hence, it is essential to sensitise service providers through more focused training and supervision. Finding appropriate avenues to reach potential service users with information about the nature and purpose of available services is also important, as is maternity care workers' capacity to provide audience-appropriate information to pregnant women and their partners, mothers-in law, household heads and others who influence decisions related to obstetric care utilisation. Non-formal education may also provide a strategy to strengthen women's decision-making abilities regarding their health care choices.

Healthcare systems may be made more responsive to the needs of target groups if more emphasis is placed on sociocultural sensitivity in midwifery education. The literature demonstrates that by overlooking women's preferences and concerns such as freedom to choose birthing positions, having a birth partner or family present, and fear of various hospital procedures, vulnerable groups of women are excluded from accessing care. A more open and receptive approach by care providers may improve the acceptability of services and increase obstetric care utilisation.

### Conclusion

Barriers to obstetric care access are complex and multi-faceted; hence, they require multi-dimensional approaches

that take into consideration the needs of service providers and users. Although the barriers are similar across sub-Saharan African countries, variations exist with regards to the nature and extent of the problem. Country-specific strategies are thus needed to tackle the challenges raised.

Governments are best placed to create favourable conditions to raise the status of women and improve their overall socioeconomic well-being. Improved socioeconomic status will have multiple effects and is generally associated with an increased ability to afford health services and associated indirect costs such as means of transport, better access to appropriate health information, higher assertiveness, a reduced likelihood to engage in negative sociocultural practices/beliefs and greater acceptability of maternity care.

Lastly, significant investments in healthcare systems, with a focus on improving healthcare infrastructure (obstetric care facilities, good roads, electricity, water supply, communication) and equipment, human resources for health and community level public health education may lead to improved access to obstetric healthcare services. Identifying and exploiting new opportunities for policies that include key perspectives of accessibility, availability, affordability and acceptability of obstetric care will ensure that important viewpoints or concerns are not overlooked.

### Additional files

**Additional file 1:** PubMed search strategy. Sample search strategy (for PubMed database). (DOC 51 kb)

**Additional file 2:** Quality assessment using the mixed methods appraisal tool (MMAT). Quality assessment of included studies. (DOC 160 kb)

**Additional file 3: Table S1.** Characteristics of included studies. Description of eligible/retained studies. (DOC 378 kb)

**Additional file 4:** PRISMA 2009 Checklist. PRISMA checklist for reporting of systematic review. (DOC 65 kb)

**Additional file 5:** PRISMS 2009 Flow Diagram. Flow chart of data extraction process. (DOC 64 kb)

### Abbreviations

CINAHL: Cumulative Index to Nursing and Allied Health Literature; EmOC: Emergency obstetric care; MMAT: Mixed methods appraisal tool; MMR: Maternal mortality ratio; PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses

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### Availability of data and materials

Most data generated or analysed during this study are included in this published article and its supplementary information files. Additional information is available from the corresponding author on reasonable request.

**Authors' contributions**

MKN, MCO and TVM conceived and designed the study. MKN conducted the literature search, extracted all the data and drafted the manuscript. All authors (MKN, MCO and TVM) contributed to the analysis and interpretation of the data as well as the critical revision of the study. All authors read and approved the final manuscript.

**Authors' information**

None provided.

**Competing interests**

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## **2.5 Maternal healthcare in Ghana**

In the past few years, Ghana has prioritised maternal healthcare and taken steps to monitor service delivery and outcomes more closely through several national programmes. The overarching aim of efforts made has been to facilitate equitable access to obstetric care and improve reproductive health outcomes.

### **2.5.1 Socio-demographic characteristics of Ghana**

Ghana is located on the Gulf of Guinea on the west coast of Africa, about 750 km north of the equator. It is bordered to the north by Burkina Faso, to the west by Ivory Coast, to the east by Togo and to the south by the Atlantic Ocean. Ghana occupies a total land area of 238,537 square kilometres (Ghana Statistical Service, 2015). The population was estimated at over 24.65 million in the 2010 Ghana Population and Housing Census. This represented an increase of 30.4% in the 10 years preceding the census. Over 51% of the population is female. The country has 10 administrative regions and 170 districts, with the Greater Accra Region as the capital. Approximately 51% of the population live in urban areas and the country has a youthful population with about half the total population below 15 years of age (Ghana Statistical Service, 2012).

Ghana's gross domestic product has grown at rates ranging from 4.5% to 15% between 2005 and 2013, contributing significantly to a decrease in poverty levels. Between 2005 and 2013, extreme poverty was reduced from 16.5% to 8.1%. As a result of this sustained economic growth, Ghana transitioned from a low-income to a lower middle-income country (see footnotes) (Ghana Statistical Service, 2014). In spite of these advances, poverty levels in rural Ghana remain far above the national average of 24.2%, particularly in three regions where as many as 50.4% in the Northern Region, 70.7% in the Upper West Region and 44.4% in the Upper East Region live in poverty (Ghana Statistical Service, 2014).

In the *Ghana Demographic and Health Survey 2014*, reports from a survey of women aged 25–49 years indicate that the median age at first birth was 21.4 years, with rural women having their first birth about two years earlier than their urban counterparts. On average, women in urban areas have 3.4 children while those in rural communities have 5.1.

Fertility varies by region, with women in the Greater Accra region having an average of 2.8 children compared with 6.6 in the Northern region. For women between the ages of 15 and 19, 14% had begun child-bearing (Ghana Statistical Service, 2015). By 2010, the majority (75.7%) of the population between 15 to 24 years was literate (could read and write in any language), and the proportion of working population (15 years and older) in employment was 67.4% (Ghana Statistical Service, 2012).

**Table 2.1: Some sociodemographic characteristics of Ghana’s population by region**

<b>Region</b>	<b>Total population</b>	<b>Female population</b>	<b>Average household size</b>	<b>Mean female age (years)</b>
<b>All regions</b>	24,658,823	12,633,978	4.4	24
<b>Western</b>	2,376,021	1,188,247	4.2	24
<b>Central</b>	2,201,863	1,151,751	4.0	24
<b>Greater Accra</b>	4,010,054	2,071,829	3.8	26
<b>Volta</b>	2,118,252	1,098,854	4.2	26
<b>Eastern</b>	2,633,154	1,342,615	4.1	25
<b>Ashanti</b>	4,780,380	2,464,328	4.1	24
<b>Brong Ahafo</b>	2,310,983	1,165,712	4.6	24
<b>Northern</b>	2,479,461	1,249,574	7.7	22
<b>Upper East</b>	1,046,545	540,140	5.8	25
<b>Upper West</b>	702,110	360,928	6.2	24

Source: Ghana Statistical Service (2012)

Across all regions of Ghana, household members may include relatives such as nieces and nephews or domestic help. Therefore, the average household size shown in Table 2 reflects this trend. Nonetheless, household sizes in the Northern, Upper East and Upper West tend to be larger because of the higher number of births.

### **2.5.2 Structure of the healthcare delivery system in Ghana**

Ghana's Ministry of Health is the governing body that oversees health service delivery in the country and is responsible for providing overall policy direction. It works closely with the Ghana Health Service and the three teaching hospitals in Ghana, which are responsible for service provision in the public sector (Ministry of Health, 2013). Administratively, the Ghana Health Service is organised at three levels, the national, regional and district levels. However, functionally it is organised at five levels; namely, national, regional, district, sub-district and community levels (Ghana Health Service, 2013). The country has 3,217 healthcare facilities to serve the population. These include teaching hospitals, regional and district hospitals, private health facilities and mission hospitals (Ministry of Health, 2010). Most of these facilities are located in urban areas (Anarfi et al., 2010). Healthcare service referrals are usually made upwards from community level health facilities through to sub-district, district, regional and other tertiary health institutions, while supervision of health facilities runs top-down from regional hospitals to community health centres or Community-based Health and Planning Services (CHPS).

### **2.5.3 Law on abortion in Ghana**

As indicated earlier, bleeding, hypertensive disorders, sepsis and unsafe abortion account for a significant proportion of adverse maternal outcomes in Ghana (Asamoah, Moussa, Stafström, & Musunguzi, 2011; Lee, Odoi, Opare-Addo, & Dassah, 2012). A number of guidelines have been developed specifically to guide maternal healthcare workers and facilitate the treatment of these major causes of death as outlined in Kyei-Nimakoh, Carolan-Olah, and McCann (2016), and presented later in the chapter. However, despite being an important cause of maternal mortality, health service delivery procedures regarding abortion-related services seem unclear and generally inadequate.

More than 1-in-10 maternal deaths in Ghana result from unsafe induced abortions (Ghana Statistical Service et al., 2009); however, it may be difficult to quantify possible complications that accompany this practice. Additionally, the incidence may be higher due to under-reporting because of the stigma associated with abortions (Sundaram, Juarez, Bankole, & Singh, 2012). Appropriate use of contraceptives could help reduce the incidence of unintended pregnancies and abortions, however, modern contraceptive use in

Ghana tends to be low, particularly among poor and less educated people. As a result, more than one-third of pregnancies have been reported to be unwanted (Ghana Statistical Service et al., 2009).

Ghana's abortion laws were amended in 1985 to permit abortion by a qualified medical practitioner under the following circumstances: in cases of rape, incest, or the defilement of an intellectually impaired female; if there is risk to the life, mental or physical health of the woman; or if there is risk of foetal abnormality or disease (Morhee & Morhee, 2006). In accordance with the law, the Ghana Health Service and Ministry of Health adopted protocols in 2006 for the provision of safe abortions. These protocols stipulate the components of comprehensive abortion care and outline mental health conditions that may allow a woman to undergo an abortion. They also advocate for the inclusion of midwives and nurses in the category of healthcare workers permitted to perform first-trimester abortions (Morhee & Morhee, 2006).

Notwithstanding, safe abortion services are neither well patronised nor easily accessible because of a myriad of issues. Prominent among these issues is a general lack of awareness or comprehension of abortion law (Morhee & Morhee, 2006), leading to a perception that abortion is illegal. A study by Voetagbe et al. (2010) revealed that knowledge of all the circumstances under which legal abortion may be offered is low even among midwifery tutors. Furthermore, midwifery tutors' willingness to teach comprehensive abortion care was influenced by personal and religious beliefs. These attitudes may translate into deficiencies in the competencies of newly trained midwifery staff. Similar observations have been made by Aniteye and Mayhew (2013) among healthcare providers. In another study, of clinicians who had received essential obstetric training, midwives were less likely to provide post-abortion care compared with physicians. However, midwives who worked in private maternity units and those who had a copy of the *National Reproductive Health Policy and Standards* were more likely to provide post-abortion services (Clark, Mitchell, & Aboagye, 2010).

Another significant barrier is public stigma associated with abortion in Ghana. Norris et al. (2011) describe abortion-related stigma as 'the discrediting of individuals as a result of

their association with abortion’ (p. 2). Perceived stigmatisation may be elicited by one’s family, friends or healthcare staff. Stigma may hinder women from seeking safe abortion services in recognised healthcare facilities. Women from lower socioeconomic groups are the most likely to have an unsafe abortion (Sundaram et al., 2012) and they may have little choice because financial constraints prevent them from using safer but more expensive alternatives. There is a need for more amendments in the abortion law to ensure better clarity and enhance women’s right to choose (Morhee & Morhee, 2006)

#### **2.5.4 Reproductive health rights**

Reproductive health rights are described in several international and national documents. This includes the *Sexual and Reproductive Health Framework* by the United Nations Population Fund (2008) and the International Conference on Population and Development, (1994) (United Nations Population Fund, 2014a). The International Conference on Population and Development (1994) in Cairo defined reproductive health as ‘a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, in all matters relating to the reproductive system, and to its functions and processes’ (United Nations, 1994). The reproductive rights and reproductive health section covered subsections such as family planning, sexually transmitted diseases, human sexuality, gender relations and adolescents (United Nations, 1994). This document provided a framework for governments to advance the reproductive health agenda of their populations, as do the MDG 5 and SDG targets.

Ghana is a signatory to the 1994 International Conference on Population and Development and is therefore bound by its recommendations. The benefits of upholding rights to sexual and reproductive health include enhancing a reduction in maternal and child deaths, offering choice and opportunity for women to make informed decisions with more control over their lives and a reduction in sexually transmitted infections (United Nations Population Fund, 2012). Family planning is considered vital to the achievement of the National Development Policy Framework’s goals; however, a wide gap exists between knowledge of family planning and level of contraceptive practice, and access to other reproductive health services (Ghana Statistical Service, 2015).

## **2.6 Strategies to reduce maternal deaths in Ghana and associated challenges**

Multiple strategies are in place to help improve maternal health outcomes in Ghana. Most national programmes are adapted from broader international policies to suit local needs, while others emerge in response to changing health needs. A synopsis of advances and difficulties encountered by Ghana in its efforts to reduce adverse maternal health outcomes is presented as part of this PhD study in a peer-reviewed paper published in *BMC Pregnancy and Childbirth* (Kyei-Nimakoh et al., 2016).

DEBATE

Open Access



# Millennium development Goal 5: progress and challenges in reducing maternal deaths in Ghana

Minerva Kyei-Nimakoh\*, Mary Carolan-Olah and Terence V. McCann

## Abstract

**Background:** High maternal deaths in developing countries are recognised as a public health issue. To address this concern, targets were set as part of the Millennium Development Goals, launched in 2000 by the United Nations General Assembly. However, despite focused efforts, the maternal health targets in developing regions may not be achieved by 2015.

**Discussion:** We highlight progress and challenges in reducing maternal deaths, with a particular focus on Ghana. We discuss key issues like the free maternal healthcare package, transportation and referral concerns, human resources challenges, as well as the introduction of direct-entry midwifery training and the Community-based Health and Planning Services rolled out to specifically help curb poor maternal health outcomes.

**Summary:** A key contribution to the country's slow progress towards achieving Millennium Development Goal 5 is that policy choices have often been in response to emergency or advancing problems rather than the use of preventive measures. Ghana can benefit greatly from long-term preventive strategies, the development of human resources, infrastructure and community health education.

**Keywords:** Millennium development goals, MDG 5, Ghana, Obstetric care, Maternal deaths, Maternal health, Maternal mortality ratio

## Background

In the late 20th century, maternal health gained international attention as a public health issue [1]. The increased interest was driven partly by the 'Safe Motherhood Initiative', launched in 1987, at the International Conference on Safe Motherhood, in Nairobi. In 1994, women's right to safe pregnancy and childbirth were recognised at the United Nations International Conference on Population and Development, and adopted formally within its programme of action [2]. The Safe Motherhood Initiative included a goal to reduce maternal morbidity and mortality by half, by 2000 [3]. Though the initial aims of this initiative were not achieved by 2000, it contributed greatly in setting the stage for the introduction of the more rigorous efforts and policies seen today.

Since 2000, global attention has turned to the Millennium Development Goals (MDGs), which were developed after the Millennium Summit in 2000, and involved 189 nations as initial signatories, including Ghana. The MDGs were established by governments around the world under the United Nations Millennium Declaration. The central focus of the MDGs was to address socio-economic and health-related inequities [4], in areas such as poverty, education, gender equality, child mortality, maternal health, and infectious diseases, by the end of 2015 [5]. Eight broad development goals, along with measurable outcomes, were outlined, offering a path for directing efforts and a framework for tracking progress.

Previous international collaboration did not yield expected rewards in women's reproductive health issues, particularly, in developing countries. In response, the fifth of the eight MDGs was included specifically to advance maternal health. This particular goal aimed to reduce maternal mortality ratio (MMR) by 75 % by 2015

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(Target 5A) and to achieve universal access to reproductive health (Target 5B) [5]. MDG 5 is important because it formed the foundation for reducing maternal deaths in Sub-Saharan Africa. Between 1990 and 2013, global MMR decreased by 45 %; however, the targets for MDG 5 were not realised by many Sub-Saharan African and Southern Asian countries [6], where MMR continues to be very high.

#### Maternal deaths in Africa

Global MMR for 2013 was 210 per 100,000 live births. In the same year, Sub-Saharan Africa's MMR was 510 per 100,000 live births compared to a developing region like Eastern Asia, which had the lowest rate at 33 per 100,000 live births [6]. Consequently, in 2013, the lifetime risk of maternal death for women in Sub-Saharan Africa was 1 in 38, compared to 1 in 1,800 for women in Eastern Asia and 1 in 3,700 in developed regions [6]. Rural women in Sub-Saharan Africa have the least access to quality health service delivery, at the same time as having the highest MMR. Although conditions have improved considerably since 1990, a rural-urban gap has persisted. The proportion of births attended by skilled personnel, crucial for reducing perinatal, neonatal and maternal deaths, remains low [6].

In the African Region, Equatorial Guinea, Eritrea, and Rwanda had achieved the goals of MDG 5 by 2013. Some countries (Kenya, Guinea-Bissau and Central African Republic), made insufficient progress while other countries even saw a rise (South Africa, Somalia and Zimbabwe), in maternal deaths. Many others (Ghana, Ethiopia and Senegal) experienced a slow decline [6]. As noted by the United Nations Population Fund [7], recent declines in global MMR, particularly evident in the achievements of countries like Equatorial Guinea, Eritrea, Egypt and Bolivia, confirms that with commitment and appropriate resource allocation, strategies for reducing maternal deaths can produce excellent results, even in resource-poor settings. Therefore, considering that 2015 has ended, it is imperative to not only strengthen efforts but also understand why past interventions have not yielded anticipated outcomes. Several nations are currently evaluating their successes or shortcomings regarding the MDGs. This paper contributes to the discussion of maternal deaths with particular focus on evaluating Ghana's progress and challenges in reducing MMR.

#### Ghana

Ghana, a West African country, with an estimated population of over 24.65 million [8], has realised some gains in reducing maternal deaths since 1990. Based on current data, the country did not meet its target of a 75% reduction in MMR by the end of 2015. According

to the World Health Organization (WHO) report, *Trends in Maternal Mortality: 1990–2013*, MMR declined in Ghana from 760 per 100,000 live births in 1990 to 570 in 2000 and to 380 in 2013 [6], which represents a 50 % reduction in MMR in 23 years. Notwithstanding these advances, the fact remains that Ghana's progress is less than optimal and much more needs to be done. Ghana was ranked 154 out of 179 countries assessed in the 2015 annual *State of the World's Mothers* report, which ranks the wellbeing of mothers in various countries. The assessment is based on several indicators. Ghana's overall ranking was low with a 1 in 66 lifetime risk of maternal death, under-five mortality rate of 78.4 per 1,000 live births, 11.5 expected number of years of formal education, gross national income per capita of US\$1,770 and only 10.9 % of government seats were held by women. Additionally, Ghana is one of 11 countries with the greatest urban child survival gaps, that is, poor urban children are 3 to 5 times as likely to die as their rich counterparts [9]. Such inequities are often reflected in poor living conditions, making these mothers and children even more vulnerable to ill-health. Conditions such as poor sanitation, food insecurity, limited access to perinatal care and skilled birth attendance lead to poorer health outcomes. As pointed out in the report, average statistics for health indicators often mask inequalities [9], even when it appears progress is being made on those indicators. Therefore, methods of data collection and analysis require particular consideration, especially disaggregated data, which provides valuable information for healthcare planning.

#### Causes of maternal deaths in Ghana

The major contributors to maternal deaths in Ghana are attributable to direct obstetric causes. A retrospective cohort study in one of the major teaching hospitals in Ghana revealed that the top five causes were hypertensive disorders of pregnancy, haemorrhage, genital tract sepsis (including septic abortion-related complications), early pregnancy deaths (including ectopic pregnancy, abortion-related complications and molar pregnancy), and infection, with the first four accounting for about two-thirds of all deaths [10]. Another study based on a 5-year retrospective survey, reports haemorrhage, abortion, hypertensive disorders of pregnancy, sepsis and obstructed labour as the major causes of maternal deaths. It also lists major infectious diseases, such as malaria and viral hepatitis, as well as non-infectious conditions like anaemia [11]. Similar findings have been reported by other researchers [12, 13].

As a consequence of the slow progress by many countries in reaching MDG targets, the MDG Acceleration Framework was developed in 2010, by the United

Nations Development Programme and other United Nations' agencies. The MDG Acceleration Framework provides a systematic approach for countries not achieving MDG targets to identify possible causes for the delay and find solutions to hasten progress [14]. For this reason, the framework is different for each country and is tailored towards aspects of the Millennium Declaration that a country has been slow at realising. Justifiably, Ghana's MDG Acceleration Framework Country Action Plan, developed in 2011, focuses on MDG 5, in a bid to intensify efforts to overcome barriers to reducing maternal deaths [15]. Three areas identified as requiring prioritised interventions are family planning, skilled delivery services, and emergency obstetric and neonatal care [14].

Policy guidelines on reproductive healthcare in Ghana include evidence-based best practices adopted to enhance care. For instance, active management of the third stage of labour is recognised as an effective strategy to prevent post-partum bleeding. This strategy was introduced jointly in 2003 by the International Federation of Obstetrics and Gynaecology and the International Confederation of Midwives [16]. Active management of the third stage of labour consists of three components which are intended to facilitate the delivery of the placenta and prevent post-partum bleeding. It was later adopted by Ghana as outlined in the 2008 *National Safe Motherhood Protocol* of the Ghana Health Service [17]. Nonetheless, a recent evaluative study points out that, despite having received training in the use of the protocol, all the components involved are not followed consistently by maternal health personnel when attending to births, due to multiple reasons such as inadequate support from colleagues and high workload [18]. Similarly, a criteria-based audit of quality of care in severe pre-eclampsia and eclampsia indicated a 15–85 % mean adherence to nine key clinical care protocols [19], revealing significant gaps in practice. Other evidence-based guidelines (mostly local adaptation of internationally accepted standards) identified in a desk review [20] include the following:

- The National Family Planning Protocols Manual (2007) [21];
- Reproductive Health Service Policy and Standards (2003) [22];
- Prevention and Management of Unsafe Abortion - Comprehensive Abortion Care Services, Standards and Protocol (2006) [23]; and
- Improving Access to Quality Care in Family Planning, Medical Eligibility Criteria for Contraceptive Use (2008) [24].

Within the national guidelines are strategies for the prevention and treatment of the major causes of maternal deaths. These include use of Oxytocin/Misoprostol

in the management of haemorrhage and post-abortion complications; management of eclampsia with Magnesium Sulphate; and prevention of sepsis by using clean delivery kits and antibiotics. Data from studies in resource-poor settings support the use of criteria-based clinical audits as a useful tool for identifying gaps in obstetric practice and providing targeted information on areas requiring quality improvement or intervention [19, 25–27]. Application of such audits could be valuable for monitoring care and guiding improvement plans for increasing adherence to standard protocols in Ghana.

## Discussion

### Major maternal health challenges and initiatives in Ghana

The following discussion is centred on Ghana's continuing efforts to reduce MMR and includes an evaluation of some of the difficulties encountered. These difficulties include:

- challenges in tracking of maternal deaths;
- midwifery workforce crisis;
- challenges in community-based health services;
- poor transport and emergency response; and
- low skilled attendance at birth.

### Ghana's continuing efforts

Multiple challenges have prevented developing countries from making good progress in reducing maternal deaths, including inefficient maternity referral systems [28], inadequate numbers and uneven distribution of skilled health personnel [29] and sociocultural barriers to use of obstetric services [30]. Ghana has so far adopted various strategies in response to specific maternal health challenges. A significant measure introduced in 2008, to improve equity in access to maternity care services is the provision of free maternal healthcare services for all pregnant women through the Ghana National Health Insurance Scheme [31]. Interestingly, family planning services are not covered under the scheme, despite evidence that the country has significant unmet need for family planning. For instance, in 2014, unmet need for family planning was 30 % among married women alone and 42 % among unmarried sexually active women [32]. This unmet need may translate into higher abortion rates with associated abortion-related complications. Given that abortion-related complications are a significant contributor to maternal deaths in the country [10–13], it is unclear why the country's Ministry of Health has yet to include family planning services in the health insurance benefit package of maternal healthcare [33]. In 2012, changes to the Ghana National Health Insurance Act (Act 852) mandated the health minister to prescribe the healthcare benefits package and include any family planning package under the National Health Insurance

Scheme [34]. Despite passage of the law (Act 852), it is yet to be operational [35]. In the longer term, eliminating Ghana's unmet need for contraception through its inclusion in the National Health Insurance Scheme will offer cost-saving benefits for the country through the reduction of unintended pregnancies, prevention of abortion-related complications and general improvement in maternal health [35]. Nonetheless, despite these deficiencies, some advances have been made in Ghana. For instance, skilled attendance at birth has shown an increase from 40 % in 1988 to 74 % in 2014 [32].

#### **Tracking maternal deaths**

One particular difficulty in developing countries is measuring and tracking maternal deaths [6, 36, 37] due to the absence of complete and accurate registration systems [6]. In Ghana, MMR measurement problems stem from a poor vital registration system, poor data collection practices in health facilities, possible misclassification of maternal deaths, and difficulties tracking births that do not occur in health facilities. As a consequence of such difficulties, data may be outdated, unreliable or incomparable [37]. For instance, in a 2014 WHO report, Ghana's 2013 MMR was given as 380 per 100,000 live births, with a possible lower estimate of 210 and a higher estimate of 720 [6], a wide disparity which may hinder the proper planning and meeting of healthcare needs of the population. MMR measurement problems have real implications for decision-makers with regards to setting realistic targets and efficient allocation of resources [36]. Maternal death reviews are an essential means of capturing maternal deaths by helping estimate maternal mortality while providing insight into ways of improving practice and preventing future maternal deaths [6]. Ghana's Ministry of Health actively promotes clinical and case audit of maternal deaths [38], which will help improve the quality of obstetric care and documentation. In recent times, there has been an increase in published research based on clinical audits of maternal deaths within the Ghana Health Service to help improve health service provision [12, 19, 39, 40].

#### **Midwifery workforce crisis**

Midwifery personnel are a critical group of maternal healthcare providers. Even though there is evidence of shortage of healthcare personnel globally, there is no universal measure of the shortage [41]. A yardstick often used to plan midwifery workforce is 6 midwives per 1,000 births in a year [42]. The 2011 *State of the World's Midwifery* report estimated Ghana's midwife to population ratio to be 5 per 1000 live births [42], which is close to the WHO's recommendation. While this ratio compares favourably with some developing countries, and almost meets the WHO's recommended target for

midwifery personnel per population, it must be viewed in the context of the country's particular circumstances. According to the 2014 *State of the World's Midwifery* report, due to the ageing population of midwives in Ghana, the country is expecting high workforce losses in the next 10 years, further depleting the midwifery population [43]. Unfortunately, published data on the current age distribution and specific rates of exit from the workforce is not available. Statistics on workforce availability in 2012 showed that, the sexual, reproductive, maternal and newborn healthcare in Ghana was only 30 % of what is required [43]. The 2012 graduates account for nearly a quarter of the 2014 midwifery workforce, a trend, if maintained, that could significantly increase women's access to midwifery services. Comparatively, the 2011 and 2014 *State of the World's Midwifery* reports show a general increase in the total numbers of maternal health staff in Ghana. The number of midwifery personnel has increased from 3,780 to 4,185 with an additional 273 nurses who spend 80 % of their working time on maternal and neonatal services [42, 43]. Midwives provide the majority of skilled maternity care services in Ghana and any discussion of maternal health workforce must consider recruitment, retention and equitable distribution of midwives. Factors such as poor remuneration, lack of incentives, inadequate resources and lack of social amenities inhibit the recruitment and retention of midwifery and other health staff in rural areas, where services are most needed [44–46]. Many developing countries have experienced significant losses of skilled health workforce, including midwives, to high-income countries [47]. In 2009, it was reported that over 24 % of nursing and midwifery personnel trained in Ghana were working abroad [48]. In response to the shortage of midwifery personnel, the government of Ghana has upgraded midwifery training schools and introduced direct-entry midwifery training programmes at the diploma level in 2007 [49] and as Bachelor of Science in 2011 [42]. A third entry pathway is the 2-year post-basic midwifery programme, leading to a diploma, targeted at community health nurses and health assistants from underserved communities, which may help increase the number of midwives in remote areas, due to the shorter duration of training [50]. The impact of the country's investment in expanding the health workforce needs to be measured to guide further action on current and future needs. However, despite the government's efforts, there are challenges in retaining these key personnel in remote/rural areas and these challenges need to be addressed to improve retention [46, 51].

Historically, the country's healthcare efforts have been reactionary to emergency or advancing healthcare system problems rather than being proactive in preventing such problems. For example, major increases in training

of professional midwifery personnel were not pursued, until their numbers dipped significantly, despite the known effects of economic migration and advancing age of existing personnel. Such reactionary measures create conditions where problems become deep-rooted and use of short-term strategies make them more costly and time-consuming to resolve. Targeted investments need to be consistently made in human resources planning and training for the maternal health sector. Ultimately, a more cost-effective and sustainable approach is to invest in standardised midwifery training which equips personnel with the minimum competencies required to provide emergency obstetric care [43]. Policymakers also need to consider relevant health-worker needs when developing guidelines to improve retention of key personnel, particularly in remote areas [46, 51].

#### **Other maternal healthcare workforce**

The midwifery workforce in Ghana is supplemented by other categories of health service workers. The 2014 *State of the World's Midwifery* report indicates that the number of obstetricians and gynaecologists were 549, a great improvement over 64 obstetricians reported in the 2011 report [42, 43]. This category of specialists could make a real difference if, in reality, their services reach those who need them most.

In recent times, Ghana has focused on training increasing numbers of auxiliary and middle level personnel [52], particularly for service in remote/rural areas. Categories of trained auxiliary healthcare workers include community health nurses (certificate) and health care assistants. Since 2003, efforts were intensified to train more community health nurses for Community-based Health and Planning Services (CHPS). CHPS are a type of healthcare facility in Ghana which plays an important role in reproductive healthcare in remote and rural communities. Although it was initially planned for each CHPS zone to have one community health nurse, it is estimated that currently, there are at least two per zone, suggesting an over-production of this category of health workers for the CHPS zones available [53]. The initial emphasis on auxiliary personnel is, however, not without cost to reproductive healthcare as it has implications for the quality of patient care and does not adequately cater for future workforce requirements. It appears to be an attempt to lower the financial cost of training and retain the personnel since they are deemed less likely to seek career advancement [54]; and unlikely to emigrate [55]. In contrast, the WHO's recommendations emphasise local recruitment and training, as well as access to professional education and support, as a means to retain health workers in remote areas [56]. The existence of different types of health professionals carrying out maternity care tasks creates particular

challenges due to lack of standardisation in training and poorly defined roles [57, 58]. The efficiency and cost-effectiveness of recently introduced low- and mid-level healthcare workers providing maternal health services remains to be fully determined. Conscious efforts must be made to ensure that growth in maternity care workforce is driven mainly by higher numbers of professionally prepared midwifery personnel rather than auxiliary personnel, as it has been demonstrated that professional midwifery care is key to reducing MMR [43].

In Ghana, some pregnant women seek care from multiple sources including traditional practitioners, even where there is access to obstetric care [59–62]. Traditional practitioners may include traditional birth attendants (TBAs), diviners, spiritualists and herbalists [60, 61]. The 2008 *Ghana Maternal Health Survey* report shows that, over half (55 %) of all births occurred in the presence of a skilled attendant, while 29 % were assisted by TBAs [63], although the extent of use may vary across the country. Reasons for preference of such services are often socio-cultural in nature [59]. Therefore, improvement in utilisation of skilled care requires an understanding of the culture and values of service users. A recent study revealed that formal healthcare providers were isolated from the culture of the communities they served, as opposed to traditional providers [60]. Presently, the role of TBAs in Ghana is officially restricted to non-birthing support during pregnancy, hence, TBAs no longer receive training and support for maternal birthing services [61]. Despite the lack of support, pregnant women may continue to use them for antenatal and birthing care because of deep-rooted, traditionally held beliefs [59]. Although the activities of traditional practitioners have an impact on maternal health outcomes, limited engagement of these practitioners makes it difficult to measure the nature and extent of their impact [62]. Without a discontinuation or decline in utilisation of their services by community members, marginalising TBAs and other practitioners means that the country misses an opportunity to reach some of its most vulnerable population.

#### **Community-based health and planning services**

A significant national health policy initiative implemented by Ghana is the Community-based Health and Planning Services system. The initiative was adopted in 1999 by Ghana's Ministry of Health to increase geographic access to maternal and child health services, particularly in rural and remote communities [64]. The programme relies on collaboration with community leaders and volunteers to mobilise resources and labour to construct a health facility known as a Community Health Compound, consisting of space for a clinic and accommodation for a health care provider. These compounds

are manned by Community Health Nurses and Community Health Officers [63]. Upscale of the CHPS initiative has occurred at different rates in the various districts in Ghana. By 2008, almost all districts had some coverage of functioning CHPS, though districts where the pilot projects took place had up to 90 % or more of their population covered while most others had between 10 to 40 % coverage. On the whole, the population covered by functioning CHPS zones across Ghana is low, especially, in the highly populated regions in southern Ghana [65].

In 2010, the geographical delineation for a CHPS zone was changed to correspond with electoral areas as opposed to being based on population size. In 2013, there were 5,487 CHPS zones, out of which 1,189 were reported to be functional [53]. Though the initiative has been largely successful in reducing distances to health facilities, reports indicate an inadequate skill mix of community health officers, thus affecting the quality and scope of their work, particularly in terms of obstetric care services [46, 66]. This situation is problematic because evidence shows that not only is the availability of healthcare workers important [67], so is their ability to identify and respond effectively to obstetric emergencies [68]. The activities of community-based workers are further limited by inadequate supervision and lack of resources [46, 58]. Also, high attrition rates of community health workers have been reported in some communities [58]. Overall, hard-to-reach areas will be better served if expansion of the CHPS programme and health infrastructure progress in tandem with health resource needs such as essential health personnel.

#### **Transport and emergency response**

Functional maternity referral systems rely on well-organised emergency medical systems. In Ghana, lower level health facilities, such as district hospitals and CHPS compounds, require a supportive network of maternity referral systems to function effectively and efficiently [40]. Efficient referral systems depend on factors such as good roads, appropriate transportation, information and communications technologies [69]. These factors are deficient in many parts of the country [69]. Maternal deaths in Ghana are therefore highest in rural areas where access to emergency obstetric care is also limited by scarce resources, long distances to health facilities, poor transportation and road networks [69]. Strengthening of its emergency response system is therefore of great importance to Ghana.

Development of emergency medical services in Ghana is still at an early stage. The Ghana National Ambulance Service was established in 2004 by the Ministry of Health, to provide pre-hospital emergency medical care, and transport patients to health facilities. Emergency medical training programmes have also been developed

for physicians, nurses and middle level personnel [70]. Currently, national ambulance services are free [71] and although services have expanded to cover all regions in the country, they remain confined to the regional capitals and a few districts [70, 71]. Additionally, public awareness of services provided by the National Ambulance Service is low, coupled with the perception that they are unreliable, due to poor response times [70, 71]. In remote areas of the Upper East Region of Ghana, for instance, women referred to a higher level facility for emergency obstetric care may not have access to an ambulance and may use alternative means of transport, delaying their arrival. In the absence of ambulances, common modes of transportation used include taxis, motorbikes, bicycles and donkey carts [28], which may put ill pregnant women at serious risk. This deficit is well recognised and some new initiatives aim to address the problem. For example, under a program called the Ghana Essential Health Intervention Program (GEHIP), a pilot project was launched in 2012 to strengthen the emergency referral system in the Upper-East Region of Ghana, with the supply of 3-wheeled emergency transport vehicles and communication equipment at community levels [72]. These motorcycles have been modified to serve as ambulances ('Motorking Ambulances') [73]. Following the pilot, which improved emergency response times [72], it was later upscaled as the Sustainable Emergency Referral Care (SERC) Initiative [73]. The project was developed taking into consideration the particular context of healthcare delivery in the region and the introduction of 3-wheeled motorcycles was a key strategy. A similar project in a rural district of East-Mamprusi in the Northern Region of Ghana has been reported to ease transport-related challenges while remaining cost-effective [74]. Similarly, innovative approaches in solving healthcare problems could be developed in other remote communities in Ghana, with the support and input of community members.

#### **Low skilled attendance at birth**

Another major reproductive healthcare challenge is low patronage of skilled care at birth. Though women may be aware of the merits of skilled birth attendance in formal maternity care units, they may not always utilise these services. Unlike antenatal care visits which are flexible and amenable to rescheduling, the onset of labour is less so and care during labour can be compounded by health system barriers and the individual's particular circumstances at the time. It is concerning, however, when the skilled birth attendance rate is very low relative to antenatal care attendance, especially, among vulnerable populations. For instance, between 1993 and 2014, pregnant women who made antenatal care visits at least once increased from 86 to 97 %, while

births occurring in a health facility rose from 42 to 73 % [32]. Rural women remain at a disadvantage as the 2014 *Ghana Demographic and Health Survey* reports that, in the 5 years preceding the survey, 91 % of births in urban areas were assisted by a skilled provider, compared to 59 % in rural areas and as low as 36 % in the Northern Region of Ghana [32].

Several factors, including sociocultural factors and perceived quality of healthcare, may have contributed to the situation. Studies have also raised concerns about negative attitudes of health staff, poor communication skills, and low standards of care [75–78]. Other reasons for preference for alternative care, such as home birth or use of TBAs, include the liberty to engage in cultural practices/beliefs, such as use of herbal medicines believed to hasten the birthing process; and the freedom to use various birthing positions of choice. Additionally, TBAs are perceived by some as more empathetic and trustworthy than orthodox healthcare professionals [30].

Strategies to increase use of skilled healthcare services at birth must accommodate the challenges of healthcare providers as well as inputs and expectations of service users. Healthcare workers need to provide a more supportive environment by being sensitive and accommodating to diverse socio-cultural perspectives and employing tact in educating clients or managing their needs. Certain non-harmful socio-cultural practices could form part of comprehensive holistic care at home and in health facilities. Finally, during national health policy development processes, especially when adopting broader global strategies, such as the post-2015 sustainable development agenda [79], health service users from different socio-cultural backgrounds may be better served if their inputs are sought and included through local consultative processes.

### Summary

Ghana's potential success at reducing maternal deaths is hampered by multiple problems, despite many adopted strategies. Critical among the country's reproductive health issues are health workforce crisis, infrastructural challenges, poor emergency response system, healthcare policy issues and socio-cultural factors. Without doubt, the MDGs have facilitated more targeted and deliberate actions to eliminate inequities in societies. In Ghana, serious thought needs to be given to strategies adopted previously and improvements made, where appropriate. Current evidence suggests that both targets of MDG5 (significant reduction of MMR and universal access to reproductive health) have not been reached by Ghana. While acknowledging that Ghana is confronted with multiple maternal health issues and has taken some remedial actions, it is also recognised that available evidence on maternal health standards and practices, can

help reduce MMR, if properly applied. As the country repositions itself to draw on such knowledge and past experiences, it needs to ensure that policies adopted suit its unique country-specific needs. Also, in re-evaluating maternal health efforts, long-term goals need to receive higher emphasis and sustained attention, which is particularly important if the post-2015 target of reducing global MMR to less than 70 per 100,000 live births by 2030, is to be achieved [79]. Ghana can reduce its MMR considerably by ensuring adherence to evidence-based clinical care protocols, strengthening its midwifery workforce and primary health services, improving transport and emergency response systems, and fortifying measures to increase skilled attendance at birth.

### Abbreviations

CHPS: community-based health and planning services; GEHIP: Ghana essential health intervention program; MDGs: millennium development goal; MMR: maternal mortality ratio; SERC: sustainable emergency referral care; TBAs: traditional birth attendants; WHO: World Health Organization.

### Competing interests

The authors declare that they have no competing interests.

### Authors' contributions

All authors (MKN, MCO and TVM) made substantial contributions to the conception of this paper. MKN wrote the first draft of the manuscript. All authors critically reviewed and contributed to the intellectual content of this paper. All authors read and approved the final manuscript.

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## **2.7 Chapter Summary**

In this chapter, an account of the historical background of women's reproductive health issues was provided. Literature pertinent to the improvement of EmOC and reduction of maternal deaths was also explored. In the process, global milestones attained in reducing maternal deaths were discussed, as were acute disparities across geographic regions. While there has been considerable research on various aspects of maternal healthcare in Ghana and other low- and middle-income countries, it is evident that more needs to be done. Justifiably, EmOC which encompasses availability and accessibility of skilled maternal healthcare, has been promoted nationally and internationally because its benefits are backed by research.

Maternal deaths in Ghana are highest among poor rural populations with limited access to basic and comprehensive EmOC. Even those who seek skilled care are more likely to be attended by low- to mid-level or auxiliary health personnel because of staff shortages and inability to retain skilled staff in rural areas. Furthermore, antenatal care is better patronised than facility-based birthing services even among vulnerable populations, revealing a preference for alternative care. These circumstances combine to make rural poor women the least likely to seek or obtain birthing services from qualified/trained health personnel, despite being the population most in need of advanced care. This disturbing trend has continued over time. Undoubtedly, these difficulties played a significant role in undermining the country's best efforts and continue to drive high maternal death rates in Ghana.

This literature review has helped to make a case for further investigation and research, by highlighting gaps in knowledge and practice of obstetric care. Knowledge in this area is important and a fundamental requirement in shaping responsive and practical health policy.

## **CHAPTER THREE**

### **RESEARCH DESIGN AND METHODS**

#### **3.1 Introduction**

In this chapter, the methodological approach employed in this thesis is discussed. First, the theoretical framework as it relates to the process and outcomes of obstetric care is detailed. A discussion of the framework, the rationale for its selection and its adaptation to suit this study follows. A description of the study design that was employed to meet the aims of the study is then presented. Next, an explanation of the research methods is provided, followed by a discussion of the techniques and problems associated with the chosen research design. Also outlined are the justification for selection of a retrospective cohort study design and survey research approach. A brief profile of the study site is then provided followed by a discussion of the two major stages of the study. The chapter concludes with consideration of the ethical issues pertinent to this thesis.

#### **3.2 Theoretical foundation**

Research problems are often multidimensional and complex. This complexity may make a problem difficult to understand and raise the chances of overlooking certain aspects. Theories, models and concepts offer more logical ways of looking at a problem, or ways of representing how complex things work, and assist in finding possible solutions (Bordage, 2009). The theoretical approach selected for this thesis draws on the Framework for Evaluation of Quality Care in Maternity Services by Hulton, Matthews, and Stones (2000).

##### **3.2.1 Background**

The principal focus of this study is maternal health service delivery and its outcomes, as it pertains to the Upper East Region of Ghana. As discussed in the literature review, severe maternal morbidity and mortality are common in Ghana. As a result, efforts are underway to improve maternal well-being and pregnancy outcomes. A central theme in addressing those efforts is emergency obstetric care, which is viewed as a cornerstone to better outcomes. The quality of such care is, without doubt, a key concept linked to improved birth outcomes. In the context of this study, a broad theoretical framework that recognises the interaction between the content of care and its outcomes is needed to enhance understanding of the subject. By implication, the nature of care denotes the standard or

quality or care. The framework for evaluation of quality care in maternity services by Hulton et al. (2000) has been used, because it addresses key concerns within the scope of this study. Hulton et al. (2000) approached quality of care from two dimensions, namely quality of care provided within the institution and quality of care as experienced by clients. Given the sphere of this study, application of the framework was confined to aspects related to the provision of care, thus necessitating an adjustment of the original framework as is discussed later.

Within the context of the framework, provision of care is situated within the institution/health facility. This position is supported by the fact that skilled care at birth is widely understood as a means of reducing preventable perinatal morbidity and mortality (United Nations Population Fund, 2014b). In Ghana, healthcare facility-based services form an essential part of maternity care and domiciliary midwifery/home birthing services are not commonly offered. However, the use of traditional birth attendants and home births which may be attended by family (Akazili, Doctor, Abokyi, Hodgson, & Phillips, 2011) are also widespread but do not offer skilled care.

Skilled attendance at birth is low in Ghana, but it improved slightly from a national average of 55.3% in 2013 to 56.7% in 2014 (Ghana Health Service, 2015a). Skilled care, however, offers a unique opportunity to improve maternity outcomes for women who use birthing services at healthcare facilities. This is because skilled care is linked to improved outcomes for women. Despite the expected benefits and outcomes of skilled care, the country's institutional (health facility-based) MMR remains high, and was reported at 143.8 per 100,000 live births in 2014 (Ghana Health Service, 2015a). This situation may result from limited availability of emergency care. An in-depth understanding of emergency obstetric care and referral processes, as explained by Hulton et al. (2000), could help advance maternity care and improve outcomes.

### **3.2.2 The framework for evaluation of quality care in maternity services**

Hulton et al.'s work (2000) is a quality assessment framework. These authors define quality of maternal healthcare as 'the degree to which maternal health services for individuals and populations increase the likelihood of timely and appropriate treatment for

the purpose of achieving desired outcomes that are both consistent with current professional knowledge and uphold basic reproductive rights' (p. 9). Their definition is based on the premise that, for care to be truly of high quality, the elements in its provision must not only meet established standards but the experience of care should also be acceptable to health service users. Based on this rationale, the framework has two broad divisions: provision of care and experience of care. Under each division, there are several elements that guide the evaluation of services. The focus of this thesis is largely on the elements of provision of care.

Under provision of care, six factors are identified, which are human and physical resources, referral system, maternity information systems, use of appropriate technologies, internationally recognised good practice, and management of emergencies. Under experience of care, the elements named are human and physical resources, cognition, respect, dignity and equity, and emotional support. The framework is illustrated in Figure 3.1.

According to Hulton et al. (2000), criteria and standards for evaluation must be developed for each element. They offer a broad list of criteria, standards, indicators and sources of information for evaluation of each element. For instance, for the element of referral system, a possible criterion could be 'reliable transport available on a 24-hour basis'. The corresponding standards may include 'reliable' and '24-hour basis'. Suggested indicators include 'observed versus reported reliability' and 'vehicle in working order'. Useful sources of data for assessing this element include facility records, provider interviews and observation. The authors clarify that although the suggested criteria may be universally applied in institutions of similar status, given the wide contextual differences in developing countries, standards must be defined to suit specific settings. There are, however, internationally accepted standards that remain universal.

**Figure 3.1:** Framework for assessing quality of institutional delivery services (Hulton et al., 2000).



Conceptually, Hulton et al.'s framework provides a useful guide to evaluating the quality of maternity health services. In fact, most of the elements identified are also mentioned in the WHO's publication: *Monitoring Emergency Obstetric Care: A Handbook*, which offers a much broader tool for the assessment of adequacy of emergency obstetric and newborn care (World Health Organization, 2009).

### **3.2.3 Application of the framework to study**

As mentioned earlier, although Hulton et al.'s framework provides a more comprehensive picture in evaluating quality of service, its application has been limited to the factors/elements under provision of care, because those under experience of care do not fall within the remit of this PhD thesis. Nevertheless, the framework is a valuable tool which

helped meet the objectives of this study. Hence, the factors/elements of primary concern are human and physical resources, referral system, maternity information systems, use of appropriate technologies, internationally recognised good practice, and management of emergencies, as listed under provision of care. Together, these factors take account of the multiple dimensions of emergency obstetric care, which is central to this study. Obstetric outcomes were examined by conducting a medical records review in a cohort study. Additionally, the elements of provision of care were explored in a survey with the use of questionnaires. Figure 3.1 demonstrates a direct relationship between the quality of service (in the context of health service provision) and the process and content of the care provided.

### **3.2.3.1 Human and physical resources**

Human resources relate to the number and types of health and non-health workers, supervision, management styles, staffing ratios and staff training. Physical resources include the health facility infrastructure, medical and non-medical equipment and supplies. According to Hulton et al. (2000), the availability, quality and extent of use of these factors are essential parts of a quality assessment.

### **3.2.3.2 Referral system**

Ideally, maternity health systems should allow ease of referral of clients from lower level facilities to more advanced ones in obstetric emergencies, using pre-defined referral protocols. The quality of referral procedures during labour or emergencies is one of the primary concerns of quality assessment in this framework.

### **3.2.3.3 Maternity information systems**

Maternity information systems include record-keeping procedures to ensure that information on obstetric records is complete and consistent. A well-functioning system enhances smooth case management, peer reviews and maternal death audits, where necessary. It also reduces misclassification of maternal deaths and, in effect, contributes to proper tracking of progress in maternal healthcare. Quality assessment involves a review of record-keeping practices and skills.

#### **3.2.3.4 Use of appropriate technologies**

Although not all technologies in maternity care are widely embraced, Hulton et al. (2000) make the point that assessing the extent of inappropriate use of technology is not widely practised or known as an indicator of quality. Hulton et al. (2000) describe these ‘technologies’ as interventions that support the process of normal birth. According to the World Health Organization and Unicef (1978), an appropriate technology is not only scientifically sound but also acceptable, adapted to local needs and affordable. In particular, Hulton et al. (2000) discourage common use of routine procedures that confer no proven benefits in specific circumstances. Routine pubic shaving, administration of enemas, intravenous infusions, vaginal examinations, caesarean births, episiotomy, and use of the supine position are some of the procedures which could be inappropriately applied in maternity care.

#### **3.2.3.5 Internationally recognised good practice**

Evidence-based practices may be drawn upon from various sources. For instance, in Ghana the *National Safe Motherhood Service Protocol* (Ghana Health Service, 2008) contains accepted guidelines for good practice (Oduro-Mensah et al., 2013). Examples of internationally recognised good practices are routine prophylactic use of antibiotics at the time of caesarean sections and adoption of a position of choice during labour in uncomplicated births (Hulton et al., 2000).

Haemorrhage, unsafe abortion, hypertensive disorders, obstructed labour and sepsis contribute significantly to maternal deaths in Ghana (Asamoah et al., 2011; Lee et al., 2012). The framework by Hulton et al. (2000) provides criteria for determining facilities that can provide quality clinical care to prevent death from these causes and was valuable in the current study.

#### **3.2.4 Suitability of Hulton et al.’s framework**

This thesis is specifically concerned with factors related to maternity services and their influence on maternal outcomes. An appropriate theoretical approach is defined by its objectives, that is, it should explore the content of maternity care as related to maternity outcomes in healthcare settings. Several theories or models of maternity care exist that

only touch on one part, or focus extensively on issues of maternity care from viewpoints other than the service provider. For instance, the ‘three delays model’<sup>3</sup> is popular as a tool for analysing barriers, opportunities, and systems at different levels of obstetric care (Thaddeus & Maine, 1994). It identifies sources of delays (including community and health service factors) from the pregnant woman/household, healthcare workers, infrastructure, health system and others. Given the focus of this study, the three delays model is broader in scope than required, making it less suitable because healthcare services on reaching a maternity care unit or between different facilities is of primary concern herein.

Another obstetric care quality assessment tool that was considered was developed and tested in Burkina Faso by Morestin, Bicaba, de Dieu Sermé, and Fournier (2010). It consists of a conceptual framework and a grid analysing 37 instruments for local adaptation to low-resource settings<sup>4</sup>. The grid allows data collection on human and material resources, processes of care and outcomes. These are mapped against the type of instrument, unit of observation, sources of information and type of data. Though the framework could be applied in this study, it is complex and would require sorting of items relevant to service provision from the grid.

Another framework considered was the ‘quality improvement for emergency obstetric care tool’. It is described as a client-oriented and provider-efficient services approach (EngenderHealth, 2003). It has several tools, including one for emergency obstetric care, which allows periodic assessments to identify problem areas. It contains questions on

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<sup>3</sup> The model explains three main levels during health seeking where service users may encounter barriers. The first (delay in the decision to seek care) is at the individual or household level, where there are considerations such as cost, distance, quality of service, severity of illness and other circumstances. The second delay (delay in arrival at a health facility) occurs while attempting to reach the facility. Access problems such as availability of health facilities, lack of transportation may pose challenges. The third is delay in the provision of adequate care on arrival at a health facility which may be due to staff shortages, a lack of essential drugs and supplies, and administrative delays.

<sup>4</sup> Morestin et al (2010) developed an evaluation instrument that includes a conceptual framework and an analysis grid for use in low resource settings. The conceptual framework has three levels for evaluating the quality of care: **structure** (human, material, and organizational resources); **process** (the health services themselves); and **outcome** (the consequences of these services on patients). Every item in the framework is a potential criterion for evaluating obstetric care quality. The analysis grid reproduces the structure of the conceptual framework with each line corresponding to one component of obstetric care quality.

service appropriateness, timeliness and adherence to standards, which are scored to give a quality measure. This framework seems more appropriate for self-assessment and on-going progress rather than a tool for evaluating general quality of care in facilities as a whole.

The framework for evaluation of quality care in maternity services was selected over other models and theories because it focuses on the process and content of care, thus, relative to other frameworks, it is more specific to the objectives of this study. Additionally, from its emphasis on quality of care, it takes into account outcomes of maternity care services, thus embracing all the key concerns of this PhD thesis. Hulton et al.'s framework is considered a fitting tool because it is specifically designed for monitoring and improving health facility-based maternity care. The framework is deemed most appropriate because it offers insight into key elements of maternity care while allowing comparison with accepted standards.

The framework is more specific to the concerns of this study but sufficiently comprehensive to address the range of factors involved. It lends itself to being segmented in order to evaluate aspects of obstetric care quality without losing the general purpose or meaning of the framework.

Finally, a significant reason Hulton et al.'s framework is the preferred choice is that it takes account of factors that explain or affect the referral of obstetric complications. This is important because such factors can impact on obstetric outcomes. Therefore, by providing better insight, difficulties could be addressed and maternity outcomes could be improved.

### **3.3 Research design**

The research design refers to the overall plan or approach selected to combine different parts of a study in a logical manner, which allows the researcher to successfully address the research problem (Hoskins & Mariano, 2004; Kirshenblatt-Gimblett, 2006). Generally, the type or nature of the study aims dictate the research design, which, in turn, informs the techniques for data collection, measurement, and analyses.

In this study, a quantitative research design was employed. Vosloo (2014) describe quantitative research as involving the objective evaluation of data through the application

of numerical analysis. This approach was chosen because although quantitative research is largely situated in statistics, it begins from the premise of testing theory (Vosloo, 2014), an essential characteristic that generates many advantages. Quantitative research offers researchers the ability to measure and quantify trends, behaviours, attitudes, perceptions and other attributes of interest, using techniques that allow the researcher to generalise to larger populations (Babbie, 2010; Hoskins & Mariano, 2004). Similarly, the purpose of this study can best be achieved through the use of a quantitative approach, because it measures and computes trends in birthing outcomes, and practices in the management and referral of obstetric complications. Consequently, the results obtained are generalisable to the larger population. Quantitative studies tend to use relatively large-scale and representative sets of data, since their focus is making standardised and systematic comparisons. The goal of this type of research is to determine relationships between one variable and another in a particular population (Babbie, 2010). Its application is, therefore, suitable to the current study because the aim was to determine relationships between maternal outcomes, and other factors such as types of obstetric complications and obstetric referrals.

In general, quantitative research may be divided into experimental and observational designs (Curtis & Drennan, 2013). Specifically, this research used an observational approach to draw inferences by describing and comparing outcomes for women with obstetric complications. Additionally, comparisons were made between the referral practices of private and public practitioners and among different categories of practitioners. Observational studies do not involve intervention or manipulation. The researcher studies or examines the strength of the relationship between an exposure and outcome variable (Merrill & Timmreck, 2006). This allows researchers to provide useful insights into prevailing phenomena by identifying and explaining possible relationships between variables. Consequently, such studies provide valuable data for further research and help assess risks and benefits of practices (Curtis & Drennan, 2013), which is an important consideration where little is known about the problem. In this study, a quantitative framework using two approaches was employed; a cohort study and a survey. One of the strongest merits of observational studies is that they offer relatively inexpensive research

designs that can be used not only to explore hypotheses but also to confirm or disprove phenomena.

### **3.3.1 Retrospective cohort study design**

In cohort studies, a researcher follows a group of people with common/similar characteristics through time to identify statistical occurrences relevant to the research problem under investigation. The direction of follow-up over time in a cohort study may occur in two ways, either backwards in time (retrospective or historical cohort study) or forward (prospective cohort study) (Healy & Devane, 2011; Silman & MacFarlane, 2002). The aim of cohort studies is to estimate the risk of disease or specific outcomes (Healy & Devane, 2011). A retrospective cohort design is used in this study to examine maternal outcomes among pregnant women in the Upper East Region of Ghana. In retrospective cohort studies, researchers identify subjects who had the exposure in the past. Subsequently, the progress of subjects is followed or traced from when they were exposed until the present time to determine their outcome status (Silman & MacFarlane, 2002). For instance, the outcome of interest in this study was obstetric complications; therefore, pregnant women in the cohort were traced back in time to identify those who developed complications.

The choice of cohort study selected depends on a number of factors. A retrospective cohort is more appropriate if a research question can be answered with data that already exists (Euser, Zoccali, Jager, & Dekker, 2009), as is the case in this study. Routine data collected on pregnant women and their birth outcomes in this study adequately answer the research question. The researcher may also need to consider the availability of information on other factors (referred to as confounding factors, for example, poverty or patient's age) which may influence the outcome (Silman & MacFarlane, 2002). Retrospective cohort studies offer the advantage of being a less expensive and a quicker alternative (Silman and MacFarlane, 2002), using already existing data. For these reasons, this design was chosen for this study.

### **3.3.1.1 Justification for use of a retrospective cohort study approach**

According to Silman and MacFarlane (2002), the choice of one research design over another depends on the validity and feasibility of the method in relation to the research question being addressed. They explain validity as the ability of a study design to achieve the most precise answer to the research question. Feasibility is closely associated with validity and denotes the ability of a chosen research approach to obtain an answer. A retrospective study design is valid and feasible within the context of this study, because it is designed to collect existing health facility data on outcomes of obstetric complications. Retrospective cohort studies are particularly useful in studies which would otherwise not be feasible for ethical reasons, time and cost constraints, or in rare medical conditions (Euser et al., 2009). For instance, to use an experimental design in this study may mean purposefully withholding referrals from a group of pregnant women with complications. Denying referrals to a control group of women to allow subsequent comparison between them and those who receive treatment in order to determine outcomes is unethical. Conducting research in such a manner may impose more risks than benefits to participants and society, and is unacceptable. A prospective cohort study may not cause significant harm to clients but may be cost-prohibitive and time-consuming (Silman & MacFarlane, 2002). Hence, to work within the limited timeframes of a PhD study, an approach that offers the advantage of reviewing large amounts of data within a reasonably short duration was the most appropriate. For these reasons, a retrospective cohort method was the most practical approach to answering the research question on obstetric outcomes in this study.

A retrospective cohort study design has previously been successfully applied in studies on maternal outcomes by several researchers in similar settings. They include Gumanga et al. (2011), Majoko et al. (2005), and Igberase and Ebeigbe (2007). The study by Majoko et al. (2005), for instance, was carried out in a district in Zimbabwe and used health records of pregnant women to determine the prevalence of antenatal and intra-partum referrals, compliance with advice, and perinatal outcomes among referred pregnant women. The cohort consisted of 10,572 women and spanned a period of three and a half years (January 1995 to June 1998), retrospectively. Given that there is available data on outcomes of

pregnancy in the study area for this PhD study, a retrospective cohort study was feasible and yielded anticipated results.

### **3.3.1.2 Limitations of retrospective cohort studies**

Retrospective cohort studies rely heavily on pre-existing data. Consequently, one of the major challenges of retrospective cohort studies is the lack of researcher control over the quality of existing data. Additionally, data on possible significant or key confounding variables may be unknown (Silman & MacFarlane, 2002). This is because existing data are often gathered for other (usually more general) purposes. Therefore, a relevant cohort with accurate records of variables of interest, dating back several years, cannot always be assured. Nevertheless, this challenge was circumvented in this study because data on maternity referrals and outcomes are systematically collected, particularly in formal healthcare settings in Ghana. Data collected are passed from the community to regional levels, because of the need to measure progress and to support ongoing efforts to reduce maternal deaths. The most challenging area with regard to accuracy and depth of data was related to the method of record-keeping (hard copies) and the fragmented nature of health data for the same patients at different units. The paper-based system meant that it was not possible to capture a woman's data in a single effort and the researcher encountered other problems like missing pages, illegible handwriting and poor documentation practices. Additional efforts were necessary, therefore, to meet the data requirements for this study. Extra efforts included initiating data gathering in one unit and following up to locate and complete forms in another unit. Furthermore, there were slight differences between the various health facilities in the format of data. With regard to confounders, data in all probable relevant variables were collected and strict adherence to well-defined eligibility criteria was ensured to reduce confounding influences.

Another possible challenge in the application of cohort studies is that, for rare conditions, the number of cases captured in a study may be insufficient to yield meaningful results. However, the problem of under investigation does not constitute a rare condition/occurrence in Ghana. Hence, significant information on outcomes of obstetric complications such as maternal deaths and other adverse outcomes was obtained.

### **3.3.2 Survey research**

A survey constituted the second part of this study and this approach was used to gather data on maternity birthing and referral services in the Upper East Region of Ghana. Survey research is a descriptive research method used to obtain information about specific aspects of a given population (Glasow, 2005). This approach is useful because it provides valuable information on respondents' opinions. Surveys allow researchers to count, describe, and quantify characteristics of a group of people, its resources, needs, or opinions (Sapsford, 2006). In this study, the purpose was to assess EmOC interventions in the Upper East Region and to explore maternity care workers' understanding, views and practices around EmOC.

Survey research may be carried out by using the researcher administered technique (Sapsford, 2006). Other techniques used in survey research include content analyses and in-depth interviews (de Vaus, 2002). Regardless of which method is used, it is essential to establish the validity of the tool. Validity denotes the degree to which a test measures what it is meant to measure (Hoskins & Mariano, 2004). Hence, the validity of a study represents how accurate the report or conclusion of a study is, which has implications for the value and usability of research results. Sapsford (2006) argues that validity can be ensured through standardisation in measurement, sampling, and comparison. To achieve this degree of accuracy, various steps must be taken in different stages of the study, including questionnaire design, sampling, data collection and analysis. To allow for valid and reliable comparisons when administering questionnaires, the measure of variables must be equivalent in all instances so that questions are not interpreted differently by different subjects. In addition, it is critical that findings obtained from the variables measured can be generalised to the wider population. Hence, the sample has to be representative of the population, that is, it must have all the important characteristics of the population from which it is drawn (Curtis & Drennan, 2013).

Although questionnaires are commonly used as data collection tools in survey research, other approaches may be employed such as observation and extraction of data from records. Additionally, questionnaires may be self-administered or interviewer-administered (de Vaus, 2002). Interviewer-administered questionnaires were used in this study to

enhance standardisation in measurement. This approach was adopted to avoid differences in the comprehension or interpretation of questions, which in turn may influence responses. It however, has the potential for social desirability bias, where respondents may provide inaccurate answers to questions they perceive as conflicting with existing norms (Gittelman et al., 2015). To minimise this bias, respondents were assured of utmost confidentiality and the value of their contribution was clearly explained to them. Interviewers were trained to employ a non-judgemental and non-confrontational approach to encourage accurate responses.

### **3.3.2.1 Justification for use of survey research**

In survey research, large data sets are often generated. The analysis of survey data broadens the understanding of phenomena by allowing comparison of characteristics and often by drawing of causal inferences (de Vaus, 2002). Additionally, a broad range of data can be obtained, allowing for investigation of multiple aspects of a subject (Kelley, Clark, Brown, & Sitzia, 2003). This function of survey research matches the purpose of this study. Another key advantage of survey research in this study is that it was preceded by the cohort study; hence, it served as a means of incorporating and exploring related variables of interest observed while carrying out fieldwork. By collecting data from a representative sample in the district, it was hoped that valuable information obtained would help to inform obstetric care and policies in future.

### **3.3.2.2 Limitations of surveys**

Survey research has been criticised as lacking in detail and depth on the subject being researched, particularly where closed questions are used, which may affect the validity of the results (Kelley et al., 2003). The questionnaires employed in this study contained a limited number of open-ended questions to capture a broad range of views. The data collection team were well trained to allow sufficient probing for eliciting accurate responses while ensuring consistency in the line of questioning.

Another limitation of surveys is that respondents may not be inclined to provide accurate or honest responses (Gittelman et al., 2015). Inaccurate responses may be given for various reasons; for example, respondents' concerns about providing answers that may project

them in an unfavourable light. Although this is possible, especially in a study involving professionals, its likelihood may be reduced by thoroughly explaining the purpose of the study and how data would be used, assurances of privacy and confidentiality, and assurance that there are no wrong answers to questions.

Finally, it may be difficult to attain a high response rate in surveys (Kelley et al., 2003), particularly if conducting research in settings where respondents are busy or difficult to reach. The maternity care workers who volunteered to take part in this study were asked to schedule a convenient time and place where they were relaxed and unhurried, to facilitate a higher response rate.

### **3.3.3 Training of research assistants**

Research assistants were recruited and trained for each distinct component of the study. The research assistants were mostly recently graduated nurses and nurse trainees who had some data collection experience. The training was facilitated by the student researcher. Training sessions included information about the study, its purpose, research methods including data collection, the sampling process and its importance, the interviewing process, interviewer bias, ethical issues, and best practices for addressing sensitive issues. It was emphasised that the quality of the results depended on good data collection.

Although all data collectors were familiar with the culture and values of the study area, cultural sensitivity was emphasised, as was confidentiality and respect for privacy of participants. After training sessions, the research assistants completed trial data collection sessions and improvements were made to ensure consistency. Upon commencement of fieldwork, samples of completed forms for the cohort study and survey were cross-checked regularly to allow for further clarification as required.

## **3.4 Methods**

### **3.4.1 Demography of study site**

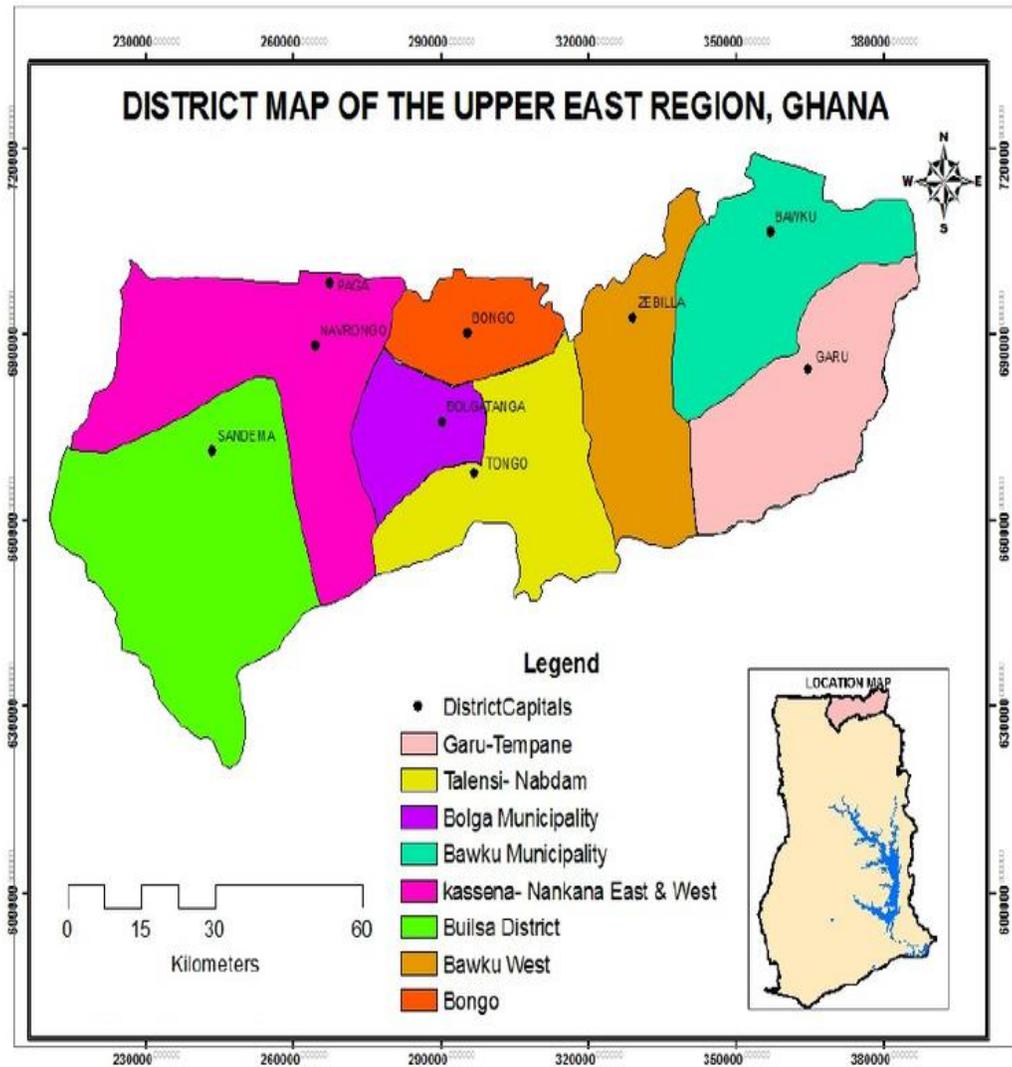
The study was conducted in the Upper East Region of Ghana. The Upper East Region was chosen because it has a high MMR. At 802/100,000 live births, the region's MMR is close to twice that of the national average (485/100,000 live births) (Ghana Statistical Service, 2012). The region is located in the north-eastern part of Ghana and occupies an area of

8,842 square kilometres. It shares two national boundaries with Burkina Faso to the north and the Republic of Togo to the east. It is bordered to the west by Sissala in the Upper West Region and to the south by West Mamprusi in the Northern Region. The proximity to other countries presents challenges for health service delivery in the area, including uncontrolled movement of people across borders. This situation has led to difficulties in disease surveillance and control (Ghana Health Service, 2015c). The region had a population of 1,046,545 and an average household size of 5.8 in the 2010 Population and Housing Census (Ghana Statistical Service, 2012). About 87% of the population lives in rural areas, with a highly-dispersed settlement pattern across 911 communities. The major languages spoken in the region include Gurune, Kusal, Kasem, Buili and Bisa (Ghana Health Service, 2015c). The region's economy is largely dependent on agriculture such as cattle rearing and cultivation of cereals including millet, sorghum, guinea corn and rice. Hence, the major occupations in the region are in the agricultural sector (65.9%). About 44% of the region's population were living below the poverty line in 2013 (Cooke, Hague, & McKay, 2016).

In 2014, 19% of children in Ghana had stunted growth and 11% were underweight. Compared with the rest of the country, the Upper East region is one of two regions where children are most likely to be underweight and have stunted growth. The region had 14.4% of children with stunted growth and 9% of children were underweight in 2014 (Ghana Statistical Service, 2015). In the 10-year period preceding the *Ghana Demographic and Health Survey 2014*, the region had a mortality rate of 72 per 1000 among children under five years, compared to 47 for Greater Accra, the country's capital (Ghana Statistical Service, 2015).

**Figure 3.2: Map of the Upper East Region of Ghana**

Source: Ampofo, Kumi, and Ampadu (2015)



### **3.4.1.1 Healthcare Services Administration**

The Upper East Region is divided into six administrative districts and municipalities with 42 health sub-districts. The region has 297 healthcare facilities; 266 of these facilities are government-owned and are overseen by the Ghana Health Service, 12 are mission health facilities, 18 are private-owned and one is a quasi-government health facility (Ghana Health Service, 2015c). The region has consistently experienced a shortage of health professionals, mainly due to skilled health workers refusing postings to rural and deprived areas (Ghana Health Service, 2009). However, in recent years there has been a 50% increase in the number of nurses, resulting in a ratio of one nurse per 715 persons compared with a national average of one nurse per 1,362 in 2013 (Ministry of Health, 2014). This follows an increase in training of community health nurses and a national policy allowing regions to retain a large proportion of nurses they train (Ministry of Health, 2014). Despite the general increase in nursing staff, the number of midwifery and other skilled maternal health personnel remains inadequate to meet the obstetric care needs of the population (Kyei-Nimakoh et al., 2016). Community awareness of general health risks and endemic diseases within the region is low, leading to delayed and low reporting of diseases. This situation is coupled with adverse sociocultural practices such as encouraging pregnant women to deliver at home or non-acceptance of family planning services as proof of fidelity to one's husband. To help resolve some of the region's health service delivery problems, programmes focusing on community participation have been developed. Communities select their own health agents as volunteers, based on mutually agreed upon eligibility criteria. Volunteers are trained in defined health interventions with technical support from health staff (Ghana Health Service, 2009).

From the nine districts in the Upper East Region, Bolgatanga (Bolga) Municipal, Bawku West district and Builsa North District (Builsa District) were selected for the study. These three districts represent approximately 30% of the total Upper East Region's population. The districts were chosen because the percentage distribution of their rural–urban population would allow comparisons between the different types of locality. In Bolgatanga Municipal, which is the regional capital, there is an almost equal rural–urban population distribution. The Bawku West and Builsa North Districts both have a largely rural

population of 91.9% and 94.6% respectively. In addition, the regional hospital, which is a referral facility, is located in Bolgatanga Municipal. The mix of rural–urban population and presence of health facilities at different referral levels provide valuable information on birth outcomes and referral practices. Another pivotal factor in selecting these districts was the accessibility to relevant data, as discussed under ‘*Research Process*’ below.

### **3.4.2 Stage I: Retrospective cohort study**

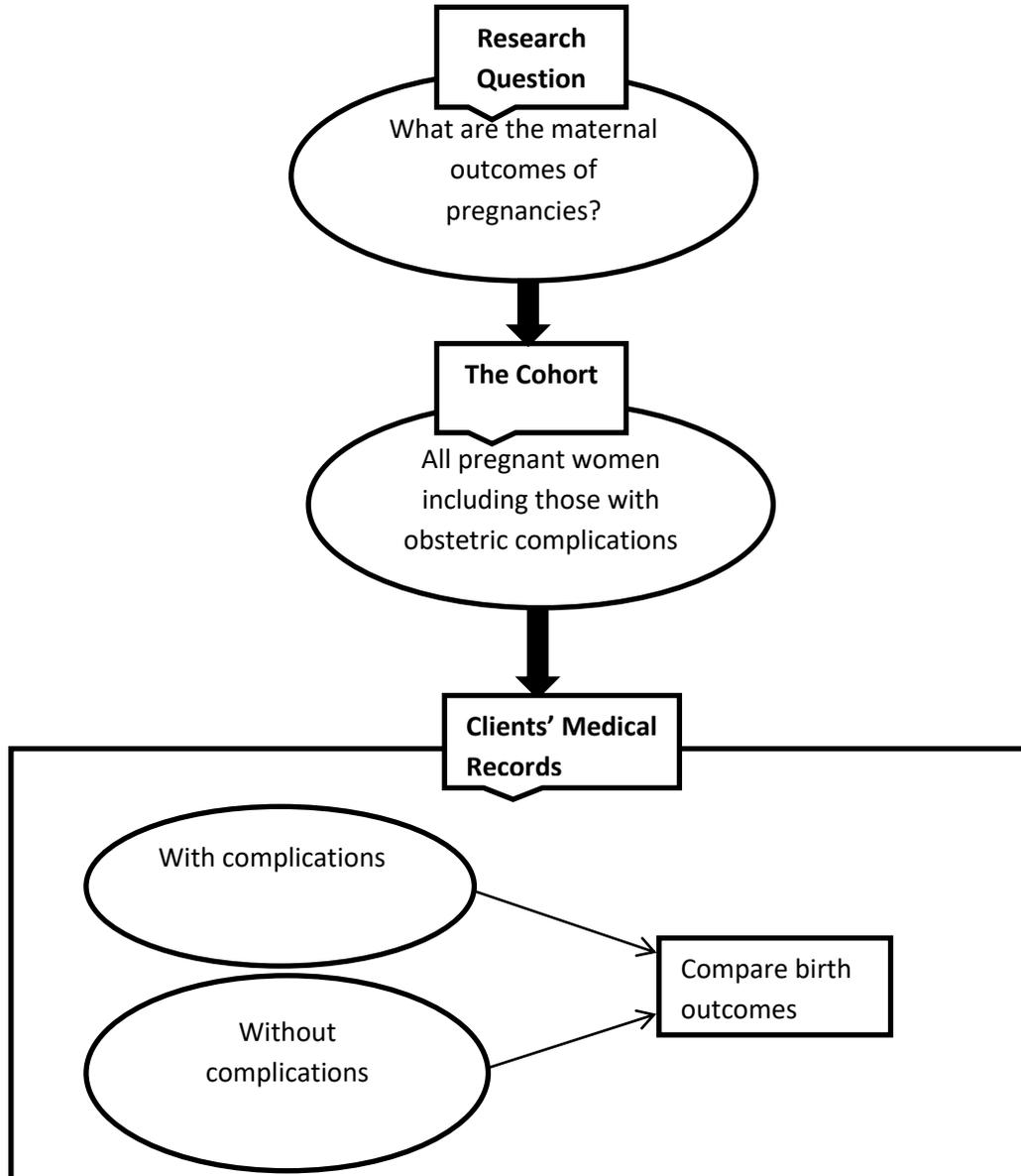
#### **3.4.2.1 Research Process**

This part of the study involved a review of health data to determine obstetric outcomes in the selected districts for 2014. Data reviewed included outcomes for births which occurred in three hospitals: the Regional Hospital in Bolgatanga, Sandema Hospital in Builsa District, and Zebilla Hospital in Bawku West District. Data were collected over a period of six months from 01 February 2015 to 31 July 2015. Data were collected at the antenatal units and tracked to patients’ records at the maternity wards for completion of the data abstraction forms (Appendix VI). Data collected were cross-checked weekly and data entry carried out concurrently. The research process is illustrated in Figure 3.3.

During the planning and implementation of cohort studies, several critical factors need to be borne in mind to ensure that the study reaches valid conclusions. A good study protocol begins with a clear definition of the cohort. It involves the development of eligibility criteria for the recruitment of subjects (Mann, 2012). This means that in a cohort study, the researcher defines the population at risk using inclusion and exclusion criteria based on the outcome of interest. Those who meet the eligibility criteria, therefore, form the sample or cohort. Additionally, in cohort studies, the researcher has to determine the dates of entry into and exit from the study for all subjects (Silman & MacFarlane, 2002). In this study, the cohort consisted of all pregnant women who attended the study facilities (Regional Hospital, Bolgatanga, Zebilla Hospital, and Sandema Hospital) for maternity care in 2014. The exclusion criteria consisted of those with incomplete or unavailable data. A data extraction form was used to guide retrieval of non-identifiable (de-identified) data. Finally, subjects were followed historically to determine their birth outcomes. Comparisons were drawn between those with and those without complications. By applying the

aforementioned measures, an equivalent period of exposure to pre-determined risk factors is ensured for all participants, thus enhancing the validity of the study.

**Figure 3.3: Research process**



Information recorded for each woman included place of residence, place of birthing, age, religion, marital status, gravidity (number of pregnancies), parity (number of births), mode of birth, gestational age at birth, type of complications and treatment (if any), comorbidities and referral details. Based on studies conducted in Ghana, major causes of

obstetric complications include sepsis, hypertensive disorders, severe bleeding, unsafe abortion, obstructed labour and anaemia (Gumanga et al., 2011). Therefore, the focus of this study is the impact of these variables (and any other recorded) on maternal outcomes in the Upper East Region. Perinatal outcomes were also recorded, including birth weight, perinatal complications, and mortality.

### **3.4.3 Stage II: Survey**

This phase of the study was designed to obtain information about maternity services in the Upper-East Region of Ghana from a representative sample of maternity care workers.

#### **3.4.3.1 Research Process**

##### *Development of questionnaires*

Two sets of questionnaires were used in the survey. The first was a health facility information questionnaire (Appendix VII), which was administered to heads or persons in charge of facilities visited. The questionnaire was developed from two documents, *Monitoring Emergency Obstetric Care: a Handbook* (World Health Organization, 2009), and Appendix C of the *2002 Ghana Service Provision Assessment* (Ghana Statistical Service, Health Research Unit, Ministry of Health, & ORC Macro, 2003). It contained 26 closed questions on the nature and types of services provided

The second questionnaire was the service provider questionnaire (Appendix VIII). This was a 54-item questionnaire consisting of 41 closed and 13 open-ended questions. The questionnaire was divided into three sections, A to C. Section A covered questions on respondents' professional background, section B focused on obstetric care/practice, and section C on client referrals. The content of the questionnaire was largely informed by the tool used in the *2002 Ghana Service Provision Assessment Survey* (Ghana Statistical Service et al., 2003). Relevant sections of the tool included questions on existence of functioning systems to support quality services and adherence to standards in maternal healthcare services. The benefit of adopting questions from a pre-existing questionnaire is that it has already been tested and validated and is thus more likely to facilitate obtaining data of high quality (Dowrick, Wootten, Murphy, & Costello, 2015).

### *Pre-testing*

The questionnaires were pre-tested with eight people who were similar in characteristics to the intended subjects. The purpose of pre-testing was to highlight possible problems such as inappropriate questions, or ambiguity of wording, layout, length and adequacy of instructions, before the full-scale survey. It also provides practical ideas about expected response rates and data quality (Silman & MacFarlane, 2002). The questionnaire was subsequently refined according to the findings of the pre-test. For instance, in the health facility information questionnaire, it was necessary to re-order the sequence of some questions to improve the logical flow. Questions 6 and 9 outlined below were interchanged to enhance understanding.

‘6. Does this facility offer normal maternity care services?’

‘9. Routinely, how many days each week is this facility/unit open for maternity care services?’

### *Questionnaire Administration*

Data were collected by the student researcher and trained assistants through interviewer-administered questionnaires. Potential participants were approached at their places of work, through the unit/facility heads. Maternity care workers were recruited into the study after informed consent was gained through a thorough explanation of the purpose of the research. Participation was voluntary. After provision of information about the study to participants, volunteers were required to sign a consent form before proceeding with an interview. Interview sessions were booked at the convenience of respondents and conducted in a private area of the facility or other designated place. The interviews lasted 30–45 minutes.

### **3.4.4 Data analysis**

Data analysis allows researchers to interpret collected data into meaningful and useful information. The data were entered using Epi Info™ 7 (Version 7.1.5). The data were cleaned and screened for errors and then exported to IBM® SPSS® Statistics Version 22.0 for analyses. In cohort studies, persons exposed to specific risk factors are compared with persons not exposed to these factors. The occurrence of diseases or deaths (outcomes of

interest) in the two groups is observed prospectively or retrospectively (Ressing, Blettner, & Klug, 2010). Various measures were used to compare obstetric outcomes. In addition, the impact of specific variables such as maternal age, parity, place of delivery, obstetric complications, on maternal mortality were examined. By providing information on degrees of risks for vulnerable groups, cohort studies analysis offers a means that allows proactive steps to protect affected groups.

Data from the survey were entered into IBM® SPSS® Statistics Version 22.0 and screened for errors and double entry before carrying out analyses. Frequency distributions, means analysis, and cross-tabulations were used to summarise and interpret the data. All data gathered were interpreted and reported in aggregates to maintain anonymity of the study participants

### **3.5 Ethical Considerations**

Ethical clearance was sought from Victoria University, Melbourne, Australia (HRE14-074) and Navrongo Health Research Center, Navrongo, Ghana (NHRCIRB189) before data collection commenced. On receiving ethical approval, the aims of the research and information required were explained to data management officers or other personnel in charge before data were extracted from medical records.

Paid research assistants were involved in data abstraction during Phase I and questionnaire administration in Phase II of the study. Research assistants were health workers with some experience in field research in the region of study, who were familiar with the language, values, culture, codes and standards of research conduct in that setting. They were thoroughly trained on the purpose of the study, ethical codes and data collection techniques by the student researcher. The importance of maintaining confidentiality was particularly emphasised. The research assistants only had limited access to data gathered by them while assisting in the field and not all the dataset was collected at any point in time.

Data collection from medical records was carried out at the maternity care units. The data included only non-identifiable data. Non-identifiable data is data from which identifiers have been permanently removed, such that specific individuals cannot be identified (National Health and Medical Research Council, 2007). For this study, data will be stored

for at least five years after completion of the publications and thereafter be re-evaluated for the need for continued storage.

The purpose, potential risks and benefits, time commitment and the process of data collection for the study were clearly explained to potential participants. Opportunities were granted for questions and clarifications. Contact details of investigators were given to them in case of further concerns. Potential participants were given time to think about the information and make their decision to participate. Only participants who provided a written informed consent were included in the study. Questionnaires were then administered at a time and location convenient to participants. Survey data collected were kept in confidence. Questionnaires were coded and responded to anonymously. The questionnaire codes consisted of alphanumeric figures which helped to identify sources of groups of data such as different types of health facilities, different referral level/facilities, rural or urban centres. This was to enhance meaningful comparison and analyses across different sub-groups while preventing the chances of linking questionnaires to specific respondents. Data were stored and protected as described for the cohort study above.

Dissemination of research outcomes may be in the form of published journal articles, conference presentations as well as organised feedback forums in the communities involved. All participants and maternity units involved were made aware of how the data would be used or published before data collection. Prior agreement on confidentiality and privacy were adhered to at all times. Ethical issues related to data ownership disputes were not envisaged in this study.

### **3.6 Chapter Summary**

Details of the theoretical basis for the study, research design and methods to be used have been presented in this chapter. Main issues highlighted were the theoretical approach which draws on the Framework for Evaluation of Quality Care in Maternity Services by Hulton et al. (2000) and its application to this study. The justification of the study design, its limitation as well as the research processes in the two phases of the study have also been elaborated. Finally, ethical considerations as they relate to this study were discussed.

## **CHAPTER FOUR**

### **OBSTETRIC OUTCOMES**

#### **4.1 Introduction**

This chapter is the first of three results chapters. The findings of the retrospective cohort study (Phase I) are reported in this chapter. The findings of Phase II health facility review and service provision surveys are presented in the subsequent chapters (Five and Six respectively). The cohort study focused on maternal outcomes of parturient women in the Upper East Region of Ghana and the major factors related to adverse outcomes. Data were extracted from a review of obstetric records in three hospitals in this region. A manuscript on obstetric outcomes is included in this chapter and supplementary data analyses relevant to the study, which were not covered in the article, are also presented. A brief discussion of the findings is then provided.

#### **4.2 Manuscript**

The first aim of the study was to determine maternal outcomes for women with obstetric complications in the Upper East Region of Ghana. To address this aim, information about antenatal care attendance, types and rates of obstetric complications and causes of maternal mortality in the region was sought. These findings are presented in the accompanying manuscript *Obstetric outcomes in the Upper East Region of Ghana: a retrospective cohort study*, submitted to *BMC Women's Health* and is currently under review. Major causes of maternal deaths were haemorrhage, hypertension/(pre-)eclampsia and sepsis. Generally, pregnant women initiated antenatal care late, with nearly 50% starting in the second or third trimesters. In addition, about one-quarter did not attend for the recommended number of four visits over the course of their pregnancies. There was a high prevalence of low haemoglobin levels at registration among pregnant women, and low usage of partographs by maternity care workers. In addition, record-keeping problems were prevalent. For instance, because of the high rate of missing data it was not possible to compare haemoglobin levels at initial ANC attendance with similar data at 36 weeks' gestation. These findings suggest a need for further investigations into specific causes of the widespread low haemoglobin levels among pregnant women in the region, and greater attention to health education about nutrition during pregnancy at ANC visits. In addition, it

is important to train maternity care workers in the use and clinical significance of partographs. Other recommendations for the future include greater monitoring of health services, and strengthening of health education to promote increased use of antenatal and other maternity care services.

### ***Abstract***

#### ***Background***

*Although the principal causes of maternal morbidity and mortality are mostly preventable and treatable, women continue to experience significant adverse outcomes, particularly in sub-Saharan Africa. In this study, we assessed the prevalence of adverse obstetric outcomes among pregnant women in the Upper East Region of Ghana.*

#### ***Methods***

*Sociodemographic and clinical data of 3,963 women who gave birth in 2014 in three hospitals were abstracted and reviewed. The data were entered using Epi Info<sup>TM</sup> 7 (Version 7.1.5) and exported to IBM® SPSS® Statistics Version 22.0 for analysis. Descriptive statistical analyses were undertaken.*

#### ***Results***

*There was a total of 30 maternal deaths in the three health facilities during the study period. Principal morbidities included prolonged and obstructed labour, haemorrhage, hypertensive disorders, sickle cell disease and anaemia. These five conditions accounted for more than three-quarters (78%) of morbidities. One-quarter of all pregnant women in the study did not attend the recommended four antenatal care visits. Gaps in the application of partographs and maternal healthcare record-keeping were also identified.*

#### ***Conclusion***

*We concluded that likely improvement in maternal health outcomes can be achieved with consistent monitoring and application of evidence-based national guidelines, such as partograph and good record-keeping. Promotion of antenatal clinic attendance through community awareness is necessary to reduce adverse pregnancy outcomes.*

**Keywords:** *Ghana, emergency obstetric care, maternal morbidity, maternal mortality, obstetric complications, essential obstetric care, maternal outcomes.*

### **Background**

*The maternal and perinatal health status of women is considered a significant health indicator globally, and the maternal mortality ratio (MMR), or number of women who die of pregnancy-related complications, is directly related to health status and provision of health services. MMR varies considerably from approximately 12:100,000 live births in developed countries to as high as 546:100,000 in sub-Saharan African countries (WHO et al., 2015). Such high rates of MMR in developing countries triggered the development of the Millennium Development goals (MDGs) (Ronsmans & Graham, 2006). The maternal health targets for the MDGs were to reduce MMR by 75% between 1990 and 2015 and to achieve universal access to reproductive health. If achieved, global MMR would have declined to 95 per 100,000 live births by 2015 (United Nations, 2015a). Some progress has been made and since 1990, MMR has declined by approximately 45% worldwide, from 380 to 210 per 100,000 live births, representing an average annual MMR reduction of 2.3% by 2013. Although considerable progress was made, a number of countries, including Ghana fell short of their targets (Kenny & Sumner, 2011; WHO et al., 2015). Due to this slow progress, the Sustainable Development Goals (SDGs) were developed by the United Nations in 2015, as a post 2015 development agenda successor to the MDGs. The SDGs are the new set of global goals for achieving shared inter-country aspirations and embody current global targets. Presently, the SDGs targets include attaining a 7.5% annual reduction in MMR between 2016 and 2030, in order to reach a global MMR of 70 per 100 000 live births or less (WHO et al., 2015).*

*In Ghana, where this study was conducted, significant reductions in MMR have been achieved, from 760 to 380 per 100,000 live births between 1990 and 2013. Nonetheless, the country was unable to attain its projected MDG target of 190 per 100,000 live birth by 2015 (National Development Planning Commission and the United Nations Development Programme, 2015). Globally, women's access to and use of high quality reproductive health services is understood to directly influence positive obstetric outcomes. However,*

*MMR remains high even among women accessing skilled maternity care. Institutional maternal mortality ratio (iMMR) or MMR in health facilities (hospitals, clinics) is also high, and in Ghana iMMR ranged from 105 to 185 per 100, 000 live births with a national average of 144, in 2014. The highest iMMR, 185 per 100, 000 live births, was recorded in the Greater Accra Region (Ghana's capital city) while the Upper East Region recorded 139 in 2014 (Ministry of Health, 2015). The persistently high iMMR may be suggestive of service inadequacies or other factors such as a greater prevalence of high-risk pregnancies in health facilities. In a Nigerian study by Fawole et al. (2012), women requiring emergency caesarean surgeries, grand multiparous<sup>5</sup> women, and those with a high level of obstetric risk, were predictive of maternal death and were more likely to be seen at secondary and tertiary health facilities. In addition to identified risk factors, a shortage of anaesthetists was independently predictive of maternal death.*

*In the 5 years preceding a 2014 national survey, 97% of women in Ghana received antenatal care from a skilled provider and 87% attended the recommended 4 or more antenatal care visits (Ghana Statistical Service, 2015). It is especially important to understand why skilled care during pregnancy and birth has made so little difference in reducing mortality rates in health facilities. Ghana continues to invest in health institution-based birthing services and it is important to ensure that services meet the needs of the women who seek care.*

*MMR is the most commonly reported adverse maternal health outcome; however, several other obstetric complications severely impact on women's lives, causing short-term (haemorrhage, obstructed labour, postpartum sepsis, complications of abortion, pre-eclampsia/eclampsia, ectopic pregnancy, and ruptured uterus) and long-term (fistula, uterine prolapse, and dyspareunia) morbidity (Koblinsky, Chowdhury, Moran, & Ronsmans, 2012). For every maternal death, there are approximately 30 more cases of severe maternal morbidity (Prual, Bouvier-Colle, Bernis, & Breart, 2000). Additionally, maternal morbidity is a precursor to maternal death. Therefore, assessment of the*

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<sup>5</sup> Grandmultiparous denotes to a woman who has had as five or more previous births at a gestation of 20 or more weeks (Humphrey, 2003).

*determinants of adverse maternal health outcomes could inform policy decisions that guide health planning and to help reach SDG targets. For all these reasons, the objective of this cohort study was to determine the prevalence of adverse obstetric outcomes among pregnant women in the Upper East Region of Ghana.*

## **Methods**

### *Study design*

*A retrospective cohort study was conducted to collect data on pregnant women who attended antenatal clinics (ANC) or gave birth in selected health facilities.*

### *Study area*

*The Upper East Region is located in the north-eastern part of Ghana. The region has 7 hospitals; 6 district hospitals and 1 regional hospital (Awoonor-Williams et al., 2015). It has a population of over one million, with a predominantly rural population (79%) (Ghana Statistical Service, 2012), and nearly half (44%) of the population are classified as poor (Service, 2014). The region was selected because it has been a beneficiary of several healthcare initiatives such as the Community-based Health Planning and Services (Awoonor-Williams, Bawah, et al., 2013; Nyonator, Awoonor-Williams, Phillips, Jones, & Miller, 2005); Mobile Technology for Community Health project (2012), and the Ghana Essential Health Intervention Project (Awoonor-Williams, Bawah, et al., 2013), all of which were aimed at improving maternal health outcomes. We used the 2014 data on routinely collected clinical care information from antenatal and labour ward registers in three hospitals: The Regional Hospital, Bolgatanga, and two district hospitals — Sandema Hospital, and Zebilla Hospital. The Regional Hospital has a maternity bed capacity of 64 and serves as the referral hospital for the Upper East Region with a catchment area population of about 1,097,691. Sandema Hospital serves a population of approximately 59,237 and has a 17-bed maternity unit. Zebilla Hospital is a district hospital serving a population of about 98,630, with a 16-bed maternity ward. These hospitals were selected as they vary by geography and the type of population they serve. The Upper-East Region has an urban population of 21%, compared to similar regions classified as poor such as the Upper West Region (16%) and the Northern Region (30%) (Ghana Statistical Service, 2012). The selected facilities are located in the western, central and eastern parts of the*

*Upper East Region. Additionally, the regional hospital has a largely urban population and the two district hospitals mainly serve rural populations, thus allowing representative inclusion of a cross-section of women in the region.*

#### *Data collection*

*Fieldwork for the study took place between March and July 2015. A data abstraction form was designed using information from the antenatal and labour ward registers. The form included information on place of residence, antenatal care visits, place of birthing, age, marital status, number of pregnancies, number of births, mode of birth, type of complications and treatment (if any), and referral details.*

*The primary outcome measures were:*

- 1) Types and rates of obstetric complications in the region.*
- 2) Factors associated with maternal ill-health and mortality in the region.*

*Initial data was abstracted from antenatal unit registers. Then, patients' registration numbers were used to trace records in the labour unit registers and data related to labour and birth was extracted. Data abstraction forms were checked regularly for completeness and accuracy by the principal investigator.*

#### *Data analyses*

*Data were entered and cleaned using Epi Info<sup>TM</sup> 7 (Version 7.1.5) and exported to IBM® SPSS® Statistics Version 22.0 for analysis. Descriptive statistics such as median, mean, and proportions were used to describe the general characteristics of the cohort. Mortality and prevalence rates of obstetric complications were compared across different health facilities.*

#### *Ethics approval*

*The study was approved by the institutional review boards of Victoria University, Melbourne, Australia (HRE14-074) and the Navrongo Health Research Center, Navrongo, Ghana (NHRCIRB189). Permission was obtained from the heads of each health facility prior to data collection. No patient identifiers were used in the analyses and reporting of the study.*

## Results

Data were retrieved from the records of 3,963 women. It is important to note, however, that due to missing data the total sample (*n*) may vary at different data points.

### Sample characteristics

The mean age of women in the cohort was 26 years at the index birth (SD: 6.5). Women aged between 20 and 29 years represented over half (53%) the sample. Over a third of the cohort (35%) were pregnant for the first time and a similar proportion (36%) had between 2 and 4 previous births. About half the women attended an antenatal clinic during the first trimester and another 43% did so in the second trimester. About 75% attended antenatal clinic more than 4 times throughout their pregnancy (4 is the recommended minimum number of ANC attendances, commencing in the first trimester) (Lincetto, Mothebesoane-Anoh, Gomez, & Munjanja, 2006). However, just over half of the women commenced in the first trimester (Table 1).

Table 1: Maternal characteristics

<b>Variable</b>	<b><i>n</i></b>	<b><i>Per cent</i></b>
<i>Maternal age (years) at the index birth</i>		
<i>&lt;/= 19</i>	414	15.9
<i>20 – 29</i>	1,398	53.7
<i>30 – 39</i>	705	27.1
<i>&gt;/= 40</i>	84	3.2
<i>Obstetric history</i>		
<i>Nullipara (no previous birth)</i>	1,336	34.8
<i>Primipara (1 previous birth)</i>	909	23.7
<i>Multipara (2 – 4 previous births)</i>	1,395	36.3
<i>Grand multipara (5 – 7 previous births)</i>	192	5.0
<i>Great-grand multipara (&gt;7 previous births)</i>	10	0.3
<i>Trimester at 1<sup>st</sup> antenatal clinic attendance</i>		
<i>1<sup>st</sup> trimester</i>	886	50.5
<i>2<sup>nd</sup> trimester</i>	760	43.3
<i>3<sup>rd</sup> trimester</i>	108	6.2
<i>Antenatal clinic visits</i>		
<i>&lt;4</i>	597	25.0
<i>&gt;/=4</i>	1,800	75.0

<i>Haemoglobin level at 1<sup>st</sup> antenatal clinic registration</i>		
< 8.0 g/dl	40	2.4
8 – 10.8 g/dl	919	55.0
≥10.9 g/dl	1,670	42.6
<i>Mode of birth</i>		
Spontaneous vaginal delivery	2,143	82.1
Caesarean section	411	15.6
Vacuum	56	2.1

Among those tested at 1<sup>st</sup> antenatal clinic attendance, more than 57% had low haemoglobin levels of under 10.9 g/dl (Normal range: 12.1 – 15.1g/dl). The majority of the cohort had a spontaneous vaginal delivery and nearly 16% underwent a caesarean section due to conditions such as breech presentation, prolonged labour, pregnancy induced hypertension and post-maturity.

#### *Pregnancy Outcomes*

Table 2 shows the causes of maternal morbidity and mortality.

**Table 2: Pregnancy outcomes**

<i>Maternal conditions</i>	<i>n</i>	<i>Per cent</i>
<i>Pregnancy-related conditions</i>		
Hypertensive disorders	125	16.0
Postpartum haemorrhage	71	9.1
Antepartum haemorrhage	46	5.9
Sepsis/puerperal infection	6	0.8
Retained placenta	22	2.8
Prolonged and obstructed labour	189	24.2
Cephalopelvic disproportion	43	5.5
Other	10	1.3
<i>Non-pregnancy related conditions</i>		
Malaria	30	3.8
Sickle cell disease	104	13.3
Urinary tract infection	6	0.8
Hepatitis B infection	13	1.7
Anaemia	91	11.7
Other	25	3.2

<b>Maternal mortality</b>		
<i>Regional Hospital</i>	18	60.0
<i>Zebilla Hospital</i>	7	23.3
<i>Sandema Hospital</i>	5	16.7
<i>Total</i>	30	100.00
<b>Maternal deaths by age (years)</b>		
<i>&lt;/= 19</i>	6	20.0
<i>20 – 29</i>	13	43.3
<i>30 – 39</i>	9	30.0
<i>&gt;/= 40</i>	1	3.3
<i>Missing</i>	1	3.3
<i>Total</i>	30	100.00
<b>Causes of maternal deaths</b>		
<i>Antepartum and postpartum haemorrhage</i>	9	28.1
<i>Sepsis</i>	5	15.6
<i>Hypertension/(pre-)eclampsia</i>	9	28.1
<i>Unsafe abortion</i>	2	6.3
<i>Other</i>	4	12.5
<i>Unknown</i>	3	9.4
<i>Total</i>	32*	100.00

*\*n is higher than total number of deaths due to existing co-morbidities for some patients*

Overall, out of 2, 610 women who gave birth in the 3 hospitals, there were approximately 781 cases (30%) of maternal morbidities, and 30 maternal deaths. Major causes of obstetric deaths were hypertension/(pre-)eclampsia, haemorrhage, and sepsis, which represented approximately 70% of the deaths. Nearly two-thirds (60%) of maternal deaths occurred in the Regional Hospital (Table 2). Over two-thirds (73%) of women who died attended ANC while pregnant, with about 55% fulfilling the recommended 4 visits. Ninety per cent (n=27) of the deaths occurred in hospitals, 6.7% (n=2) in a health centre/clinic, and 3.3% (n=1) at an unknown location. Eighty-three per cent of the women who died gave birth in a hospital and only 3.3% (1) gave birth at home. Major causes of obstetric complications were prolonged and obstructed labour (24.2%), hypertensive disorders (including eclampsia/pre-eclampsia) (16%), postpartum haemorrhage (9%), antepartum haemorrhage (5.9%) anaemia (11.7%), sickle cell disease (13.3%), and malaria (3.8%). Nearly all women with low haemoglobin levels presenting at labour wards were treated

*with iron medications or blood transfusion. Overall, over two-thirds (70%) of births were monitored using a partograph.*

### ***Discussion***

*The major findings of our study include late initiation of ANC by attendees, as well as failure to attend for the recommended number of ANC visits and across all trimesters, a high prevalence of low haemoglobin levels among pregnant women, low usage of partographs by maternity care workers and poor documentation.*

*The mean age for women in the cohort was 26 years. Approximately 16% were under 20 years old and 60% had 1 - 4 births. This is consistent with recent demographic data from Ghana which shows a decline in fertility rates among women under 20 years but higher fertility rates particularly among 25 – 29-year-olds. Currently, the average number of children per woman in Ghana is 4.1 but it is higher at 5.7 in the Upper East Region (Ghana Statistical Service, 2015).*

*The primary purpose of ANC include early identification and management of pregnancy-related complications as well as prevention of mother-to-child-transmission of HIV/AIDS (UNICEF, UNFPA, WHO, & the World Bank, 2010). Hence, to ensure its effectiveness, guidelines for ANC are evidence-based, and targeted at major contributors to perinatal morbidity and mortality, including interventions such as screening and early detection of anaemia, hypertensive disorders, bleeding, malpresentation of the foetus; counselling on danger signs and emergency preparedness; and intermittent preventive treatment of malaria and (Pell, Meñaca, Were, et al., 2013). Nearly half of the pregnant women in the current study only initiated ANC attendance in the second and third trimesters despite recommendations by the WHO (Lincetto et al., 2006) to do so as early as possible, in the first trimester. Additionally, about 25% of women did not achieve the recommended number of four attendances during pregnancy, which is significantly higher than the national average of about 13% reported in the Ghana Demographic and Health Survey 2014 (Ghana Statistical Service, 2015). This situation of ANC non-attendance or poor attendance has dire implications for morbidity and mortality as pregnant women may miss out on the important evidence-based components of ANC related to the prevention, early*

*detection, treatment and monitoring of obstetric conditions. Studies have shown that the timing of ANC interventions contributes significantly to reducing the risk of experiencing specific adverse maternal health outcomes (Asundep et al., 2014). Health conditions which are most amenable to treatment are those that can be detected early and also have effective interventions. These conditions include malaria, HIV, and pre-eclampsia/eclampsia (Oyerinde, 2013). In addition, ANC attendees are more likely to give birth in a health facility (Anastasi et al., 2015) as attendance presents an opportunity for maternity care workers to encourage pregnant women to utilise skilled birthing services, a key strategy for reducing maternal mortality (Ghana Statistical Service, 2015).*

*The leading causes of morbidity in this study were prolonged and obstructed labour, hypertensive disorders, haemorrhage, sickle cell disease and anaemia. Overall, prolonged and obstructed labour, hypertensive disorders and haemorrhage, accounted for over 80% of pregnancy-related morbidities. Similarly, sickle cell disease, anaemia and malaria constituted more than 80% of non-pregnancy-related morbidities. The major maternal complications leading to death identified are consistent with those reported in similar studies. The causes include eclampsia/pre-eclampsia, postpartum haemorrhage, and anaemia (Asamoah et al., 2011; Der et al., 2013). Given that these conditions and their associated ANC interventions are well-documented, it is unclear why so many women in this study did not initiate ANC early or failed to achieve the minimum number of recommended ANC visits.*

*Women aged between 20 and 29 years, which is the age range with the highest number of births, were at higher risk of death than any other age group. This finding is consistent with a study based on the Ghana Maternal Health Survey 2007 by Asamoah et al. (Asamoah et al., 2011). Generally, it is recommended that caesarean section rates should not exceed 10-15% at the population level (World Health Organization, 2009). The caesarean section rate in the present study was at 15.6% compared to a national rate of 13% (Ghana Statistical Service, 2015). The relatively higher rate found may be attributable to the fact that selected hospitals receive referrals from lower-level health facilities within the Upper East Region.*

*Evidence indicates that anaemia, particularly severe anaemia (Hb < 8.0 g/dl), is associated with poor maternal and foetal outcomes (Geelhoed et al., 2006; Kavle et al., 2008). More than 1 in 2 women presented with low haemoglobin levels at their first ANC visit in the current study. It is unclear, however, if these pregnant women received iron supplementation as this information was not recorded in the ANC registers which were the source of data for this study. Regardless, the prevalence of low haemoglobin is of concern and is higher than the 45% prevalence rate of anaemia among pregnant women reported in the Ghana Demographic and Health Survey 2014 (Ghana Statistical Service, 2015). In Ghana, Helminthiasis (intestinal parasites) and malaria in pregnancy are major contributors to the prevalence of low haemoglobin levels (Ghana Statistical Service, 2015). Interventions are in place, however, for identification and treatment of these conditions at ANC, underscoring the importance of ANC attendance.*

*Partographs are graphical tools used in monitoring key observations during labour. They provide early warning/alerts which assist in clinical decisions regarding interventions, referral and ongoing evaluation of patients. Even though partograph use is generally recommended by the WHO (World Health Organization, 1994a), evidence supporting its value in improving obstetric outcomes is mixed (Lavender, Hart, & Smyth, 2012). There is, however, a suggestion that it could be a valuable tool in resource-poor settings such as Africa (Lavender et al., 2012) by facilitating the early identification of, and intervention of complications, when properly applied (Gans-Lartey et al., 2013). Despite the promotion of partograph use in Ghana, just over two-thirds of births were monitored using the tool in the current study, which is in line with previous research (Duysburgh, Williams, Williams, Loukanova, & Temmerman, 2014; Nesbitt et al., 2013; Opoku & Nguah, 2015). A recent study in the Upper East Region reported that most midwives had not received training on the modified WHO partograph currently in use by the Ghana Health Service (Awoonor-Williams et al., 2015) and in spite of training provided to midwives as part of that study, there was no significant change in utilisation of the tool or its correct application (Awoonor-Williams et al., 2015). This finding indicates a need for an examination of the training methodology in order to identify approaches that are more results-oriented. In addition, it may be necessary to implement training programmes tailored to the scopes of*

*practice and needs of the different categories of maternity care providers (midwives and community health nurses). Supervisory visits and on-the-job peer-support sessions after training programmes may also help to promote adherence to relevant guidelines/procedures.*

*An important limitation of this study is that due to missing data and poor record keeping practices in some instances, not all data entry forms were fully completed. Second, patient history and other clinical data are collected on paper forms/folders or in registers at the health facility level. The non-use of electronic clinical record-keeping systems at the health practitioner's level has resulted in fragmentation of data in the form of hardcopies at different units/departments. The existing record-keeping system does not adequately support clinical decision-making and continuity of care. Furthermore, it makes it more difficult to access and analyse morbidity and other data, and increases waiting time for clients due to associated challenges with retrieval processes (Teviu et al., 2012). Consequently, the data collection process may have been more susceptible to errors as records had to be tracked at various units and linked to obtain a more complete obstetric data. In order to enhance accuracy, records were located and matched using patient names and their unique reference numbers. Identifying information were however not abstracted as part of the review data.*

### **Conclusion**

*The causes of maternal morbidity and mortality found in this study are supported by the wider literature. Factors relating to poor ANC attendance, inconsistent partograph use, and poor record keeping need to be prioritised and addressed. The availability of national guidelines alone does not ensure that appropriate processes and procedures are applied; hence, it is essential to ensure regular and consistent monitoring to identify training and other needs for health planning. Given that poor ANC attendance often results from service-related and individual/household-level influences, promotion of ANC attendance through community awareness is necessary to reduce adverse pregnancy outcomes. Community-based strategies that are culturally appropriate and enhance a sense of partnership are likely to foster greater participation in ANC and other healthcare programmes.*

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### **4.3 Additional findings**

In this section, additional findings relating to obstetric referrals are presented. Data on birth outcomes for infants in the cohort are also presented. These findings include obstetric complications which gave rise to referral of pregnant women, infant birth weight, Apgar scores, gestational age and infant status at birth and at discharge.

#### **4.3.1 Reasons for obstetric referrals**

In total, records in the data set showed that 687 pregnant women were referred for advanced care for a variety of reasons. The chief reason for an obstetric referral to health facilities was prolonged labour (reported as prolonged first or second stage of labour) (42%, n = 204). Other obstetric conditions that gave rise to referrals included malpresentation of foetus<sup>6</sup> (6.8%, n = 47), pregnancy-induced hypertension/eclampsia (11.2%, n = 77) and severe anaemia (6%, n = 41), a history of previous caesarean section (5.7%, n = 39), post-term pregnancy (7.8% = 54), poor obstetric history (12.1%, n = 83) and other conditions (20.7%, n = 142). In isolated cases, pregnant women were referred from lower level health facilities because of lack of availability of a skilled health professional such as a midwife, obstetrician or anaesthetist.

#### **Malaria treatment**

The World Health Organization recommends that all pregnant women receive a prophylactic dose of anti-malaria medication [sulfadoxine pyrimethamine (IPTp-SP)] at each scheduled ANC visit in the second and third trimesters. If administered correctly, most women will receive at least three doses of the medication (WHO, 2014). Intermittent Preventive Treatment in pregnancy (IPTp) using sulfadoxine pyrimethamine (IPTp-SP) is recommended for African countries where malaria is endemic (WHO, 2014). When adhered to, IPTp-SP has been found to be effective as malarial prophylaxis in pregnancy (Aduloju, 2013). There was a low uptake of IPTp-SP in the current study. Among those

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<sup>6</sup> Abnormal position or presentation of the foetus that may complicate the labour by causing prolonged or obstructed labour.

who received IPTp-SP, more than one-third received it only once, about 29% received it twice and another 29% received it three times.

**Table 4.1: Adherence to IPTp-SP**

Number of times IPTp received	n	%
1	332	37.6
2	258	29.2
3	257	29.1
4	26	2.9
5	11	1.2
Total	884	100.0

#### 4.3.2 Neonatal outcomes

Most of the births were singletons (96.7%) and more than half of all births in the cohort were males. Most infants had a birth weight of 2.5kg or more (87%). Approximately 6% were born beyond the gestational age of 40 weeks (n = 133), 69% (n = 1,656) were born between 37 and 40 weeks, and about 22% (n = 521) were born between 33 and 36 weeks. Nearly 2% (n = 52) of infants were stillborn and a total of 2.5% (n = 65) had died at the time of discharge (Table 4.2).

**Table 4.2: Neonatal outcomes**

Variable	n	%
Outcome of births		
Single	2,525	96.7
Twins	84	3.2
Triplets	2	0.08
Sex		
Female	1,311	48.8
Male	1,376	51.2
Birth weight		
< 2.5 kg	339	12.7
>= 2.5 kg	2,324	87.3

Gestational age at birth (weeks)		
<24	7	0.3
24 – 27	18	0.8
28 – 32	59	2.5
33 – 36	521	21.8
37 – 40	1,656	69.2
41 – 44	133	5.6
Infant status at birth		
Live birth	2,576	98.0
Fresh stillbirth	30	1.1
Macerated stillbirth	22	0.8
Infant status at discharge		
Alive	2,538	97.5
Dead	65	2.5

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#### 4.3.2.1 Apgar scores

The Apgar score is an assessment tool for evaluating the physical condition of newborns after birth (Li et al. 2013). The tool has five components: heart rate, respiratory effort, muscle tone, reflex irritability and colour. Each component is assigned a score of 0 to 2, and the total score determines the need for neonatal resuscitation interventions (Casey et al. 2001). The Apgar score is taken at one and five minutes of life, with the latter being a better indicator of infant physical health (Razaz et al. 2016). An Apgar score of 7 or more is indicative of good to excellent physical health of the baby (Casey et al. 2001); scores ranging from 4 to 6 are indicative of fair health; scores of 3 or less are indicative of poor health (American College of Obstetrics and Gynecology, 2014). Just over 2% of infants in this study had Apgar scores of zero at one and five minutes. Overall, the Apgar scores of infants improved between the first and fifth minutes of life. At one minute, 1.5% (n = 39) of infants had Apgar scores in the range of 1 to 3; at five minutes, only 0.4% (n = 10) of infants fell within this range. In contrast, about 87% (n = 2,313) of Apgar scores were 7 or greater at one minute, and approximately 95% (n = 2,504) at five minutes (Table 4.3).

**Table 4.3: Apgar scores at one and five minutes**

<b>Score (/10)</b>	<b>n (one minute)</b>	<b>%</b>
0	60	2.3
1 – 3	39	1.5
4 – 6	247	9.3
≥7	2,313	86.9
<b>Score (/10) n (five minutes) %</b>		
0	57	2.3
1 – 3	10	0.4
4 – 6	65	2.5
≥7	2,504	95.0

**4.3.2.2 Infant survival by gestational age at birth and at discharge**

The highest survival rate was for infants in the gestational age group of 37 to 40 weeks. Data were available on the gestational ages for 46 infant deaths at birth; 26 were fresh stillbirths<sup>7</sup> and 20 were macerated stillbirths<sup>8</sup>. Fresh stillbirth rates were highest among infants born before 28 weeks of gestation. All macerated stillbirths occurred at 28 weeks or beyond, with the highest number occurring between 28 and 32 weeks of gestation (Table 4.4).

**Table 4.4 Gestational age by infant status at birth**

<b>Gestational age (weeks)</b>	<b>Number of infants</b>	<b>Alive</b>		<b>Fresh stillbirth</b>		<b>Macerated stillbirth</b>	
		<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
<24	7	6	85.7	1	14.3	0	0.0
24 – 27	17	14	82.4	3	17.6	0	0.0
28 – 32	54	49	90.7	1	1.9	4	7.4
33 – 36	515	501	97.3	9	1.7	5	1.0
37 – 40	1,622	1,602	98.8	11	0.7	9	0.6
>40	129	126	97.7	1	0.8	2	1.6

Generally, babies were more likely to survive as their gestational age increased. Among infants born before the gestational age of 24 weeks (n = 6), most were alive when their mothers were discharged (n = 5, 83.3%). Among those born at 37 weeks and beyond (n =

<sup>7</sup> Foetal death occurring just prior to or during labour and delivery (intrapartum).

<sup>8</sup> Foetal death occurring in the antepartum period at least 12 hours prior to birth.

1,754), only a small proportion (n = 26, 1.5%) had died by discharge. In comparison, babies born at the gestational ages of 24 and 27 weeks were the least likely to survive and those born at 37 weeks or beyond were most likely to survive (Table 4.5).

**Table 4.5: Distribution of alive and dead infants at discharge by gestational age**

Gestational age (weeks)	Number of infants	Alive		Dead	
		n	%	n	%
<24	6	5	83.3	1	16.7
24 – 27	22	14	63.6	8	36.4
28 – 32	58	54	93.1	4	6.9
33 – 36	510	494	96.9	16	3.1
37 – 40	1,626	1,603	98.6	23	1.4
>40	128	125	97.7	3	2.7

#### 4.3.2.3 Complications associated with foetal deaths at birth

There were 37 foetal deaths for which data was available on the associated maternal or foetal conditions. Approximately 23% (n = 6) of fresh stillbirths were associated with obstructed and prolonged labour, about 19% (n = 5) with severe malaria and 11.5% (n = 3) with antepartum haemorrhage. Most (n = 8, 73.7%) macerated stillbirths were recorded as intrauterine foetal deaths (Table 4.6). Nearly 8% of stillbirths were twins.

**Table 4.6 Foetal deaths at birth**

Complication	Fresh stillbirths		Macerated stillbirths	
	n	%	n	%
Postpartum haemorrhage	1	3.8	1	9.1
Eclampsia	1	3.8	1	9.1
Severe anaemia	2	7.7	1	9.1
Puerperal sepsis	1	3.8	0	0.0
Obstructed and prolonged 2 <sup>nd</sup> stage of labour	6	23.1	0	0.0
Antepartum haemorrhage	3	11.5	0	0.0
Severe malaria	5	19.2	0	0.0
Inevitable abortion	2	7.7	0	0.0
Cephalopelvic disproportion <sup>9</sup>	1	3.8	0	0.0

<sup>9</sup> Cephalopelvic disproportion refers to an obstetric complication in which the baby's head or body does not fit through the mother's pelvis, due to a mismatch between the size of the baby's body and the pelvis.

Intrauterine foetal death	0	0.0	8	73.7
Preterm birth	2	7.7	0	0.0
Cord prolapse	2	7.7	0	0.0
Total	26	100.0	11	100.0

## 4.4 Chapter discussion

### 4.4.1 Obstetric referrals

The study confirmed that prolonged labour, malpresentation of foetus, and pregnancy-induced hypertension/eclampsia and anaemia are common causes of obstetric complications. Prolonged labour may increase risks of foetal distress, maternal injury, haemorrhage and infection. Not surprisingly, these conditions were among the major causes of maternal deaths reported in the region.

### 4.4.2 Neonatal outcomes

The data show that there were 2,611 births, with 84 sets of twins and 2 sets of triplets. These figures give the incidence of twins and triplets as approximately 1 in 32 and 1 in 1,306 respectively. In this study, the incidence of twin births was slightly higher than that reported in a similar study in Nigeria (1:29.6) (Obiechina, Okolie, Eleje, Okechukwu, & Anemeje, 2011). In parts of central, western and eastern Africa, Monden and Smits (2017) reported twinning rates of 18 per 1,000, which were considerably higher than those reported for East Asia and Latin America (6 to 9 per 1,000); and for Europe, North America and the Middle East (9 to 16 per 1000).

The stillbirth rate was 20.2 deaths per 1,000 births. Based on the number of infant deaths at the time of discharge, the infant mortality rate was 25.6 per 1,000 live births. The stillbirth rate was comparable to the 23 deaths per 1,000 reported in a study by Engmann et al. (2012) in the same region in Ghana. Their study spanned a 7-year period and they reported a perinatal mortality rate of 39 deaths per 1,000. Comparatively, more babies survived with increasing gestational age and an increasing number died as gestational age decreased.

As expected, there was a general improvement in Apgar scores by five minutes relative to scores obtained at one minute. This improvement may indicate substantial neonatal resuscitation and infant care provided to babies requiring such care. A low Apgar score at 5

minutes (particularly a score of 1 – 3) is associated with a heightened risk of infant death (Iliodromiti, Mackay, Smith, Pell, & Nelson, 2014). Overall, intrauterine foetal deaths, obstructed labour, severe malaria, and antepartum haemorrhage were important conditions associated with foetal deaths at birth. These conditions are treatable if identified early and managed in well-resourced health facilities.

Malaria in pregnancy is particularly significant because, in addition to being preventable, policy guidelines are available in Ghana for implementation by maternal health staff. IPTp-SP is given as a directly observed treatment protocol in Ghana (Pell, Meñaca, Afrah, et al., 2013). In other words, pregnant women are required to take the medication in the presence of health staff during ANC visits and for a minimum of three recommended doses. Overall, only about 4% of those who received IPTp-SP achieved four doses, with about 29% receiving three doses. Studies have shown that uptake of IPTp-SP often does not correspond with higher ANC attendance. Low uptake in Ghana has been attributed to problems such as poor knowledge of IPTp among women, previous experiences of side-effects, non-availability of water at consulting rooms, and misinterpretation of the national malaria policy by health staff (Pell, Meñaca, Afrah, et al., 2013). Similar factors such as unclear policy on IPTp-SP, poor knowledge on timing and dose of IPTp-SP, stock shortages, and poor ANC attendance were reported in a systematic review (Hill et al., 2013). The low adherence to recommendations may partly explain why malaria (and anaemia) accounted for a significant amount of morbidity among pregnant women in the current study. Directly addressing pregnant women's concerns regarding IPTp-SP and additional training for health professionals on the treatment protocol may help increase adherence to this vital evidence-based intervention. In addition, ANCs may enhance health literacy among pregnant women, which could in turn facilitate self-identification of common obstetric risks and improve health-seeking behaviours.

#### **4.5 Chapter summary**

In this chapter, the results of the cohort study were presented together with a scientific journal article. Notably, poor ANC attendance, low uptake of malarial prophylaxis, a high incidence of low haemoglobin levels among pregnant women and poor partograph use were identified. Additionally, the conditions associated with both maternal and infant

deaths are mostly preventable and treatable. Hence, increased efforts at key points throughout pregnancy, labour and the postpartum period could help reduce adverse outcomes.

## CHAPTER FIVE

### EMERGENCY OBSTETRIC CARE INTERVENTIONS

#### 5.1 Introduction

Current evidence supports the provision of timely access to emergency obstetric care to help reduce adverse maternal and perinatal health outcomes. In this chapter, the survey evaluating EmOC services in the Upper East Region of Ghana is presented. A total of 120 health facilities were surveyed to determine the availability of key obstetric care services and their capacity to adequately respond to obstetric complications. The results provide some insight into the prevailing circumstances in health facilities.

A manuscript titled: *Review of emergency obstetric care interventions in health facilities in the Upper East Region of Ghana: a questionnaire survey*, submitted to in *BMC Health Services Research*, is presented. Along with the publication, a brief summary of the findings is provided.

#### 5.2 Manuscript

The review of emergency obstetric care interventions revealed inadequacies in three important areas of the obstetric care systems: low availability of basic and comprehensive EmOC facilities, human resource shortages and poor referral processes.

Most public health facilities surveyed did not meet basic and comprehensive EmOC criteria. Only 20% of facilities met the criteria for basic and comprehensive EmOC, with three of the districts having no basic or comprehensive EmOC facility. A further 31% of health facilities did not meet basic EmOC criteria because they did not provide one or two EmOC interventions. Approximately two-thirds of facilities that met the criteria for comprehensive EmOC were hospitals and most facilities with basic EmOC facilities were clinics/health centres. Recommendations in the paper included the need to upgrade the already available CHPS facilities to provide at least basic EmOC. Upgrading is a good way to service community needs because CHPs are the most common type of health facilities in the region and are also more dispersed throughout the communities.

Although most respondents in this study reported that trained personnel were always present in their health facilities, overall, 8% did not have a person with midwifery skills present on a 24-hour basis and 19% had a non-midwife present. Similarly, over one-third of facilities reported that the skill-mix in their units was inappropriate for the types of caseload they received, while 70% indicated that their units were ill-equipped.

Standard referral protocols, communication, and reliable transportation are core parts of a good referral system. However, data from the survey indicated that these components were inadequate. For instance, nearly one-fifth of facilities did not have a standard procedure for transporting referred women. Over one-third of health facilities had no working telephone or short-wave radio for communication, and of these, over half did not have access to a telephone within five minutes of the facility. Consequently, health personnel may be unable to facilitate referral processes fully. Furthermore, only one-third of the facilities had an emergency vehicle available at all times for transportation of women. The average travel time for transporting women was 37 minutes, with a maximum time of 2 hours. Considered together, these conditions, if not remedied, may hinder the timeliness of care for pregnant women, which is critical in many obstetric emergencies. The findings and an extensive discussion about obstetric care in the region are provided in the journal article.

### ***Abstract***

#### ***Background***

*Maternal morbidity and mortality is most prevalent in resource-poor settings such as sub-Saharan Africa and southern Asia. In sub-Saharan Africa, Ghana is one of the countries still facing particular challenges in reducing its maternal morbidity and mortality. Access to emergency obstetric care interventions has been identified as a means of improving maternal health outcomes. Assessing the range of interventions provided in health facilities is, therefore, important in determining capacity to treat obstetric emergencies. The aim of this study was to examine the availability of emergency obstetric care interventions in the Upper East Region of Ghana.*

## **Methods**

*A cross-sectional survey of 120 health facilities was undertaken. Status of emergency obstetric care was assessed through an interviewer administered questionnaire to directors/in-charge officers of maternity care units in selected facilities. Data were analysed using descriptive statistics.*

## **Results**

*Eighty per cent of health facilities did not meet the criteria for provision of emergency obstetric care. Comparatively, private health facilities generally provided emergency obstetric care interventions less frequently than public health facilities. Other challenges identified include inadequate skill mix of maternity health personnel, poor referral processes, a lack of reliable communication systems and poor emergency transport systems.*

## **Discussion**

*The availability of emergency obstetric care interventions was found to be low across the region; however, emergency obstetric care facilities could be increased by nearly one-third through modest investment in some existing facilities. Also, the key challenges identified in this study can be improved by enhancing pre-existing health system structures such as Community-based Health Planning and Services, training more midwifery personnel, strengthening in-service training and implementation of referral audits as part of health service monitoring.*

## **Conclusion**

*Multiple factors combine to limit women's access to a range of essential maternal health services. The factors include gaps in availability of emergency obstetric care interventions, skilled personnel and referral processes, and these factors must be tackled in order to improve obstetric outcomes.*

**Keywords:** *Ghana, emergency obstetric care, maternal mortality, obstetric complications, health facility review, signal functions*

## **Background**

Globally, approximately 289,000 women died as a result of pregnancy and childbirth related complications in 2013 [1], and about 5.7 million women experience severe maternal complications annually [2]. Low- and middle-income countries account for 99% of global maternal mortality, with most occurring in sub-Saharan Africa and southern Asia [1]. Similarly, the incidence of severe maternal morbidity is estimated to be highest in low- and middle-income countries [3]. Although estimates vary, for every maternal death, many other women suffer a pregnancy-related illness, sometimes with long-term debilitating consequences [3-5].

Reduction in maternal morbidity and mortality is a priority health sector goal for Ghana's Ministry of Health, with ongoing efforts including provision of antenatal care and attendance at birth by skilled health personnel [6]. Recent reports indicate that, between 2008 and 2014, 97% of women who gave birth in Ghana received antenatal care from a skilled provider at least once, 73% of births occurred in a health facility and 74% were attended by a skilled provider [7]. Nevertheless, considerable health disparities persist throughout the country, and the maternal mortality rate per 100,000 live births remains high at 380 in 2013, compared with 89 in Algeria and 15 in Libya [1]. Many of these deaths result from inadequate emergency obstetric care (EmOC) and poorly equipped facilities [8]. Women's needs in an obstetric emergency vary considerably; however, key issues include a lack of life-saving interventions in maternity care facilities, a lack of skilled attendants [8], and an absence of standardised referral procedures such as use of referral forms and access to emergency transportation [9]. Assessing health facilities' capacity to treat obstetric emergencies is an important part of addressing poor maternal health outcomes as such information is vital for health system planning and implementation. This survey, conducted as part of a broader study of EmOC services in the Upper East Region of Ghana, provides baseline information on EmOC services.

In recent years, a number of efforts have been made to reduce barriers to maternity care services in Ghana. For instance, the free maternal healthcare policy was introduced in 2008 as part of the National Health Insurance Scheme, which entitles pregnant women to six free antenatal care visits, birthing care, two postnatal care visits and newborn care for

up to three months [10]. Additionally, the Community-based Health Planning and Services (CHPS), a type of primary health service, was commenced in 1999. The main purpose of CHPS was to increase access to primary health services by reducing the distance to health facilities in communities [11], especially in remote and underserved communities [6]. However, although increased access is important, it may not necessarily improve birthing outcomes if services are not matched to client needs. This may be the case with CHPS services which are mostly manned by auxiliary nurses called community health nurses, with two years training in the provision of basic health services for minor ailments [12]. Generally, CHPS facilities do not routinely provide birthing services, particularly if there is no midwife assigned; although antenatal, postnatal and family planning services are often offered. Some community health nurses in CHPS facilities have undergone short in-service training programmes that equip them to provide emergency, non-complicated birthing services; nonetheless, not all those trained offered such services. This dilemma has arisen due to a shortage of midwifery personnel and the advanced age of many practising midwives in Ghana. As a result, it has become necessary to adopt measures, such as task shifting and training different categories of midwives to ensure continued access to skilled birthing services. Presently, community health nurses can opt to receive a two-year midwifery training which prepares them to provide basic obstetric care [12]. Furthermore, the Ghana Health Service is implementing a policy shift of discouraging the use of traditional birth attendants (TBAs) for birthing services [13].

In addition to measures mentioned, such as efficient health financing, provision of health infrastructure and personnel, the responsiveness of a health system to clients' needs requires monitoring. One way to measure the availability or effectiveness of maternal health services is to examine their capacity to respond to obstetric emergencies or provide EmOC interventions. The term 'signal functions' is often used to denote essential or key interventions for the treatment of direct obstetric complications which account for most maternal deaths [14]. The components of basic and comprehensive EmOC interventions are based on evidence that the majority of maternal deaths worldwide are due to five direct causes; namely, severe bleeding, unsafe abortion, hypertensive disorders, obstructed labour and sepsis. These causes can be treated effectively in well-staffed, well-equipped health facilities [2]. The Monitoring Emergency Obstetric Care: a Handbook [14],

provides an organising framework for assessing evidence-based clinical interventions that an EmOC facility offers, specifically, components of basic and comprehensive EmOC capabilities (Table 1). The selected components are considered necessary to protect women against preventable deaths and should not be viewed as a comprehensive list for service provision at any level of care.

**Table 1: Composition of basic and comprehensive EmOC (signal functions/)**

<b>Basic EmOC</b>	<b>Comprehensive EmOC</b>
a) Administer parenteral antibiotics	- All 6 basic functions plus:
b) Administer uterotonic drugs (i.e., parenteral oxytocin)	g) Perform blood transfusion
c) Administer parenteral anti-convulsants for pre-eclampsia and eclampsia	h) Perform surgery (e.g., caesarean section)
d) Perform manual removal of placenta	
e) Perform removal of retained products (e.g., manual vacuum aspiration)	
f) Perform assisted vaginal delivery (forceps, vacuum extraction)	

Adapted from World Health Organization, UNFPA, UNICEF and Averting Maternal Death and Disability (2009).

Assessment of facility-based obstetric interventions is based on the combination of basic and comprehensive obstetric services provided by a health facility. If a facility provides services a-h, it is categorised as providing comprehensive EmOC; a-f indicates basic EmOC; and any discrepancy in a-f is rated as not providing basic EmOC.

Another measure, which is useful for collecting data on the status of health services, is the Service Provision Assessment developed by The DHS Program [15]. The Ghana Service Provision Assessment, conducted in 2002, is very broad and includes a segment on maternity care (Section 2). The present study drew on Section 2, Maternal Health Services, which explores the availability of basic and comprehensive EmOC and referral services for mothers. Selected questions from the sub-section, Part 2: Facility Inventory Questionnaire, were particularly useful for this study [16].

*The aim of this study was to assess the status of EmOC facilities. We focused particularly on the provision of life-saving obstetric interventions, availability of skilled personnel, service hours, communication and transport for emergency referrals.*

## **Methods**

### **Study setting**

*The Upper East Region is located in the north-eastern part of Ghana with a population of over one million. The region has a predominantly rural population of 79% [17] and is the third poorest region with about 44% of the population classified as poor [18]. The region currently has 13 administrative districts/municipals. Health service delivery is organised at four levels of care in a total of 267 facilities, comprising about 159 primary health-care units (CHPS facilities), 101 health centres and clinics, six district hospitals and one regional hospital, which is the major referral facility. Only a few private health facilities operate in the region [9].*

### **Study design**

*A cross-sectional survey was conducted across the four levels of care. Status of EmOC was assessed through an interviewer administered questionnaire to directors/in-charge officers of maternity care units in selected facilities. The questionnaire was developed from two documents (described above), *Monitoring Emergency Obstetric Care: a Handbook* [14], and *Appendix C of the 2002 Ghana Service Provision Assessment* [16]. It contained 26 closed questions on the nature and types of services provided. Levels of EmOC availability were defined as basic or comprehensive as shown in Table 1.*

### **Sample size**

*Not all 267 health facilities in the region provide birthing services. The main inclusion criterion was provision of birthing services in the region, including public and private facilities. Based on available information, 160 health facilities met this inclusion criterion (N=160). The sample size was calculated using the formula  $n = [(z^2 * p * q) + ME^2] / [ME^2 + z^2 * p * q / N]$  at a confidence level of 95%, (standard value of 1.96), margin of error (ME) of 5% (standard value of 0.05), and population proportion (p) of .50. This calculation yielded a minimum sample size of 114 health facilities.*

### **Data collection**

*Prior to data collection, contact details of directors/in-charge officers of selected facilities were obtained from the district health directorates. Prospective participants were then contacted by telephone, offered information about the nature and purpose of the study and given time to consider it. Information sheets for participants' were also offered to provide further information on the study. Participation in the study was voluntary. Interviews were conducted at the health facilities at a prearranged time with the directors/in-charges. Interviews lasted between 30 and 35 minutes.*

### **Data analysis**

*Data were entered into Epi Info™ 7 (Version 7.1.5) and subsequently exported to IBM® SPSS® Statistics Version 22.0 for analysis. Data were analysed using descriptive statistics and results shown mainly as percentages and frequency distributions.*

### **Results**

*The healthcare facilities were oversampled and 123 were approached for data collection, out of which 120 consented to participate in the survey. Reasons for declining included too busy to participate (n=2) and personal reasons (n=1). The 120 participating facilities included 17 clinics, 52 CHPS centres, 41 health centres, 9 hospitals (including private hospitals) and 1 maternity home. All 13 districts/municipals in the region were represented in the study. Public health facilities comprised about 91% of the total sample, which is consistent with birthing service use.*

### **Provision of emergency obstetric interventions**

*Eighty per cent (n = 96) of the health facilities did not meet the criteria for provision of basic or comprehensive EmOC. Only 7.5% (n = 9) of facilities provided comprehensive EmOC and the remaining 12.5% (n = 15) provided basic EmOC. Of the 15 facilities providing basic EmOC, 13% (n = 2) were private. Of the 96 facilities that did not offer EmOC, 95% (n = 91) were public healthcare facilities. Public health facilities represented approximately 55% (n = 5) of facilities offering comprehensive EmOC. Approximately 10% (n = 12) of facilities almost met the basic EmOC criteria as they offered all but one basic EmOC intervention, and another 21% (n = 25) offered all but two.*

Out of 15 basic EmOC facilities, the majority (74%) were clinics/health centres and 20% were CHPS facilities. Most facilities that met the criteria for comprehensive EmOC were hospitals (67%) and the rest were clinics. More than half of the health facilities categorised as not providing EmOC (51%) were CHPS facilities and approximately 46% were health centres/clinics. Considering the majority of facilities in the study were at the lowest or middle levels of referral networks, these results are consistent with the study setting, where each level of care offers a specific range of maternity services, which is further determined by existing categories of staff and their particular skills set as well as available equipment and supplies.

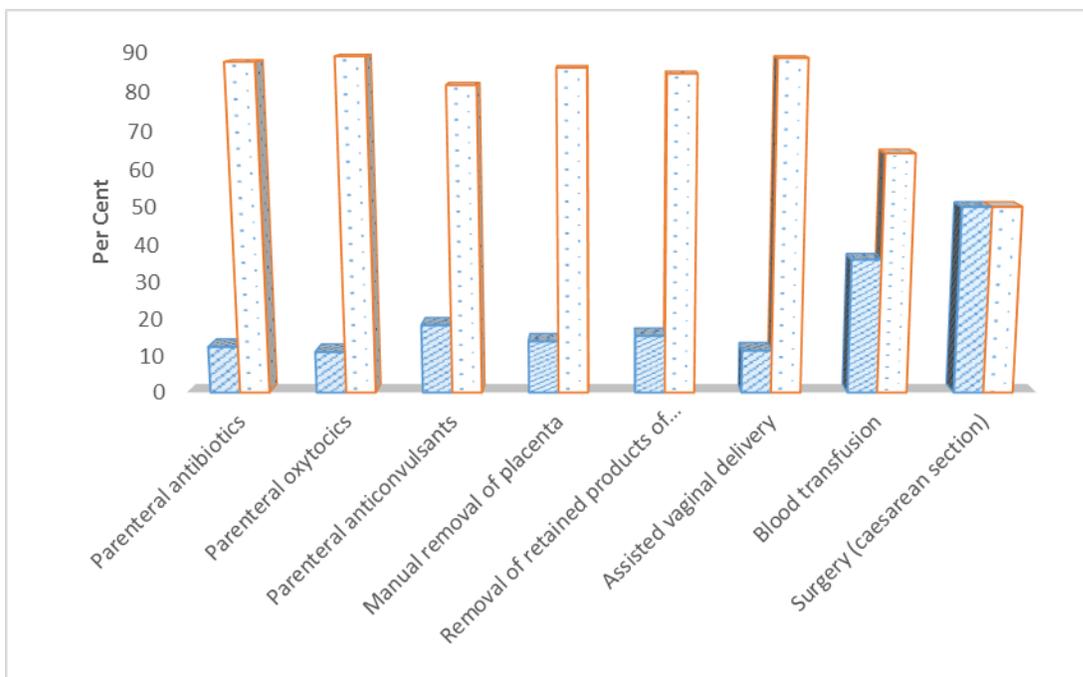
Of the key obstetric interventions outlined in Table 2, the most commonly performed basic EmOC service was assisted vaginal delivery, followed by administration of parenteral oxytocics and the least common were provision of parenteral anticonvulsants and manual removal of placenta. Overall, caesarean section was the least offered (comprehensive) EmOC procedure, closely followed by blood transfusion.

**Table 2: EmOC interventions provided across all facilities**

	<b>EmOC Interventions</b>	<b>Number</b>	<b>Health Facilities (%)</b>
<b>Basic EmOC</b>	<i>Parenteral antibiotics</i>	80	66.7
	<i>Parenteral oxytocics</i>	90	75.6
	<i>Parenteral anticonvulsants</i>	38	31.7
	<i>Manual removal of placenta</i>	57	47.5
	<i>Removal of retained products of conception</i>	58	48.3
	<i>Assisted vaginal delivery</i>	96	80.0
<b>Comprehensive EmOC (including all of the above)</b>	<i>Blood transfusion</i>	14	11.8
	<i>Caesarean section</i>	12	10.0

Other than the provision of caesarean section, overall coverage of EmOC interventions in public health facilities were high, ranging from 64% to 89%, compared to private facilities, which ranged from 11% to 36% (Figure 1). Additionally, availability of EmOC facilities differed between districts. Nine out of 13 districts/municipalities had at least one basic EmOC facility while seven out of 13 had at least one comprehensive EmOC facility.

**Figure 1: Private and public health facilities' coverage of EmOC interventions**



*Figure Legend (figure 1)*

- Private (n = 11)
- Public (n = 109)

Approximately 13% of facilities reported that they facilitated home births routinely; the majority (77.5%) offered the service only in emergency situations while 10% did not offer this service. Additionally, just 38% of the total sample reported providing post abortion care in their facilities.

**Availability of skilled personnel and service hours**

Most health facilities (91%) reported having a trained health provider (not necessarily a person with midwifery skills) present at all times, and most (86%) provided maternity care services 7 days a week.

Seventy-three per cent of facilities had a midwife or doctor present or on-call at all times, whilst 14% had trained health personnel present who was not a midwife or a medical doctor. About 8% of facilities did not have a person with midwifery skills present at all times (Table 3). Thirty-five per cent of respondents indicated that the skill mix of clinical staff in their units was not appropriate for the types of caseloads they received, and 70% reported that their maternity units were not well-equipped for the services they needed to provide.

**Table 3: Availability of persons with midwifery skills at facilities**

<i>Type of staff present</i>	<i>Number</i>	<i>%</i>
<i>Personnel without midwifery skills present</i>	10	8.3
<i>Trained Health provider (not a midwife or doctor) - may be a community health nurse or community health officer</i>	17	14.2
<i>Midwife or doctor present or on call</i>	88	73.3
<i>Other personnel on call (not a midwife) such as those trained on-the-job.</i>	1	0.8
<i>Other personnel present (not a midwife)</i>	4	3.3
<b><i>Total</i></b>	<b>120</b>	<b>100.0</b>

### ***Referral processes, communication and emergency transport***

Most health facilities (94%) had a standardised or printed referral form for obstetric referrals. Eighty-three per cent reported having a standard procedure for transferring maternity patients to other facilities. Sixty-four per cent (n = 75) of facilities had a working telephone or shortwave radio for communication while the remainder had none. Of those without a working telephone, over half (56%) could not reach one within five minutes of the facility.

Thirty-four per cent of facilities had an emergency vehicle for transporting referred clients to other facilities; however, 40% indicated that they called another facility (24 hours a day) to send their emergency vehicle for referrals. The most common means of

transportation between facilities was by a car (52%), followed by an ambulance (21%) and a motorised tricycle (10%).

One hundred and four facilities responded to the question about travel time. The mean travel time to the nearest referral facility was 37 minutes with a range of 5 to 120 minutes using the various means of transport available to them.

## **Discussion**

We examined provision of life-saving obstetric interventions in health facilities in the Upper East Region of Ghana, one of the poorest regions in the country [18]. Findings emerged regarding a range of issues, including low availability of basic and comprehensive EmOC facilities, inadequate numbers of skilled personnel and challenges in referral processes.

### **Availability of basic and comprehensive EmOC facilities**

Overall, the results show low availability of EmOC interventions across the region, which is consistent with findings of an earlier study [19] in a more affluent region of Ghana. This situation limits EmOC access for the populations concerned. Methods of rating EmOC compliant services may contribute somewhat to the low availability of EmOC services and there may be reasons for not providing those services in the period under study. For instance, Paxton et al. [20] point out that some facilities may not receive enough cases of obstetric complications to perform all emergency obstetric interventions within a three-month reference period.

In implementing changes, it is practical and cost-effective to initially identify facilities that almost meet the minimal standards as these will likely require the least investment for quality improvement. The dispersed rural settlements found in most parts of the Upper East Region means that the CHPS model of primary healthcare in Ghana has the potential to reach a greater number of maternal healthcare users, if up-scaled properly. In addition, as the Ghana Health Service continues its policy shift of investing less in training and use of TBAs in maternity care services [13] in a bid to discourage their use, it is necessary that all CHPS facilities are upgraded to at least a basic EmOC status. Although current efforts to train more midwives will significantly advance obstetric care [12], the time lag between

*phasing out of TBAs and increased access to efficient EmOC will likely result in continued dependence on TBAs, particularly, in rural settings. As access to EmOC improves, maternal morbidity and direct obstetric deaths can be reduced significantly with appropriate interventions [2].*

### ***Availability of skilled personnel***

*Availability of skilled personnel directly affects maternal and infant outcomes in low-resource settings [2]. In the absence of trained health personnel, competent in the delivery of obstetric services, reducing preventable deaths is challenging [2]. Our study indicated that provision of parenteral anticonvulsants and manual removal of placenta were the least commonly performed basic EmOC interventions. This trend could be a reflection of a combination of factors, including absence of personnel qualified to provide those services and non-availability of needed equipment and supplies. Similarly, the limited provision of post-abortion care in the region may be partly attributable to poorly equipped facilities and a poor health personnel skill-mix. In addition, individual beliefs and socio-cultural factors may play a significant role. A study of attitudes of physicians toward establishing safe abortion units in Ghana showed that only 45% expressed a willingness to conduct pregnancy terminations themselves and 36% expressed a willingness to participate in counselling only [21]. Finally, based on gap analysis data from the region's human resource unit, there is a need for approximately 500 more midwifery personnel to meet the maternal health needs of women, with about two-thirds of this number classified as short-term or priority need (Human resource officer, Upper East regional health directorate, personal communication, May 7, 2015) which represents a major shortage. Challenges in the recruitment and retention of healthcare personnel, especially in rural areas, contribute to maldistribution of midwifery workforce to the disadvantage of rural dwellers. Lack of opportunities for further education, poor working conditions, poor quality of education for children and lack of social amenities have been cited as reasons which influence midwifery personnel's willingness to work in rural areas [22].*

### ***Referral processes***

*Key components of any referral process include use of referral forms, communication with receiving facilities, health workers accompanying referred clients, and access to emergency transportation especially in remote areas with poor road and transportation networks [9]. Almost one-fifth of facilities had no standard procedure for transporting clients. This significant deficit could be met by ensuring adherence to standardised referral guidelines by frontline healthcare workers. Health personnel may be unable to fully facilitate referral processes due to a lack of access to telephones for communication as found in this study. Inefficient referral systems are often associated with delays or non-compliance to referrals, reliance on alternative care such as TBAs and herbalists, which leads to a worsening of complications [23], and maternal deaths [23-25]. In an intervention study in Uganda, reliable communication and transport services increased access to hospital deliveries increased by over 50% per year [26]. Another study [9] has demonstrated that use of referral audits that are built around a problem-solving approach can significantly increase adherence to standardised referral guidelines, which has implications for reducing maternal morbidity and mortality. Furthermore, the timeframes for travel found in this current study may be too long for women to reach and obtain the EmOC they require, and consequently effect the outcomes of referred clients. Poor transportation systems have consequences, especially for poor rural women and their families, who are less likely to comply with referral instructions due to financial difficulties associated with arranging their own transportation [27,28]. Additionally, such challenges may plunge poor households further into poverty [29] and generally discourage health service users from seeking skilled care in the future. In settings where resources for comprehensive EmOC are unavailable, transport and communication networks need to be improved to increase access to care.*

### ***Strengths and Limitations***

*A major strength of this study was the large and representative sample obtained in the study area, which was possible as responses were de-identified to ensure confidentiality. However, some limitations were identified. As this study was reliant on self-report by respondents, there is a possibility of bias resulting from under-reporting. To help counter the possibility of such bias, anonymity and confidentiality of responses was assured. In*

*addition, the results cannot be generalised to the whole country, as the circumstances and context of health service provision may differ in other regions. Nevertheless, this study has important policy implications that are relevant to obstetric care in Ghana, especially in regions with predominantly rural and relatively high levels of impoverished populations.*

#### *Implications for practice*

*This study brings to light the potential of modest improvements in health facility capacities which may increase the provision of EmOC in the region, particularly for key services with very low coverage, such as post-abortion care. Ghana can also strengthen the uniquely placed community-focused CHPS system to increase utilisation of maternal health services. Training, equitable distribution, and retention of skilled personnel, must be a consideration for future planning to improve the skill-mix in maternity units. However, without an adequate supply of equipment, readily accessible transport and adequate communication systems, skilled personnel will be unable to provide required assistance to their clients. Given the importance of referral procedures and its interconnection with receipt of further treatment in obstetric emergency situations, the role of referral audits and in-service training of maternal health personnel, in appropriate and timely referral processes cannot be overemphasised, in efforts to improve birthing outcomes.*

#### **Conclusion**

*Access to EmOC for women in the Upper East Region is limited by multiple factors, including inadequate equipment and personnel, communication and transport problems as well as poor referral practices. We recommend that, as on-going changes are made, health facility reviews should be conducted regularly for up-to-date data on the status of obstetric services to guide policy directions in maternity care and support further improvements.*

#### **Declarations**

#### **List of abbreviations**

*CHPS: Community-based Health Planning and Services*

*EmOC: Emergency obstetric care*

*TBAs: Traditional Birth Attendants*

***Ethics approval and consent to participate***

*Ethics approval for this study was obtained from Navrongo Health Research Centre, Ghana (NHRCIRB189) and Victoria University, Melbourne, Australia (HRE14-074). Written informed consent was obtained from all respondents before the interviews commenced.*

***Consent to publish***

*Not applicable*

***Availability of data and materials***

*The datasets generated and/or analysed during the current study are not publicly available due to restrictions by the ethics committee. Data are however available from the corresponding author on reasonable request and approval by the Victoria University Human Research Ethics Committee.*

***Competing interests***

*The authors declare that they have no competing interests.*

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***Authors' contributions***

*MKN, MCO and TVM made substantial contributions to the conception of this paper. MKN conducted data collection and analysis and wrote the first draft of the manuscript. MCO and TVM provided leadership and supervision during conduction of the study. JKAW provided assistance with data collection and supervision on the field. All authors reviewed and contributed to the intellectual content of this paper. All authors read and approved the final manuscript.*

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## Authors' information

Not applicable

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### **5.3 Chapter summary**

Findings from the survey on obstetric care interventions were presented in this chapter. The study indicated that, currently, EmOC provision is inadequate to meet the needs of pregnant women in the Upper East Region. In addition, other health system-related factors such as a poor skill mix of personnel and poor referral systems were reported. This combination of factors creates access barriers that hinder efforts to reduce maternal and perinatal morbidity and mortality. An increased availability of basic and comprehensive EmOC and improved standards of service provision may inspire public confidence and encourage regular and consistent utilisation of services.

## CHAPTER SIX

### MANAGEMENT OF OBSTETRIC COMPLICATIONS

#### 6.1 Introduction

Professional and lay (traditional birth attendants) maternal healthcare providers<sup>10</sup> play different roles in supporting women through pregnancy, birth and the postpartum period in Ghana. Midwives and other nursing staff provide most maternal healthcare, especially in rural and remote areas. The focus of this chapter is to present findings on the management of obstetric complications by maternity care workers in the Upper East Region of Ghana. A survey of 278 healthcare providers, including midwives, community health nurses (CHNs) and traditional birth attendants (TBAs) was conducted. TBAs were included because, despite their role being formally limited to the facilitation of transfer of pregnant women to health facilities, they still assist in a minority of births. By including the various types of maternal healthcare providers, it was possible to capture a cross-section of issues, as well as the unique challenges specific to particular roles. The survey methods, results and a brief discussion of the findings are presented.

#### 6.2 Methods

A cross-sectional survey of maternal healthcare providers in the Upper East Region of Ghana was conducted. All healthcare workers who provided maternity care services in the study districts formed the study population. TBAs in the region were also included. The primary condition to include respondents was their belonging to a category of birth attendant other than specialist categories. There are very low numbers of maternal healthcare specialists such as obstetricians and gynaecologists in the Upper East Region and hence they were excluded from the study.

Potential participants were recruited from their places of practice: that is, hospitals, health centres, Community-based and Health Planning Services (CHPS) compounds, and in the case of TBAs, their local communities. These facilities and places of practice represent the different levels of service provision within the healthcare system. An interviewer-

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<sup>10</sup> Maternal healthcare provider is used here to refer to skilled and non-skilled maternity care providers in the region.

administered questionnaire<sup>11</sup> was used to gather data on respondents' sociodemographic backgrounds, in-service training, management, obstetric care and referral practices, and the challenges faced in health service delivery.

### **6.2.1 Sample size and sampling**

The study provided information about obstetric care and referral services by skilled and non-skilled maternal health personnel in the district. Skilled providers included midwives and community health nurses, while non-skilled providers were primarily TBAs. The following sample size formula for estimating a single proportion was applied:

$$n = [Z^2 \times P(1 - P)]/e^2$$

where Z = value from standard normal distribution corresponding to desired confidence level (Z=1.96 for 95% CI); P is the expected true proportion of health facility births (0.7); e is the desired precision (standard value of 0.05) and 957 is the population size (finite population). For finite populations n is adjusted so that  $n(\text{adj}) = (N \times n)/(N+n)$ . The calculation is shown below.

$$n = [1.96^2 \times 0.70(1 - 0.7)]/0.05^2$$

$$n = [3.8416 \times 0.21]/0.0025$$

$$n = 0.806736/0.0025$$

$$n = 322.6944$$

For finite populations,  $n(\text{adj}) = (N \times n)/(N+n)$ .

$$n(\text{adj}) = (957 \times 322.6944)/(957 + 322.6944)$$

$$n(\text{adj}) = 308,818.541/1,279.6944$$

$$n(\text{adj}) = 241.3 \text{ (minimum sample size)}$$

The minimum sample of 242 was increased by about 10% to account for possible non-response. Lay and professional maternity care providers were then selected from a list of maternity care facilities and sites in the region. Overall, 283 eligible maternity care providers were approached, of whom 278 participated in the study. Reasons given for declining to participate were a lack of time and unwillingness to complete a consent form.

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<sup>11</sup> see Chapter Three, p.91 for further details on questionnaire.

## 6.3 Results

### 6.3.1 Types of maternity care workers

More than half (56.5%) the maternal healthcare providers surveyed were registered midwives, nearly one-third were TBAs (31.7%) and approximately one-tenth were community health nurses (10.4%). Only two enrolled nurses (0.7%), one registered nurse (0.4%) and one public health nurse (0.4%) were included. Given the small number of enrolled nurses, registered nurses and public health nurses, they are not discussed in the subsequent sections. Midwives had a mean age of 38.1 years, CHNs had the lowest mean age of 29.4 years, and TBAs were the oldest group with a mean age of 56.2 years (Table 6.1). Midwives had an average of 6.2 years of professional practice, CHNs had an average of 2.5 years of practice while TBAs had the longest length of maternity care practice with an average of 16.5 years.

**Table 6.1: Respondents' sociodemographic characteristics**

<b>Type of care provider</b>	<b>n</b>	<b>%</b>
Registered midwife	157	56.5
Registered nurse	1	0.4
Public health nurse	1	0.4
Community health nurse	29	10.4
Enrolled nurse	2	0.7
Traditional birth attendant	88	31.7

<b>Age (years) by type of provider</b>		
	<b>n</b>	<b>Mean (SD)</b>
Registered midwife	149	38.1 (12.9)
Registered nurse	1	35.0 (0.0)
Public health nurse	1	53.0 (0.0)
Community health nurse	29	29.4 (4.0)
Enrolled nurse	2	29.5 (2.1)
Traditional birth attendant	86	56.2 (11.7)

<b>Number of years of practice</b>		
	<b>n</b>	<b>Mean (SD)</b>
Registered midwife	154	6.2 (7.0)
Registered nurse	1	37 (0.0)
Public health nurse	1	7 (0.0)
Community health nurse	27	2.5 (1.9)
Enrolled nurse	2	0.0 (0.0)
Traditional birth attendant	76	16.5 (12.2)

Among the TBAs, 71.6% (n = 63) had no formal education; the remainder (28.4%, n = 25) had some primary or high school education.

### **6.3.2 Mean number of births attended**

The mean number of births attended by the various categories of maternity care worker in the six months preceding the survey was computed. There was a mean of 76.3 births per midwife (SD = 76.0), 11.3 births per CHN (SD = 17.1) and 4.7 births per TBA (SD = 7.7).

### **6.3.3 Maternity in-service training**

Participants were asked about maternity care in-service training they had received in the three years preceding the survey. Follow-up questions were asked about training received in the 12 months preceding the survey. Overall, about 72% (n = 201) of maternity care workers had participated in at least one episode of in-service training in the preceding three years. Of those who had received in-service training, approximately 68% (n = 137) participated in training in the 12 months before the survey.

Trends in the number of personnel and types of topics included in in-service training were similar. Maternal healthcare topics most frequently included for in-service training in the preceding one to three years were care during labour, infection prevention, safe motherhood health education, management of ante- and post-partum bleeding, life-saving skills during emergency complications, management of pregnancy induced hypertension, and safe motherhood/clinical skills. The least commonly taught topics were post abortion care, manual vacuum aspiration<sup>12</sup>, and administration of intravenous fluids and blood products (Table 6.2).

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<sup>12</sup> Removal of uterine contents through the cervix by the use of a hand-held plastic aspirator. The procedure is often employed in the treatment of incomplete abortion up to 12 weeks after the last menstrual period and may be life-saving.

**Table 6.2 Maternity care in-service training topics by number of personnel trained in the 3 years and the 12 months preceding the survey**

Topics	Preceding 3 years		Preceding 12 months	
	n	%	n	%
Safe motherhood health education	124	44.6	71	25.5
Care during labour or delivery	159	57.2	91	32.7
Use of partograph	104	37.8	59	21.2
Management of risks in pregnancies	105	37.8	55	19.8
Life-saving skills/emergency complications	109	39.2	61	21.9
Safe motherhood/clinical skills	85	30.6	47	16.9
Post abortion care	49	17.6	25	9.0
Manual vacuum aspiration	32	11.5	19	8.8
Infection prevention	147	52.9	85	30.6
Management of ante- and post-partum bleeding	118	42.4	69	24.8
Administration of intravenous fluids and blood products	53	19.1	28	10.1
Management of prolonged and obstructed labour	84	30.2	38	13.6
Management of puerperal sepsis	71	25.5	40	14.4
Management of pregnancy induced hypertension	98	35.3	62	22.3

Overall, midwives tended to receive more maternity in-service training than CHNs and TBAs. Among the various maternity care worker categories, 81.5% (n = 128) of midwives, 72.4% (n = 21) of CHNs and 56.8% (n = 50) of TBAs had some in-service training in the previous three years. Similarly, in the year before the survey, approximately 56.6% (n = 92) of midwives, 48.3% (n = 14) of CHNs and 34.1% (n = 30) of TBAs had received some training.

## 6.4 Maternity care practice

Respondents were asked about maternity care practices for common obstetric complications in the region. The purpose of these questions was to gain further insight into existing knowledge and skills in maternity care and to identify any gaps requiring remedial actions.

### 6.4.1 Partograph use

Approximately 86% (n = 132) of midwives reported having used a partograph in the one month before the survey, 6.5% (n = 10) had used one in the six months before the survey or longer, and just over 1% (n = 2) had never used one. Among CHNs, about 62% (n = 18) had never used a partograph<sup>13</sup>, 10.3% (n = 3) had used a partograph in the one month before the survey and 17.2% (n = 5) used one in the preceding six months or longer. The question on partographs was not applicable to TBAs.

**Table 6.3: Partograph use**

Last use of a partograph	Midwives		CHNs	
	n	%	n	%
Never	2	1.3	18	62.1
Within the last month	132	86.3	3	10.3
Between one and two months ago	2	1.3	1	3.5
Between two and three months ago	2	1.3	1	3.5
Between three and four months ago	4	2.6	1	3.5
Between four and five months ago	1	0.7	0	0
Six months or longer	10	6.5	5	17.2

### 6.4.2 Admissions

Among midwives and CHNs, 71% (n = 132) indicated that there was an admissions procedure for admitting pregnant women in their place of practice. Respondents indicated that admissions guidelines for identification of obstetric complications were based on health facility guidelines (73.4%, n = 97), experience and intuition (22%, n = 29), and instructions from superiors (4.5%, n = 6). All TBAs provided a response of ‘not applicable’ to the question on an admissions procedure.

<sup>13</sup> The partograph is a graphical tool used to track the progress of labour, maternal and foetal well-being. The tool facilitates the early detection of abnormal progress of labour for prompt interventions.

### 6.4.3 Management of obstetric complications

Respondents provided information about previous maternity in-service training and clinical management of five of the major obstetric complications in region. The obstetric complications included post-partum bleeding, prolonged or obstructed labour, puerperal sepsis, pregnancy-induced hypertension, and incomplete abortion (Table 6.4). Information provided on in-service training in this section was not limited to any time period in respondents' practice.

**Table 6.4 Recipients of in-service training for major obstetric complications**

	<b>n</b>	<b>%</b>
Post-partum haemorrhage		
Midwives	126	81.3
CHNs	17	11.0
TBAs	12	7.7
Prolonged and obstructed labour		
Midwives	98	88.3
CHNs	1	0.9
TBAs	12	10.8
Puerperal sepsis		
Midwives	96	94.1
CHNs	3	2.9
TBAs	3	2.9
Pregnancy-induced hypertension		
Midwives	114	95.8
CHNs	4	3.4
TBAs	1	0.8
Incomplete abortion		
Midwives	72	87.7
CHNs	1	1.2
TBAs	8	9.9

#### 6.4.3.1 Post-partum haemorrhage

Approximately 56% (n = 155) of the total sample reported having received training on the management of post-partum haemorrhage. Of those trained, more than 80% were midwives, 11% were CHNs and about 8% were TBAs. (Table 6.4).

Of 152 midwives who responded to the question on management of post-partum haemorrhage, most (89.5%, n = 136) reported a range of care processes for a woman with post-partum haemorrhage. The midwives indicated different combinations of the following: call for assistance, give intravenous fluids, examine for retained products of conception, perform uterine massage, give oxytocin<sup>14</sup>, repair tears, catheterise the woman, and refer to a physician or a higher-level facility. A few included administration of misoprostol<sup>15</sup> (6.6%, n = 10) and collection of blood samples for haemoglobin level and grouping and cross-matching blood (8.6%, 13). Where indicated, the dosage for oxytocin (given intravenously in normal saline) ranged from 10 to 40 units<sup>16</sup>

Among CHNs who responded to the question (n = 27), 85.2% (n = 23) indicated they would refer the woman to another facility for further care. In addition to referring the woman, 8.7% (n = 2) mentioned that they would administer misoprostol, 13.0% (n = 3) would provide intravenous fluids and 8.7% (n = 2) would stop the bleeding with a condom tamponade first. Most TBAs who responded to the question (97.3%, n = 71) indicated that they managed post-partum haemorrhage by referring the woman to a health facility for treatment. In addition to the referral, 6.8% (n = 5) reported that they provided oral fluids or drinks before referral to another facility. Only one (1.4%) TBA mentioned performing uterine massage. TBAs who did not refer the woman (2.7%, n = 2) indicated that they would let her rest.

#### **6.4.3.2 Prolonged and obstructed labour**

Approximately 40% (n = 111) of the maternal health workers had received in-service training on the management of prolonged and obstructed labour. Among those trained, about 88% (n = 98) were midwives, 0.9% (n = 1) were CHNs and 8% (n = 12) were TBAs (Table 6.4).

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<sup>14</sup> Oxytocin is a medication that enhances contractions

<sup>15</sup> Misoprostol is a medication used to start labour. It is used in combination with other drugs to end a pregnancy (cause an abortion) and also in the treatment of postpartum haemorrhage.

<sup>16</sup> Normal dose for oxytocin: slow intravenous or intramuscular injection of 5–10 IU followed by a maintenance infusion of 5–10 IU/hour in 1000 mls normal saline for 2 hours. The cumulative dose must not exceed 40 IU (Sentilhes et al., 2016).

With regard to the clinical care of women with prolonged and obstructed labour, most midwives (92.2%, n = 142) indicated that they would give intravenous fluids, monitor vital signs, call the doctor or refer to another facility and also prepare the woman for a possible caesarean section. One midwife mentioned that she would give tocolytics<sup>17</sup> before referral and another indicated that she would give oxytocin. Except for one CHN who reported that she would not know what to do for a woman with prolonged or obstructed labour, most CHNs (89.6%, n = 26) and TBAs (86.5%, n = 77) who responded to the question mentioned that they would refer the woman to a higher-level facility for treatment.

#### **6.4.3.3 Puerperal sepsis**

Respondents were asked if they had received any in-service training on infection prevention practices during maternity care, and 80.1% (n = 125) of midwives, 51.7% (n = 15) of CHNs and 19.1% (n = 17) of TBAs reported they had received in-service training. About 37% (n = 102) of respondents had received in-service training on the management of puerperal sepsis. About 94% (n = 96) of those trained were midwives, 2.9% (n = 12) were CHNs and another 2.9% (n = 3) were TBAs (Table 6.4).

For the management of a woman with puerperal sepsis, midwives (64.3%, n = 99) indicated a range of interventions. They mentioned that they would monitor vital signs, administer antibiotics or prescribed medications, prepare for laboratory investigations, educate the woman on personal hygiene and refer her for further care. A minority of midwives (27%, n = 42) indicated that they would refer the woman for higher level care immediately. A majority (74.5%, n = 73) of TBAs would refer a woman with puerperal sepsis to a health facility and all but one CHNs indicated they would refer the woman for further care.

#### **6.4.3.4 Pregnancy-induced hypertension**

Most respondents who had received training on pregnancy-induced hypertension were midwives (95.8%, n = 114). Only 3.4% (n = 4) of CHNs and 0.8% (n = 1) of TBAs had been trained on pregnancy-induced hypertension (Table 6.4).

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<sup>17</sup> Tocolytics are medications that suppress labour

Remedial actions indicated by midwives included administration of antihypertensive medications such as magnesium sulphate, nifedipine, or hydralazine. Others included bed rest, monitoring of blood pressure, urine proteins, and foetal status. In addition, about 32.5% (n = 50) of midwives would refer the woman to a doctor or a higher facility. All TBAs and CHNs who responded to the question indicated that they would refer the woman to a health facility

#### **6.4.3.5 Incomplete abortion**

The results showed that 87.7% (n = 72) of respondents who had undergone training on early recognition of incomplete abortion were midwives, 1.25% (n = 1) was a CHN and 9.9% were TBAs (Table 6.4).

Most midwives would examine the perineal pad for blood loss, secure an intravenous line for fluids, confirm the status of the pregnancy by ultrasound scan, and prepare the woman for laboratory investigations (haemoglobin level, blood grouping and cross-matching). In addition, some midwives reported that they would give antibiotics (11%, n = 17), give oxytocin (16.2%, n = 25) or refer the women to a doctor or a higher-level health facility (36.4%, n = 56). All CHNs who responded to the question indicated that they would refer a woman with incomplete abortion to a higher-level health facility. With the exception of two TBAs (one of whom mentioned that she would not know what to do and the other indicated that she would check the status of the foetus and assist the woman to give birth), the remainder indicated that they would refer a woman with incomplete abortion to a health facility.

#### **6.4.4 Referral of obstetric complications**

Just over half (51.7%, n = 144) of respondents indicated that there were specific criteria for referral of pregnant women to other facilities. The referral criteria were mainly based on the severity of the woman's condition and the scope of practice of the maternity care worker.

About 87% (n = 243) of respondents indicated that they made referral decisions. Of those who responded to a follow-up question (n = 155), 59.4% (92) based their referral decisions

on health facility guidelines, 34.2% (n = 53) based their decisions on experience and 6.5%, (n = 10), based their decisions on instruction from supervisors.

Among the different categories of maternal health workers who responded to the question about pre-referral care given to women, 97.6% (n = 21) of midwives reported that they would provide care to stabilise a woman's condition before referral, 72% (n = 18) of CHNs and 13.6% (n = 9) of TBAs also indicated that they would stabilise a woman's condition before referral. About 57% (n = 159) of respondents mentioned that referred cases were communicated to the receiving facility before transfer. Only 32.4% (n = 90) of respondents indicated their health facilities had transportation available on a 24-hour basis and 49.6% (n = 138) had a qualified member of staff available to accompany women with complications.

#### **6.4.5 Challenges to obstetric care and referrals**

All respondents were asked open-ended questions about the major challenges experienced in the management of obstetric complications and referrals. Responses related to clinical care of the women included staff shortages, high workloads, insufficient in-service training, a lack of equipment/supplies (ultrasound machine, gloves, gauze) and unreliable public infrastructure such as poor electricity and water supply.

For the referral of women, the most common problem mentioned was a lack of reliable transportation because of reasons such as a lack of an ambulance at the facility, non-availability of an ambulance driver, and inability to afford ambulance fees by the women or their families. Other reported problems were a lack of means of communication with other health facilities, refusal of referral to another facility by women or families, delays in following referral information, and a lack of family support, especially having no one to accompany women to the receiving facility. In addition to other challenges raised, the predominant concerns among TBAs were having to use their bare hands because of the lack of gloves, shortages of cord clamps and other supplies, inadequate training and a general lack of support and motivation.

## **6.5 Chapter discussion**

Safe and efficient maternity care practice is largely reliant on the availability of well-equipped health facilities and skilled personnel matched to the required levels of care (Kyei-Nimakoh et al., 2016). Healthcare systems, in turn, require supporting infrastructure, including a good transportation network and reliable basic amenities such as water and electricity. Deficiencies in core aspects of the healthcare system and supplementary public services have practical implications for pregnant women and may contribute to suboptimal health outcomes. This study revealed several shortfalls in the maternal healthcare system in the Upper East Region of Ghana, including deficiencies in in-service training, admissions protocols and discrepancies in the management of obstetric complications.

### **6.5.1 Maternal health service provision in the Upper East Region**

Skilled maternal healthcare professionals who participated in this study assisted women in most of the births and were much younger than TBAs. Midwives assisted in most births in the six months preceding the survey. The significantly low number of births attended by TBAs and their marked older age may be attributable to efforts by the Ghanaian government to phase out and prevent TBAs from providing birthing services (Ganle, 2015). The Ghana Multiple Indicator Cluster Survey, a nationally representative survey of households, reported that in the two years preceding the 2011 survey, 82% of women in urban areas were likely to be assisted by skilled personnel during birthing, compared to 54% of women in rural areas. In addition, women in rural areas were more likely to give birth with the assistance of a TBA (24%), compared with those in urban areas (6%) (Ghana Statistical Service, 2011). The report also indicated that, in the Upper East Region, while 66.3% of women gave birth in a health facility, 3.8% were assisted by TBAs and 27.9% were assisted by their relatives or friends (Ghana Statistical Service, 2011). The low number of births attended by TBAs observed in the current study is consistent with the findings of another study in the Upper East Region of Ghana (Sakeah, Doctor, et al., 2014), which reported that about 80% of births were attended by skilled health personnel, 5% by TBAs and 16% by older women and others. The current study did not include relatives or friends who assisted in home births so the extent to which women continue to rely on such sources for assistance during births is unclear. Taking the existing literature

into consideration, it is apparent that despite a decline in use of TBA birthing services, more efforts are required to encourage women to opt for health facility-based care rather than other alternatives. It is important also to note that, even though the current directive in Ghana is to refer all pregnant women to a health facility on their arrival, some TBAs continue to provide birthing services.

### **6.5.2 In-service training**

At present, advances in research and clinical practice mean that healthcare workers need continuous updating of their knowledge and skills to ensure safe, effective, evidence-based practice. Such capacity building produces well-informed and competent practitioners who inspire confidence in service users and safeguard their own practice (Ameh & van den Broek, 2015). Upgrading of skills is even more important in the field of maternity healthcare for several reasons. One reason is that maternity healthcare is a priority area for most developing countries, including Ghana, because of the high prevalence of perinatal morbidity and mortality (Kyei-Nimakoh et al., 2016). A second reason is that there are effective standards and procedures recommended for the management of the major causes of this morbidity and mortality (Ameh & van den Broek, 2015). For instance, internationally accepted standards on obstetric complications developed by the World Health Organization are evidence-based (WHO, United Nations Population Fund, UNICEF, & The World Bank, 2003) and are generally adaptable to local situations. A third reason is that these guidelines are available in Ghana and provide direction on recommended preventive, promotive or curative practices for specific obstetric conditions (Ghana Health Service, 2008; Oduro-Mensah et al., 2013).

Data from the current study demonstrate that in-service training was not evenly distributed across the various categories of maternity care workers. Midwives were most likely to receive such training, followed by CHNs, and then TBAs. The limited opportunities for TBAs to receive in-service training probably reflect efforts to change their role in maternal healthcare. Although CHNs are trained primarily to provide antenatal and other general services (Sakeah, McCloskey, et al., 2014), they sometimes provide birthing services, especially when a woman in labour arrives at a facility at an advanced stage of labour which is considered unsafe for a transfer. Given that some CHNs are at the frontline of

service delivery, particularly in lower-level facilities without midwives, it is important to develop in-service training programmes that are targeted to CHNs to build their competencies within their current scope of practice.

In-service training subject areas are also important. Selection needs to be based on identified needs of maternity care workers, extant case mix and observed trends in health service outcomes. In the 12 months and the three years preceding the survey, important topics such as post-abortion care, manual vacuum aspiration, and administration of intravenous fluids and blood products received the least attention in this study. Taken together, the highest number of maternity care workers trained in any topic in the preceding three years was 159 (57.2%), for care during labour or birthing and 147 (52.9%) for infection prevention, respectively. Respondents generally expressed a strong need for more regular in-service training to promote high quality care. Specifically, partograph use, management of puerperal sepsis, ante- and post-partum bleeding, and prolonged and obstructed labour require additional attention.

### **6.5.3 Obstetric care practice**

#### **6.5.3.1 Partograph use**

As expected, midwives reported greater use of the partograph than CHNs. Typically, partograph use falls outside the scope of practice of CHNs because they are not trained midwives. Although current evidence is not conclusive on the value of partographs in relation to perinatal and maternal morbidity and mortality outcomes (Lavender et al., 2012), in a systematic review its credibility or evidence base was not found to be a barrier to its application (Ollerhead & Osrin, 2014). Rather, limiting factors included not having a clear understanding of or skill for application of the tool and perceiving it as time-consuming. Non-availability of the partograph, admission of pregnant women late in labour, and lack of good leadership and supervision also contributed to suboptimal use. In the current survey, 86% (n = 132) of midwives reported having used a partograph in the previous one month. It is unclear whether partographs were consistently used for all pregnant women, because the question was not directly asked in the survey. However, data

from the cohort study<sup>18</sup> indicated that there was inconsistent application of the tool among healthcare personnel, with nearly one-third of births not monitored with a partograph.

### **6.5.3.2 Admissions in labour**

Nearly three-quarters of midwives and CHNs indicated that there was an admissions procedure in place for pregnant women. However, further enquiry showed that the utility of such a policy is debatable, as respondents reported admissions procedures with a different basis. Some respondents relied on health facility guidelines, others relied on experience and intuition or on instructions from supervisors. Inconsistent reports on knowledge of admissions policies may indicate gaps in training, policy implementation and practice. It is important to streamline criteria used to admit pregnant women, identify needs, plan care, and prevent unnecessary delays in care provision or referrals. Such an approach may provide a shared understanding of admissions and referrals clinical protocols. A U.K. study indicated that to reduce inappropriate admissions to labour wards, midwives may require support in making management decisions regarding admission of women in labour (Cheyne, Dowding, & Hundley, 2006). Decision-making processes of midwives regarding the diagnoses of labour and its complications have not been well studied in Ghana. It is, however, an important issue because the diagnostic skills of midwives may form the basis of clinical judgements that ultimately affect perinatal outcomes.

### **6.5.3.3 Management of obstetric complications**

Overall, midwives constituted the largest proportion of personnel who had undergone some training in the management of the five major obstetric complications (at least 80% of midwives for all five conditions): post-partum haemorrhage, prolonged and obstructed labour, puerperal sepsis, pregnancy-induced hypertension, and incomplete abortion. On the other hand, CHNs received little in-service training for most of the five conditions: post-partum haemorrhage (11%), prolonged and obstructed labour (0.9%), puerperal sepsis (2.9%), pregnancy-induced hypertension (3.4%), and incomplete abortion (1.2%). Except for training on incomplete abortions, more CHNs than TBAs had received training.

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<sup>18</sup> See Chapter Four, p104.

As discussed earlier<sup>19</sup> Ghana's Ministry of Health has standard protocols and written guidelines regarding reproductive healthcare in general and obstetric/midwifery practice in particular. The *National Safe Motherhood Service Protocol* (Ghana Health Service, 2008) provides detailed guidance on perinatal care, commencing from the antenatal period through to the post-partum period. The guidelines include important information on obstetric complications, required actions for the various levels of health facilities, and information on when to refer a woman. Recommended medication and regimes for obstetric conditions are also included. It is noteworthy that the 2008 document currently in use includes TBAs as maternity care providers at the community level. Findings from this study on the level of education of TBAs suggest that most have neither the training nor literacy skills to benefit from such documents. Most TBAs, therefore, rightly reported that they would refer complicated obstetric cases to health facilities for treatment. Given the limited training of CHNs in maternity care, most also indicated that they would refer complicated cases, although a few would provide care and recommended medication before doing so. Hence, the responsibility of obstetric care management chiefly falls on midwives. In view of the context of the maternal health system in the study area, it is evident that the rate of obstetric referrals will be high, given that many lower-level health facilities (such as CHPS compounds) are staffed by CHNs because of the insufficient number of midwives.

In relation to obstetric care management by midwives, respondents provided the greatest detail about remedial actions for specific complications. Overall, midwives listed several essential actions in the protocol for each complication. There were, however, inconsistencies in the medications and dosages required. For instance, in the management of obstructed labour, one midwife mentioned she would give tocolytics and another indicated oxytocin, even though the clinical practice guidelines only mention oral or intravenous fluids and antibiotics, before referral for possible caesarean section (Ghana Health Service, 2008). It is unclear what accounts for these discrepancies but differences suggest that greater emphasis needs to be placed on training, monitoring and supervision of maternity care workers.

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<sup>19</sup> See Chapter 2, p.63.

#### **6.5.3.4 Referral of obstetric complications**

More than half of respondents did not indicate specific criteria for the referral of pregnant women to higher level facilities. Among those who did, the referral criteria were mostly based on the health worker's scope of practice and the severity of the woman's condition. While most midwives would provide initial care to stabilise a woman before referral to another facility, almost three-quarters of CHNs and less than one-quarter of TBAs would provide such care.

More importantly, challenges associated with the referral processes were related to communication and transportation of women with complications and a lack of qualified staff to accompany referred women. Ghana's National Ambulance Service was established in 2004 and expanded the geographic area covered by its services within a 60 minutes' response time from 8.7% to 59.4% of the country between 2004 and 2014. Similarly, the percentage of the population with access to the service has increased from 48% to 79% over the same time frame (Tansley et al., 2016). Despite this progress, access level by districts remains variable with a significant proportion of the country not accessible within 60 minutes from National Ambulance Service stations. These disparities mostly affect rural and some urban populations, and barriers related to the knowledge, acceptability and affordability of ambulance services (Tansley et al., 2016). In the Upper East Region, ambulances are often unavailable or are too distant to meet emergency needs (Patel et al., 2016). Until the National Ambulance Services are expanded further and become more affordable, the region will benefit from successful community-based initiatives such as the Sustainable Emergency Referral Care project (Patel et al., 2016). As part of that initiative, modified tricycles serve as ambulances to transport pregnant women and children under five years free of charge (Patel et al., 2016). Similar to the CHPS system, the project demonstrates that a key contributor to the success of health projects is harnessing the benefits of community engagement, which fosters a sense of ownership and continued interest in an issue beyond the life span of the initial project (Awoonor-Williams, Sory, et al., 2013).

Other challenges reported by respondents were refusal of referral by pregnant women or their relatives, primarily because of their inability to afford transportation costs. This

problem buttresses the importance of finding feasible, low cost, emergency transportation for remote, poor areas like the Upper East Region. Although Ghana's free delivery care package under the National Health Insurance Scheme has reduced financial barriers to obstetric care (Dzakpasu et al., 2012), the high prevalence of poverty in the region (Ghana Statistical Service, 2014) and its associated problems suggest the need to reassess the scheme. This is important because to realise fully the benefits of the scheme for pregnant women, financial barriers other than the service fees must be given consideration, particularly for the least privileged populations.

A lack of equipment and supplies were also reported. TBAs indicated that they have had to assist at births without protective gloves, cord clamps and other supplies, posing significant risk to themselves, their clients and other healthcare workers. Given current efforts to phase out TBAs and the fact that they operate as private birthing care providers, it is important to intensify health education regarding the dangers of unsafe and unsanitary practices.

## **6.6 Chapter summary**

Results from the survey shows that there are significant problems with maternity care practices, in-service training and the general infrastructure needed to support the timely referral of women with complications. It is important to establish and enforce guidelines for in-service training of maternity care workers, tailored to their scope of practice. Increased access to training programs is needed regardless of the category of maternity care worker. The current situation regarding TBAs is particularly problematic, where they are now expected simply to facilitate transfer of pregnant women to health facilities, but who in fact continue to assist in childbirth. Given that the number of births attended by TBAs is falling, efforts targeted at health service users and the TBAs is likely to yield eventual success at eliminating unskilled care from TBAs, a situation that will make birthing experiences safer and more amenable to positive outcomes.

## **CHAPTER SEVEN**

### **DISCUSSION AND CONCLUSIONS**

#### **7.1 Introduction**

This research has examined the maternal outcomes for obstetric complications in the Upper East Region of Ghana, the availability of essential obstetric care interventions, and the management of obstetric complications by maternity care workers in the region. The objectives of the study were achieved through a three-stage study: retrospective cohort study, and two surveys. The cohort study, which included pregnant women who gave birth in 2014 in three hospitals, sought to determine pregnancy outcomes in the region. Subsequently, a survey of health facilities was conducted to determine the availability of emergency obstetric care (EmOC) interventions. A separate survey of skilled and lay maternity care personnel was also undertaken to assess the management of obstetric complications in the region.

In this chapter, an overall discussion of the study findings is provided. The theoretical framework of the study, the framework for evaluation of quality care in maternity services<sup>20</sup> (Hulton et al., 2000), is discussed in relation to the findings by comparing the study outcomes to criteria and standards<sup>21</sup> within the framework. Each study is discussed separately initially before all studies being discussed together and more broadly. Not all the findings were captured under the criteria and standards of the framework. Thus, those findings that do not fall within the context of the framework are presented after the initial discussion.

Strengths and limitations of the study, study implications, and conclusions are presented in the final sections of this chapter. The ensuing sections are organised under three major sub-headings:

- 1) cohort study of obstetric outcomes,
- 2) survey of emergency obstetric care interventions,
- 3) and survey of the management of obstetric interventions.

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<sup>20</sup> See Chapter Three for more details on the framework

<sup>21</sup> See appendix XX

## **7.2 Cohort study of obstetric outcomes**

In the cohort study, the types and rates of adverse obstetric outcomes in the Upper East Region of Ghana were examined. Key adverse outcomes included: prolonged and obstructed labour; hypertensive disorders; and haemorrhage as the major causes of maternal morbidity. Other factors contributed to poor outcomes, namely late initiation and poor attendance of ANC, a high prevalence of low haemoglobin levels among pregnant women, poor usage of partographs, low uptake of anti-malarial treatment by the women, and a higher than expected foetal death rate. The selection of concepts within the framework for discussion is based on the extent to which those concepts were explored in the cohort study. Concepts which were of relevance to the cohort study are maternity information systems, use of appropriate technologies, and management of emergencies.

### **7.2.1 Maternity information systems**

Maternal and child health data such as obstetric and immunisation history are generally captured over a period of several months during pregnancy and over several years among women of reproductive age. Such data may span antenatal, birthing and postnatal care. The data collected may form the basis of subsequent planning, decision-making and clinical interventions. Hence, the quality of the data gathering processes is as valuable as the information collected. Good record-keeping systems and practices may allow healthcare providers to follow pregnant women seamlessly along the continuum of care and across maternity care providers. In addition, such a system may provide primary data on the coverage of obstetric health interventions and allow overall monitoring of health services by policy-makers and researchers. In this study, data were not collected directly on record-keeping practices; however, given that retrospective cohort studies rely on existing data, the range and quality of the available data was central to the research.

Ghana's health information system is still evolving. In the past, data reporting methods employed to collate routine health services data from district, regional and national levels led to difficulties in identifying and addressing significant public health problems. For instance, a high prevalence of neonatal deaths recorded in health facilities was not evident at the national level until it was reported in the *Ghana Demographic and Health Survey*

2008 report (Ghana Statistical Service et al., 2009; Nyongator, Ofori, Osei, & Atweam, 2013). The report was later confirmed by analysis of the existing data. Submission of incomplete data and late reporting partly contributed to these omissions (Nyongator et al., 2013). Routine clinical data collection is paper-based, and data are subsequently uploaded into a data management software system (Kayode et al., 2014). The District Health Information Management System (DHIMS), a data software programme, was adopted in Ghana in 2007. However, the programme was fraught with implementation problems that rendered it suboptimal in providing useful health information (Adalety, Poppe, & Braa, 2013). The problems were attributable mainly to the software not being easily adaptable to the health information needs of the Ghana Health Service. For example, the metadata were not centralised and could not be accessed from a common portal since the software was not internet-based and needed to be installed separately on computers at each data entry point or health facility. In 2012, the Ghana Health Service upgraded the software to a web-based version called DHIMS-2, which has improved the quality of data collection (Adalety et al., 2013; Kayode et al., 2014).

Although significant improvements in data collection and reporting have been observed following the adoption of DHIMS-2 (Adalety et al., 2013; Kayode et al., 2014), more remains to be done in order to derive greater benefits from health data. The format for data collection and reporting for the current system excludes specific data on individual records, as facilities are required to only report summarised facility-level data. This data reporting format makes it difficult to assess or conduct studies at the level of individual patients. For example, the additional value of organising data by variables such as age or body weight at preferred cut-off points may be lost if data is reported in predefined ranges. Such studies may, however, provide important information such as patient characteristics and associated risks as well as coverage of health services. During the current study, which relied on hard copies of registers and individual records, obtaining a full complement of health data on pregnant women proved difficult as registers were not properly stored or archived. Hardcopies of records are indispensable and need to be well-preserved for purposes such as peer review, maternal health audits and research. In order to minimise the risk of damage to records in storage, digital copies could be created for access by end-users. Staff

training in data collection, with an emphasis on how the information recorded contributes to improving obstetric management is also vital (Hulton et al., 2000).

### **7.2.2 Use of appropriate technologies/procedures**

Hulton et al. (2000) discourage the routine adoption of procedures that have no proven benefits or are even detrimental to the well-being of the woman. Such procedures include pubic shaving, enemas, intravenous infusion, episiotomies for women giving birth for the first time, and supine position for all births. In addition, the authors recommend minimal use of vaginal examination, intramuscular oxytocin to speed up labour, non-emergency caesarean sections, and encourage the use of effective pain relief after caesarean sections (Hulton et al., 2000). Among the above listed items, only the caesarean sections rate was assessed in the present study.

The caesarean section rate for the cohort of women examined in this study was nearly 16%. According to the WHO, caesarean section rates above 10% at the population level are not associated with reductions in maternal and newborn mortality (World Health Organization, 2015b). . Currently, it is recommended that rather than focusing on attaining a specific caesarean section rate, health systems must ensure that the procedure is available for those who require it. According to the WHO, medically justified caesarean section can be life-saving for mothers and babies. The WHO adds, however, that there are no evidence-based benefits for those who do not need the procedure. Women who undergo unnecessary surgery may be exposed to associated risks, which are even higher for those with inadequate access to comprehensive obstetric care (World Health Organization, 2015b). On the whole, women who underwent caesarean sections in this study had medical indications for the procedure such as breech presentation, prolonged labour, and pregnancy induced hypertension.

### **7.2.3 Management of emergencies**

Hulton et al. (2000) discuss the availability of essential drugs, equipment and qualified personnel for the treatment or referral of major obstetric complications as appropriate management of emergencies. One of the important criteria mentioned was the use of

partographs by qualified personnel to provide good quality maternity care. Partograph use was assessed in this study as it is a useful tool for monitoring the progress of labour in the first stage. The tool include parameters for monitoring labour, and maternal and foetal well-being (Opoku & Nguah, 2015) such as progression of contractions and cervical dilatation.

Partographs are particularly useful in the early identification of prolonged and obstructed labour, which is a significant cause of maternal morbidity (Asibong et al., 2014). In addition, partographs have been shown to reduce emergency caesarean sections and stillbirths (World Health Organization, 1994b). The tool was first introduced in Ghana in 1989, and currently, the WHO modified partographs are in use (Opoku & Nguah, 2015). In the current study, about one-third of women were not monitored using a partograph, representing a potential loss of opportunity to avert maternal ill-health and associated consequences. This finding is consistent with the literature and a study in a metropolitan area of Ghana showed an even lower rate of partograph use at 54%, with proper use of the partographs being up to standard in only 40 – 60% of the all cases (Opoku & Nguah, 2015). One possible explanation for the low utilisation of partographs could be that not all personnel (such as CHNs, registered nurses) involved in maternity care have undergone training in the use of the tool. Reasons reported in other studies for non-use of the tool include work overload, staff shortages (Konlan et al., 2016), and poor technical knowledge of the application and utility of the tool (Konlan et al., 2016; Opoku & Nguah, 2015).

### **7.3 Survey of emergency obstetric care interventions**

This section comprises a general discussion of the findings of the survey of 120 health facilities on the availability of emergency obstetric care interventions in the Upper East Region. The survey is important as it provides information on the capacity of those facilities to treat obstetric emergencies and highlight shortfalls for future action. Significant inadequacies in basic and comprehensive EmOC interventions were found. The concepts relevant to the survey, within the Hulton et al. (2000) framework, are human and physical resources, referral system and management of emergencies.

### **7.3.1 Human and physical resources**

Deficiencies in human and physical resources for maternal health are quite prevalent in developing countries where the need for these resources is usually greatest. Human and physical resources include the quality and type of staff, population-based staff ratios, staff training and supervision, medical and non-medical equipment as well as infrastructure (Hulton et al., 2000).

Human resources for healthcare are arguably the chief determining factor of care outcomes. For instance, in Ghana, regions with higher numbers of doctors, nurses and midwives have a higher percentage of births assisted by skilled personnel (Appiah-Denkyira, Herbst, Soucat, Lemiere, & Saleh, 2013), increasing the likelihood of better outcomes. Consequently, it is essential to increase and retain trained personnel in remote areas (Dogba & Fournier, 2009), where outcomes reflect poor staffing levels. Maldistribution of healthcare staff, especially overconcentration of more skilled personnel in the cities, with lower skilled personnel in rural settings has significantly contributed to a poor skill mix in rural areas (Appiah-Denkyira et al., 2013). A poor skill mix has direct implications for the range of obstetric care interventions that can be delivered safely.

Data from the survey in the current study indicate inadequacies in human and physical resources in the Upper East Region. These inadequacies were reported by respondents as poor skill mix of health staff, shortage of midwifery personnel, unreliable communication and transportation systems, as well as an unreliable electricity and water supply. Furthermore, only 20% of health facilities met the criteria for providing basic and comprehensive EmOC. A variety of human and physical resource shortages has been reported. Such studies, conducted in Ghana and other low- and middle-income countries, include reports on poor transport systems and long distances to facilities (Gething et al., 2012; Masters et al., 2013; Nwameme, Phillips, & Adongo, 2014), delays in obtaining timely and appropriate care at facilities due to a lack of drugs, equipment and staff shortages (Knight, Self, & Kennedy, 2013), and poor supply of electricity and water (Knight et al., 2013; Mills, Bos, Lule, Ramana, & Bulatao, 2007). Without a good balance

between appropriate number and type of personnel and supporting equipment and infrastructure, improvements in obstetric outcomes may progress slowly.

### **7.3.2 Referral system**

A three-tier maternity referral structure exists in Ghana, beginning from CHPS facilities, to health centres and district/regional/tertiary hospitals (Afari, 2015). Each level is expected to have health personnel matched to a range of obstetric services. Unhindered access to EmOC along the continuum of care from lower to higher level facilities can only occur in the presence of key prerequisites: clear admissions procedure, available skilled staff, adequate supply of drugs and equipment, reliable transport and communication, and qualified staff to accompany complicated cases to higher level facilities (Hulton et al., 2000). These prerequisites were largely unmet in the current study leading to an inability to communicate with referral facilities about impending cases, delays in securing vehicles for transporting women and long travel times. These observations are consistent with another Ghanaian study by Afari (2015), which reported health system barriers, including transportation, communication, clinical skills and management, and standards of care and monitoring.

### **7.4 Survey of management of obstetric complications**

The survey of a cross section of maternity care providers undertaken in this study offered a broad view of how obstetric complications are managed by different categories of providers as well as challenges encountered in service provision. The survey showed significant access barriers to good quality care by midwives and other maternal healthcare providers. Barriers included inadequate in-service training, poor ambulance services, inadequate provision of medical supplies and equipment, and patient declining to be referred to other facilities. The following points are discussed below: human and physical resources, referral system, use of appropriate technologies, internationally recognised good practice, and management of emergencies.

#### **7.4.1 Human and physical resources**

Health workforce shortages is an ongoing problem in Ghana affecting most professional fields of healthcare practice, including midwifery (Appiah-Denkyira et al., 2013). Rural and remote areas like the Upper East Region are often worst affected. Attrition of midwifery staff has been mainly attributed to retirement and outmigration to wealthier countries such as the United Kingdom and the United States of America (particularly before 2006). Inadequacies in the recruitment and retention of adequate numbers of midwifery personnel has resulted in the current situation where a significant number of Ghanaian midwives will reach the retirement age of 60 years by 2021. In response to these human resource issues, the government has invested in the training of more midwives and other health personnel in recent years, so as to meet the demands of vulnerable populations (Appiah-Denkyira et al., 2013). These efforts are reflected in the relatively low mean ages of skilled health personnel found in this study (38 years for midwives and 29 years for CHNs respectively). Despite an increased intake of midwifery and other trainees, such as the training of CHNs for an additional two years to register as midwives and provide maternal health services, including skilled birthing services (Sakeah, McCloskey, et al., 2014), the shortage persists in these areas. As a consequence of this shortage, some staff may take on additional tasks beyond their scope of practice, for which they are not formally trained (Okyere, Mwanri, & Ward, 2017). Despite their good intentions, the added responsibilities carry risks for pregnant women and staff.

From the survey, most births were assisted by midwives. There was an average of 88 births per midwife, and 17 births per CHN in the six months preceding the survey. CHNs are generally trained to staff primary health facilities and provide services such as ANC, family planning, immunisation and treatment of minor ailments, while referring complicated cases to more advanced levels of care (Sakeah, McCloskey, et al., 2014). As they are not trained midwives, CHNs do not routinely offer birthing services. Typically, they may assist pregnant women in labour, in the absence of a midwife, when they consider the situation unsafe for transfer. Such assistance is invaluable for pregnant women, who may otherwise be left with less safe birthing options. However, given the unpredictable nature of labour and the pre-existing health conditions of many mothers,

some births may later become complicated and require advanced care. For instance, labour that was previously progressing normally may later become complicated due to foetal distress or the labour may fail to progress, putting the baby and/or mother at risk. Delays could then result from inadequate attempts to assist or stabilise a woman's condition before eventual referral (Hulton et al., 2000; Knight et al., 2013).

## **7.5 Overall discussion**

This section entails further consideration of the study findings in order to enhance understanding by interrelating information from the cohort study and two surveys. Also, there were important findings that could not be placed and discussed within the framework. As an example, in the cohort study, data on poor ANC attendance, high prevalence of anaemia, and low uptake of anti-malarial treatment have not been discussed previously since they are more related to service user behaviour/characteristics than to service provision. These key issues are discussed under these following broad headings: uptake of maternity services; systemic and institutional challenges to obstetric care.

### **7.5.1 Uptake of maternity services**

A key indicator of obstetric health is adequate antenatal care, which facilitates improved perinatal outcomes for babies and their mothers. Ghana adopted the WHO's Focused Antenatal Care<sup>22</sup> approach in 2001 (Baffour-Awuah, Mwini-Nyaledzigbor, & Richter, 2015). Focused ANC emphasises an individualised, client-centred approach and prioritises the detection of disease rather than just risk assessment (Nyarko et al., 2006). Previous approaches to ANC encouraged more frequent visits (up to 13) during pregnancy, care was provided by different healthcare providers during visits, and women were categorised into risk groups to assess the risk of complications and the required level of care. Under focused ANC, all pregnant women are considered to be at risk, priority is placed on the

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<sup>22</sup> Focus antenatal care includes medical history taking, laboratory investigations (including haemoglobin level estimation), health education, and administration of routine drugs (supplementary micronutrients - folic acid and ferrous sulphate; malaria prophylaxis; Sulfadoxine Pyrimethamine tablets; and tetanus toxoid immunization), treatment of complications such as hypertensive disorders, malaria, haemorrhage, excessive vomiting, premature rupture of membrane, urinary tract infections and vaginitis (Nyarko et al., 2006).

quality of the visit and at least four visits with well-tailored care to meet the particular needs of the woman, are encouraged (Lincetto et al., 2006). The women are also seen by the same provider on each visit. The detection and treatment of conditions, such as malaria, prevention of mother-to-child transmission of HIV/AIDS, as well as health education on preparation for birth and potential complications, are central to the care given (Nyarko et al., 2006).

One important issue that emerged from this study is that about half of the women made their first ANC visit in the second and third trimesters rather than the first trimester, and one-quarter made fewer than the recommended four visits. This trend has implications for what can be achieved by midwives and other healthcare providers in terms of disease detection, prevention and treatment as it may affect the timing of some routine elements of ANC such as screening for gestational diabetes. For example, a recent study at the Upper East Regional Hospital reported that, compared to women who commence ANC in the first trimester, those who did so in the second trimester were more anaemic (Ahenkorah, Nsiah, & Baffoe, 2016). The content of focused ANC is wide-ranging and captures major conditions that are associated with adverse maternal outcomes (Nyarko et al., 2006).

Other findings of this study that may be partly explained by inadequate ANC visits/care are the rates of low haemoglobin levels found among women on their first visit (57.4% had a haemoglobin level of <10.8g/dl) and the low uptake of malaria prophylaxis (only about 4% completed the recommended four doses). The low haemoglobin levels found in this study is consistent with the findings of Nasiru and Albert (2014) who reported that the rate of anaemia among pregnant women in the same region was 50.4%. One problem that may arise from the poor ANC attendance is that it may be difficult to raise haemoglobin levels to normal limits before term if women present for care relatively late in their pregnancies. Notably, anaemia and malaria together accounted for over 15% of maternal morbidity in the current study and were also associated with about 22% (n = 8) of foetal deaths. Other studies have considered the relationship between moderate-to-severe anaemia and perinatal outcomes. Anaemia in pregnancy has been implicated as a risk factor for adverse outcomes such as perinatal deaths (Ali & Adam, 2011; Nair et al., 2016), post-partum haemorrhage

(Frass, 2015; Kavle et al., 2008; Nair et al., 2016), low birth weight (Ali & Adam, 2011; Nair et al., 2016) and preterm birth (Ali & Adam, 2011). Increased prevalence of anaemia has also been associated with parasitic infections such as hookworm, schistosomiasis, and malaria in the Upper East Region (Ahenkorah et al., 2016; Fuseini, Edoh, Kalifa, Hamid, & Knight, 2010) and in other parts of Ghana (Tay, Nani, & Walana, 2017). Therefore, early detection and treatment of anaemia is likely to lead to improved outcomes (Ahenkorah et al., 2016).

Maternity care workers surveyed in this study reported that access barriers for pregnant women included long distances to health facilities, a lack of transport and poverty. It is important, therefore, to develop strategies to reach out to women with limited access to care. Although health service user fees in Ghana were removed for ANC, birthing and postnatal care in 2008 (Dzakpasu et al., 2012), women may still be faced with indirect costs associated with transportation, meals and the required personal supplies necessary for health facility care/births. Other unknown access barriers may also be at play. Remedial approaches must target communities with the least access such as those in rural, dispersed settlements and women who are less likely to utilise care (those living in poverty and women without adequate family support). Long-standing approaches that principally rely on pregnant women initiating care-seeking do not appear to have produced satisfactory results in the context of the study settings. Deliberate efforts by healthcare personnel to initiate contact and engage with women from early pregnancy through community outreach programmes may elicit more interest in the health promoting activities of ANC. By identifying sociodemographic characteristics of service users that potentially put them at risk of inadequate use of essential health services, health service personnel may be able to locate and follow-up on pregnant women and offer solutions to address issues.

### **7.5.2 Systemic and institutional challenges to obstetric care**

Ghana's attainment of lower middle-income status in 2010 has been the result of steady economic growth. However, this growth is not uniformly experienced across the country, partly due to underinvestment in some areas. For instance, people living in the northern regions of Ghana continue to have the highest poverty rates (Cooke et al., 2016; Save the

Children, 2012). Similarly, children belonging to poorer families are twice as likely to die in childhood than those in more affluent families (Cooke et al., 2016). Like many low- and middle-income countries, Ghana's healthcare delivery system has several challenges, including difficulties in implementing healthcare policies. For example, although the National Health Insurance Scheme in Ghana was introduced to ensure universal access to healthcare, this aim is yet to be fully realised in many parts of the country (Save the Children, 2012), especially rural areas. In addition, the National Health Insurance Scheme is underfunded (Witter & Adjei, 2007). For instance, in 2004 and 2005, fee exemption policies<sup>23</sup> within the scheme were underfunded by 34% and 73% respectively (Ridde, Robert, & Meessen, 2012). Underfunding and associated delays in reimbursement of health facilities has contributed to problems in service provision, due to the resultant financial strain to these facilities (Agyepong & Nagai, 2011; Witter & Adjei, 2007). In the past, health facilities have resorted to various actions in order to reduce losses or to enable them to financially continue providing services. Some facilities have charged insured service users for services that are eligible for fee exemption under the scheme, some have also withdrawn their services to insured clients or threatened to do so in order to recover costs of service provision (Agyepong & Nagai, 2011). Studies indicate that these funding problems negatively affect health services to pregnant women (Witter & Adjei, 2007; Witter et al., 2013). For example, some health facilities are understocked with medications due to inability to afford them or as a cost-cutting measure (Witter et al., 2013). For health facilities, the problem is compounded by the fact that uptake of health facility-based birthing services has increased significantly since the introduction of Ghana's free delivery policy, leading to increased workload and higher expenditure (Penfold, Harrison, Bell, & Fitzmaurice, 2007; Witter, Armar-Klemesu, & Dieng, 2008). These funding problems may act as a disincentive to the use of facility-based services by poorer women, where they have to pay for services or perhaps drugs and other supply shortages.

Perinatal health issues in Ghana have increasingly been recognised as important, as evidenced by the increasing number of policy initiatives by the Ministry of Health, aimed

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<sup>23</sup> As part of health policy reforms in Ghana, fee exemption policies were introduced in 2008; pregnant women and children under 18 years were offered free membership of the National Health insurance Scheme (Witter, Garshong, & Ridde, 2013).

at averting poor outcomes. The Ghana Health Service, under the Ministry of Health, oversees healthcare provision and operates at five functional levels: national, regional, district, sub-district, and community levels (Ghana Health Service, 2015b). The government is responsible for the supply and distribution of physical and human resources in public health facilities (Amporfu & Nonvignon, 2015). Findings from the current study indicate that there is inadequate provision of life-saving EmOC interventions at the community level as four out of five health facilities surveyed did not meet the criteria for basic and comprehensive EmOC. The least available basic obstetric intervention was parenteral anticonvulsants (available at just 31.7% of facilities), followed by manual removal of placenta (47.5%), removal of retained products of conception (48.3%) and parenteral antibiotics (66.7%). In light of other findings, there are several possible explanations for these results. One such explanation is reported poor skill mix, staff shortages, inadequate medical supplies and equipment, as well as inadequate in-service training. The findings suggest that there are significant challenges with human resource distribution, training and supervision in the region. Similar issues are identified by Banchani and Tenkorang (2014), who conducted a study in a similar region in Ghana, the Northern Region. Banchani and Tenkorang (2014) reported poor knowledge of health policies among midwives, inadequate in-service training, high workload, low motivation among personnel, as well as infrastructural and transport problems.

The successful functioning of an obstetric health system depends on a complex interaction of the aforementioned and other factors. Hence, the need to ensure a good balance at all levels of service provision cannot be overstated. One of the foremost consideration is the allocation of appropriately trained personnel to each level of care provision, as poor staffing contributes to work overload and poor quality care (Banchani & Tenkorang, 2014). As important as initial training/education is, health service providers need to actively seek to advance their knowledge through continuing professional development programmes, as it has important implications for the quality of maternity services. In-service training especially for CHNs working at the community level was found to be inadequate in the current study. Updates in current knowledge and skills in maternity care is crucial to ensuring evidence-based care. Respondents in this study, particularly those

within the private sector, indicated that they have limited access to in-service training programmes. A 2013 World Bank report: *Toward interventions in human resources for health in Ghana: evidence for health workforce planning and results*, provides an account of health workforce issues in Ghana. The report supports the suggestion that health workers' access to in-service training is inadequate and often perceived as unfair (Appiah-Denkyira et al., 2013). This situation of uneven access could be partly due to the fact that in-service training in Ghana is generally overseen (including planning and selection of participants) by the Ghana Health Service rather than independent agencies. It is important, therefore, to adopt transparent and fairer strategies to ensure that all health workers have access to relevant continuing education. Women are at risk of receiving suboptimal care and may not fully benefit from health programmes/policies when cared for by inadequately trained staff. For instance, in the study by Banchani and Tenkorang (2014), midwives had poor knowledge of maternal health policies in Ghana and only a few were aware of the free maternal healthcare scheme and the safe motherhood initiative. Improvements in policy dissemination between policy makers, healthcare administrators and health personnel are important to bridge these gaps between policy formulation and implementation levels (Amporfufu & Nonvignon, 2015; Banchani & Tenkorang, 2014). In addition to pre- and in-service training, maternity care personnel need to feel supported in their roles through mentoring, monitoring and supervision.

Maternal workforce improvements can have a considerable favourable impact on obstetric outcomes, but they need to be complemented by sufficient and appropriate supplies, and equipment (Amporfufu & Nonvignon, 2015; Banchani & Tenkorang, 2014). Service providers interviewed for this study cited several examples of shortages of supplies and equipment, including inadequate ANC records, essential drugs, delivery kits, and supplies for routine investigations. Weak supply chain processes resulting from a lack of training of storekeepers, inadequate inventory skills and inability to forecast future usage of supplies have been implicated as problems (Banchani & Tenkorang, 2014). In addition, poor water and electricity supply, a lack of communication equipment, a lack of functioning ambulances/vehicles, and a lack of adequate space for the provision of ANC and birthing services were mentioned frequently in this study. Better coordination between government

and health facilities could help improve the provision and maintenance of supplies and equipment (Amporfu & Nonvignon, 2015). Moreover, the government could prioritise the provision of physical infrastructure, electricity and potable water, as they not only impact health services but also the quality of life of pregnant women.

Human resource shortages and poorly-equipped health facilities may impact maternal health referral processes in many ways. In addition to the standard reasons for referral of pregnant women, the prevailing poor conditions may result in referral of women to facilities for non-medical reasons, leading to overcrowding in more advanced facilities. Despite these mitigating circumstances, referral processes and a reliable means of transporting women are not always available. A considerable amount of literature has been published on the difficulties associated with obstetric referrals in Ghana and other low- and middle-income countries (Afari, 2015; Atuoye et al., 2015; Gething et al., 2012; Pembe et al., 2010; Pirkle, Fournier, Tourigny, Sangare, & Haddad, 2011). Reported challenges include poor documentation, poor referral practices (Afari, 2015), transport problems, a lack of means of communication and long distances to facilities (Afari, 2015; Atuoye et al., 2015; Gething et al., 2012; Pirkle et al., 2011). Similarly, respondents in the present study reported that, women sometimes decline referral due to difficulties obtaining a means of transport, financial constraints or a lack of family support. Often, the eventual outcome of these challenges is a delay in arrival at the receiving facilities and associated poor health outcomes.

Another important issue that emerged from the study is the high rate of stillbirths among the study cohort. A similar study in the same region using data from the Navrongo Health and Demographic Surveillance System and covering a 7-year period reported a perinatal mortality rate<sup>24</sup> of 39 deaths per 1,000 births and a stillbirth rate 23 per 1,000 and an early neonatal death rate of 16 per 1,000 (Engmann et al., 2012). The stillbirth rate reported by Engmann et al. (2012) is slightly higher than the rate of 20 deaths per 1,000 found in this current study and may be partly explained by the fact that the database used captured

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<sup>24</sup> Perinatal mortality denotes the number of stillbirths and deaths in the first week of life (early neonatal mortality) (WHO, 2017).

facility and community-based stillbirths. Also, the reference period for the current study was over a shorter timeframe of one year. It was not possible to estimate the perinatal mortality rate in the current study since the time of death of infants after birth was not clearly recorded. The most significant complications associated with stillbirths in the current study were prolonged and obstructed labour, haemorrhage, severe malaria and severe anaemia. Yatich et al. (2010) also reported malaria, severe anaemia, intestinal parasitic infections, low serum folate concentration, previous induced abortion, and a history of stillbirth as risk factors for stillbirths in the Ashanti Region of Ghana. In contrast, Engmann et al. (2012) found that infections, birth asphyxia, birth trauma, and prematurity were responsible for over 75% of all early neonatal deaths but they did not report the specific conditions related to the stillbirths. An unexpected finding in the current study was that although babies were more likely to survive as gestational age increased, the majority of the stillbirths occurred between 33 and 40 weeks' gestation rather than earlier in the pregnancy. Also, more than half of the stillbirths (56.5%) were fresh stillbirths, which may indicate complications during the intrapartum period. Even though there is insufficient evidence to clarify the occurrence of the third trimester or term stillbirths, the combination of individual risk factors, such as anaemia and malaria, inadequate conditions of obstetric care, as well as poor ANC attendance may provide a plausible explanation. This suggestion is supported by findings of a nationally representative survey of Ghanaian women, where higher quality ANC was reported to decrease the odds of a stillbirth by nearly half. This reduction was attributable to four factors: the health education of pregnant women about complications; the type of birthing facility; type of provider; and completion of the recommended four antenatal visits (Afulani, 2016). More research is needed, however, to better understand specific causes, risk factors, and practical preventive strategies for these deaths.

Globally, sub-Saharan Africa records the highest rate of naturally occurring twin births (18 per 1,000 births) and about 20% of these twins die before the age of 5 years, making them three times more likely to die compared to singletons (Monden & Smits, 2017). The twin birth rate found in this study was comparatively higher at 31 per 1,000 births, with 7.7% reported as fresh stillbirths. The data in this current study does not cover the survival rate

of twins beyond the immediate peripatal period, however, as supported by the literature, it is important to provide special attention to women with twin pregnancies in order to improve the chances of survival (Monden & Smits, 2017).

In general, the results of this study have been supported by the wider literature on obstetric care in Ghana. Taken together, the aforementioned barriers substantially affect the type, range, and quality of maternal health services accessible to pregnant women in the region. Such findings, of predominantly supply-side barriers, are important because they are generally amenable to change and they fall within the direct remit of healthcare providers, healthcare administrators and policy-makers within Ghana's Ministry of Health.

#### **7.6 Strengths and limitations of the study**

The principal strength of the study was the methodological and data triangulation. While the cohort study provided data on the prevalence and trends in obstetric outcomes, the two surveys provided contextual information on the availability of obstetric interventions, management of complications and associated challenges. The application of multiple data sources provided complementary information that enhanced the understanding of the research findings.

Some study limitations need to be taken into account. First, primary data for the cohort study were obtained from the maternal health registers at health facilities as these facilities only enter summary reports into the data software programme. The summarised nature of that data made it unsuitable for the purpose of this study. However, obtaining data directly from the facility records presented a number of difficulties. One problem was that some of the health facilities did not have good data filing and storage systems. As a result, some paper-based records had deteriorated significantly even though the registers contained data from the previous year and had been in storage for less than a year. Other challenges were that, some registers had missing pages, illegible writing and incomplete documentation. In a few instances, records for some months were difficult to locate, as several registers were completed for each year, particularly, in higher level facilities with high patient turnover. There is the possibility that some data may have been lost due to these outlined record-

keeping problems. Nonetheless, despite the challenges encountered, all efforts were made to capture accurate data by following up on the women's records through the various maternity care units and matching the data obtained to individual women.

The second limitation of this study relates to the survey of available obstetric care interventions in health facilities. Typically, health facility reviews include a structured quality assessment of services provided through observation and usually by conducting a walk-through of the facilities to assess presence and function of required equipment and health personnel, as well as assessment of facility registers for records of service provision in the three months preceding the survey. The principal focus of the survey conducted for this study was, however, to assess the availability and readiness to provide EmOC for pregnant women in the region, hence quality of care was not assessed. In addition, it was not possible to determine the adequacy of the geographical distribution or coverage of EmOC facilities as it was beyond the scope of this study. Future studies would benefit from a structured quality inventory on health services, equipment, infrastructure and human resources through observation and other research methods.

A third limitation is that the survey of maternity care personnel did not include categories of skilled birth attendants such as physicians, medical assistants, obstetricians and gynaecologists, due to the limited number of these personnel in the region. Consequently, the associated findings cannot be assumed to apply to all skilled birth attendants in the region. Given that midwives (and to a lesser extent CHNs) provide most maternity care in the region, the cross-section of respondents included offered substantial insight into the maternity health services. To address this limitation in the future, other studies may consider inclusion of the less represented skilled health personnel in the region through qualitative studies. A qualitative approach may allow researchers to obtain a broader view of maternal healthcare challenges, particularly ones relating to specialised personnel like obstetricians.

A final limitation is that the survey of maternal healthcare workers did not capture home births, even though related literature suggests that there are a relatively high proportion of home births in the Upper East Region of Ghana.

### **7.7 Implications of the study**

This study has several implications that can help advance aspects of maternal health service in the Upper East Region and Ghana in general. These implications relate to maternal healthcare policy and funding, clinical practice, maternal health workforce issues (education, recruitment and retention), and research. They include important short- and long-term issues for consideration.

One of the central themes in the findings of this study is insufficient funding of the maternal healthcare system. Underfunding has a direct negative impact on maternal and perinatal morbidities such as non-availability of drugs and other medical supplies, and health workforce shortages. The Upper East Region could derive real benefits from modest investment in maternal healthcare infrastructure, equipment, and human resources. Each of these elements is important and needs to receive significant attention in order for the system to function effectively. Overreliance on individual components of a health system may occur to the detriment of other equally vital elements. Since the early 2000s, there has been a greater focus on the production of mid- or lower-level health personnel (Appiah-Denkyira et al., 2013) A more balanced approach to funding and implementation of health policies that also prioritises infrastructure and medical supplies/equipment could enhance outcomes.

In addition to ensuring adequate healthcare funding, the study has key clinical implications regarding ANC attendance, prevalence of anaemia, uptake of IPTp-SP, partograph use, uniformity in the application of standard clinical protocols and perinatal health outcomes. Given that poor ANC attendance has adverse implications for the prevention of anaemia, malaria, and other conditions in pregnancy, it is important to take proactive steps to improve attendance. Community level health education of pregnant women and their families could play a vital role in promoting ANC attendance and enhancing the women's

pregnancy self-care knowledge and skills. Combined efforts of midwives, CHNs and TBAs in the delivery of health education could generate greater interest from community members. This is because in general, TBAs tend to be more socially connected and engaged in community activities than midwives and CHNs. TBAs are also respected members of communities. The involvement of TBAs in community health education programmes could help establish health education or community engagement as new roles for them while facilitating community participation.

Greater communication and dissemination of standardised protocols for care is warranted to ensure that maternal health personnel have a shared understanding of clinical knowledge and skills. The high incidence of perinatal deaths in the study area is of particular concern and will require collaboration with stakeholders (pregnant women, health personnel and researchers) to adopt and implement changes. Practical measures that could be taken to ensure that information on essential clinical protocols reach healthcare personnel including provision of printouts to all staff and regular organisation of facility or unit-based study sessions by unit heads. Such meetings may provide opportunities to assist health personnel gain more insight into clinical care processes, where needed. This approach could help reduce errors in the application of clinical protocols, such as differences in drug dosages, as reported in this study. Facility or unit-based study sessions could also contribute towards continuing education, rather than relying solely on centrally planned in-service training programmes.

As evident from the literature, midwifery education, recruitment and retention in Ghana continue to evolve in response to perinatal health needs of the population. Among other objectives, some strategies adopted appear to have been aimed primarily at increasing the intake of trainees to boost the number of personnel, especially in rural and underserved communities. Despite being a valid and necessary strategy, midwifery education includes issues beyond pre-registration training of maternity care personnel. Evidence from the study indicate that, service providers did not receive regular or adequate in-service training. In addition to being a requirement for ongoing registration, additional interventions are necessary to ensure that clinicians have equal access to such training and

remain motivated to obtain continuing education. Furthermore, the findings regarding the discrepancies in the knowledge and management of obstetric complications may indicate problems in the initial and/or in-service training of personnel. An assessment of the effectiveness of in-service training may also be necessary in order to help revise and strengthen training techniques. For example, after in-service training on the use of partographs, on-the-job evaluations may be conducted using observation techniques to determine improvements in knowledge and skills of the tool. A well-structured and coordinated programme of continuing education is important to keep personnel abreast with current knowledge and skills.

Despite efforts made, maternal health workforce supply has not kept pace with the substantial healthcare needs in rural areas. Also, the workforce problems are not limited to supply or retention of personnel. Additional steps need to be taken towards development of a coherent system where all categories of personnel have a clear appreciation of their scope of practice, and legitimate expectations of their knowledge, skills and competencies. Health personnel at lower level facilities require regular and consistent clinical support through monitoring and supervision. Such support is particularly important for newly trained or less experienced frontline workers and can be achieved through the development of on-the-job mentorship or peer-support programmes. In addition, policy decisions regarding the current role of traditional birth attendants (TBAs) must be well communicated to communities to foster public understanding of the policy shift and drive early and adequate utilisation of health facility-based services. TBAs need support to be able to transition into new roles within the healthcare system, such as facilitators of facility-based care, health educators, or into other vocations outside maternal healthcare. Without active support or intervention by health policy makers, TBAs and pregnant women may not fully appreciate the need to act in accordance with current recommendations. There may be the need to introduce stricter strategies of phasing out TBAs from provision of birthing services, as their practice poses safety problems for pregnant women, and a reliance on voluntary cessation of practice may take longer to occur. Any such strategy employed must however, be sustainable and comprehensive and

take into account broader workforce issues such as long-term recruitment and retention of health staff.

One priority for maternal health research in Ghana is the development of more feasible means for the routine capture and proper storage of individual client-level data that is easily accessible for health research. Access to such data may provide insights that are not afforded by the summary data formats currently in use for district, regional and national reporting. More attention should be paid to ensuring proper storage of health records. The importance of client-level data on a national scale cannot be overstated, given that such data provide an overview of the impact of health policies and interventions on outcomes and serve as the basis for evidence-based practice. In the short-term, record-keeping units need to devise better storage systems to preserve medical records at health facilities. Low cost filing systems such as using space-saving shelving could help reduce deterioration of records.

Finally, research can influence education and practice through the examination of recently implemented midwifery education changes and their effects on outcomes. Due to targeted efforts by the government, the number of midwives produced in Ghana nearly tripled between 2003 and 2009. In all, about 21 health training schools were created by the government between 2001 and 2006 alone, and seven more were opened in the private sector or by churches (Appiah-Denkyira et al., 2013). As a result of a focus on lower-level nursing and midwifery training, community health and health assistant training schools account for the highest proportion of health training institutions, followed by nursing and midwifery schools (Appiah-Denkyira et al., 2013). A predominance of mid- lower-level trained personnel may not result in desired outcomes. The impact of changes in the recruitment and training criteria and the subsequent posting of such maternal health personnel to meet shortage gaps have not been widely assessed in Ghana. Of greater significance, is the recognition that although policy changes may be well-intended, they may not necessarily produce the results envisaged. Therefore, independent assessments could help transform the goals of such policies to better serve pregnant women and their families. A number of assessment approaches may be employed to provide a range of

evidence to support educational decision making, including observational studies, intervention studies, and qualitative approaches. In addition, peer-to-peer assessments may help improve accountability and clinical performance and also raise minimum standards.

Ghana has adopted and implemented several evidence-based health policies and interventions.<sup>25</sup> However, there are often gaps between policy guidelines and the practicality of implementation, often leading to failure or suboptimal gains from those policies (Agyepong & Nagai, 2011). Translation of research findings into clinical practice can be impeded by poor preparation, insufficient understanding of policy implications in various applied settings, as well as poor communication and cooperation between policy makers and implementers (usually, frontline health workers). Translational research has a role to play in transforming research evidence into sustainable progress for the improvement of overall outcomes.

## **7.8 Recommendations**

The following are key recommendations of the study for practice, human resources, health policy and funding, and research:

### **Practice**

Major maternal and child health issues which require greater attention in clinical practice are high maternal and perinatal morbidity and mortality. Others include women's late initiation of ANC, failure to attend the recommended number of ANC visits, a high prevalence of low haemoglobin levels among pregnant women, low uptake of malaria prophylaxis, and low usage of partographs by maternity care workers. Although listed separately, interventions for addressing the preceding findings form part of a broader strategy to address morbidity and mortality.

The prevalence of maternal and perinatal morbidity and mortality was high in the Upper East Region. As evident from the study findings and current literature, there are multiple factors that contribute to these outcomes, including deficiencies in the healthcare delivery system and individual/household level influences. The WHO has recommended evidence-

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<sup>25</sup> See Chapter Two Pp 63 – 67.

based interventions to improve maternal and newborn health through increased access and use of skilled care. Based on the findings of the current study, important components of the WHO recommendations that could be of relevance in the study setting include male involvement in maternal and neonatal interventions, partnership with TBAs, community participation in programme planning and implementation, and community-organised transport schemes.

Partners of pregnant women could be encouraged to play more active and positive roles in women's health-seeking behaviour and self-care during pregnancy. For instance, men could be encouraged to attend ANC and other health appointments with their partners. This will provide opportunities to reach men with health education on pregnancy and childbirth, available services and information on advanced planning for accessing those services. The aim is to facilitate the planning and the decision-making processes regarding issues such as use of skilled antenatal, childbirth and postnatal services and timely use of those services.

The high incidence of obstetric complications, such as hypertensive disorders, malaria, anaemia and stillbirths, could be reduced through effective use of antenatal services. In order to optimise ANC services as a means of promoting healthy pregnancies and childbirth, it is essential to devise ways to encourage early initiation of ANC attendance and boost the number of visits. Improvements in ANC attendance alone could favourably influence related issues such as low haemoglobin levels, perinatal mortality and low uptake of malaria prophylaxis, which were also identified as problems in the current study. A practical option may be the employment of TBAs in non-clinical maternity care such as health education within communities, and provision of follow-up reminders for maternal health appointments. This approach would utilise existing lay maternal healthcare workers who are well-connected to their communities and familiar with the traditions and cultures that might cause concern for some women. Therefore, engaging TBAs offers the potential to influence health-seeking behaviour positively. This strategy will require training of TBAs in a new role as maternity care liaisons; but in Ghana where there are low levels of skilled staff, it is likely to be cost-effective, as it would allow skilled staff to focus on areas requiring more advanced care. In addition, this may be a useful way of redirecting TBAs away from providing birthing services as they may be engaged in a meaningful manner

within an integrated healthcare system. TBAs are often given gifts by pregnant women in appreciation of services provided. However, if engaged by the government, they will need to be recompensed so as to reduce the motivation to continue providing birthing services.

One way of building an interest in maternal health issues is by engaging community members in the planning and implementation of health programmes. In addition to promoting awareness of maternal and child health issues, the use of community-organised resources, such as transportation services for pregnant women, could help address needs in maternal health.

Apart from the WHO recommendations, a significant area that requires attention is the development of a well-structured continuing professional development plan, monitored by maternal health regulatory bodies in Ghana. Such a plan could provide a framework for the appropriate implementation of in-service training. There should be a shared understanding of core areas of training, the content of training, frequency and duration of training for all categories of maternal health staff. Also, staff training should be specific to their scope of practice, and clinical practice protocols should be readily available in maternal health units for reference purposes. On-going support and supervision of staff is vital for the maintenance of high standards of care. With regards to low levels of adherence to protocols, such as the partograph, it is important to investigate the exact reasons associated with low usage in order to better address such concerns. The problem may be simply related to availability partographs or limited understanding of use of the tool. Addressing reasons for low usage is important because a focus on training to the neglect of other influences may not yield desired results.

#### Human resources

Different types of human resource problems were identified in the study area. They include deficiencies in the recruitment, education and training of maternal health personnel.

#### Recruitment

This study showed that there were staff shortages and a poor staff mix for the provision of maternity care in the Upper East Region. It is important that greater investments in midwifery training are made as more midwives are needed to fill gaps in the workforce. Human resource, recruitment and retention strategies are also required to change this

situation and to successfully support the changing needs of a healthcare system. This is particularly important when structuring interventions for the training and distribution of various levels of maternity care personnel. In addition to the broader conditions of service for health personnel, the particular needs of midwives and other personnel working in rural and remote communities should be addressed to motivate staff to remain and serve such communities and also to encourage others to accept postings to those areas. One important need often cited is the need to increase the remuneration of midwives working in these communities.

#### Education and training

An equally important issue is the type/level of staff training. As reported in the literature and evident in the study, a high number of CHNs have been trained and are currently providing maternity care. Given the range/level of care that may be required by pregnant women, it is important to invest limited resources in the training of midwives to international standards. Although, a greater focus on midwifery training may seem cost-intensive initially, the approach has a higher potential to avert adverse maternal health outcomes and ultimately reduce healthcare costs through the provision of higher standards of care.

#### Health policy and funding

One of the key findings in this study was the low number of health facilities that met the criteria for provision of basic and comprehensive EmOC. Although the CHPs initiative has helped in increasing the number of health facilities within communities, its purpose could be better served if most facilities are upgraded to provide all the interventions required under basic EmOC. Such efforts could help reduce the caseloads at higher level facilities and allow for more efficient use of healthcare resources. At the health facility level, a lack of basic obstetric drugs, medical supplies and equipment, not only impede good quality service provision but also act as a disincentive to service providers. Other investments in essential amenities/services such as reliable sources of water and electricity, improved transportation and communications systems may facilitate improvements in health services and also enhance the general standards of living of community members and health staff.

## Research

In this study, the management and referral of obstetric complications and the factors that contribute to adverse outcomes in the Upper East Region were examined. Areas where further research is needed, or where a more in-depth assessment or different methodological approach is required are identified and discussed below.

The project scope and timelines did not allow for inclusion of pregnant women as participants/respondents, for instance, to investigate the barriers and facilitators for antenatal attendance. Hence, it was not possible to directly examine the opinions of women on utilisation of obstetric care and other concerns. Also, specialist maternal health professionals were not included in this study due to their very limited numbers. Future studies will benefit from the inclusion of a wider range of respondents using quantitative and qualitative techniques, as appropriate, to elicit desired outcomes.

Another avenue for future research is the use of observation techniques (including inventories and checklists) in the assessment of the capacity of health facilities to provide EmOC interventions. In addition, a combination of observation techniques and follow-up surveys may be useful in the assessment of clinical practice regarding obstetric complications as it could provide a better understanding of the context of maternal health service delivery. Such a process will also reduce the likelihood of reporting bias by respondents. For instance, where indicated in the obstetric care records, partograph use was assessed in the cohort study by noting if it was employed. Furthermore, respondents reported on how long ago they had used a partograph in a survey. In both instances, it was not possible to validate its actual application and whether it was done correctly, an issue which can be better explored through observation.

Presently, research underpins most healthcare decision-making at all levels, including education, practice, policy and outcomes. Frontline maternity care personnel as well as health policy-makers need to continually assess the effectiveness of existing interventions while adopting the best means of implementing new research evidence or outcomes.

## **7.9 Conclusion**

In this study, an assessment of obstetric outcomes, availability of obstetric interventions and management of complications by skilled and lay maternity care workers in the Upper East Region was conducted. The findings showed that significant proportions of adverse maternal and perinatal health outcomes resulted from preventable and modifiable risk factors among pregnant women. Although there were health services dedicated to the reduction of such risk factors, existing barriers made it difficult to provide high quality services and for pregnant women to access the services. Overall, Ghana's efforts so far have demonstrated sustained interest and drive to remove obstacles to healthcare access and to improve the quality of care of pregnant women. However, past efforts have not been enough to reach set targets for the reduction of maternal and perinatal morbidity and mortality. In order to strengthen the maternal healthcare system, substantial investment in human resource, particularly midwifery recruitment, retention and education; infrastructure; and research is necessary to inform future health planning and policy.

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## APPENDICES

### Appendix I: Sample Search Strategy for systematic review

#### Pubmed search strategy

Obstetric care barriers and sub-saharan africa	(obstetric[All Fields] AND barriers[All Fields] AND ("africa south of the sahara"[MeSH Terms] OR ("africa"[All Fields] AND "south"[All Fields] AND "sahara"[All Fields]) OR "africa south of the sahara"[All Fields] OR ("sub"[All Fields] AND "saharan"[All Fields] AND "africa"[All Fields]) OR "sub saharan africa"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])
maternity care barriers and sub saharan africa	((("obstetrics"[MeSH Terms] OR "obstetrics"[All Fields] OR ("maternity"[All Fields] AND "care"[All Fields]) OR "maternity care"[All Fields]) AND barriers[All Fields] AND ("africa south of the sahara"[MeSH Terms] OR ("africa"[All Fields] AND "south"[All Fields] AND "sahara"[All Fields]) OR "africa south of the sahara"[All Fields] OR ("sub"[All Fields] AND "saharan"[All Fields] AND "africa"[All Fields]) OR "sub saharan africa"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])
maternity care access and sub saharan africa	obstetric[All Fields] AND care[All Fields] AND access[All Fields] AND ("africa south of the sahara"[MeSH Terms] OR ("africa"[All Fields] AND "south"[All Fields] AND "sahara"[All Fields]) OR "africa south of the sahara"[All Fields] OR ("sub"[All Fields] AND "saharan"[All Fields] AND "africa"[All Fields]) OR "sub saharan africa"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])
Obstetric care access and sub-saharan africa	(obstetric[All Fields] AND care[All Fields] AND access[All Fields] AND ("africa south of the sahara"[MeSH Terms] OR ("africa"[All Fields] AND "south"[All Fields] AND "sahara"[All Fields]) OR "africa south of the sahara"[All Fields] OR ("sub"[All Fields] AND "saharan"[All Fields] AND "africa"[All Fields]) OR "sub saharan africa"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])
obstetric care access and developing countries	(obstetric[All Fields] AND care[All Fields] AND access[All Fields] AND ("developing countries"[MeSH Terms] OR ("developing"[All Fields] AND "countries"[All Fields]) OR "developing countries"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])
maternity care access and developing countries	((("obstetrics"[MeSH Terms] OR "obstetrics"[All Fields] OR ("maternity"[All Fields] AND "care"[All Fields]) OR "maternity care"[All Fields]) AND access[All Fields] AND ("developing countries"[MeSH Terms] OR ("developing"[All Fields] AND "countries"[All Fields]) OR "developing countries"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])

	countries"[MeSH Terms] OR ("developing"[All Fields] AND "countries"[All Fields]) OR "developing countries"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])
obstetric care barriers and developing countries	(obstetric[All Fields] AND care[All Fields] AND barriers[All Fields] AND ("developing countries"[MeSH Terms] OR ("developing"[All Fields] AND "countries"[All Fields]) OR "developing countries"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])
maternity care barriers and developing countries	(("obstetrics"[MeSH Terms] OR "obstetrics"[All Fields] OR ("maternity"[All Fields] AND "care"[All Fields]) OR "maternity care"[All Fields]) AND barriers[All Fields] AND ("developing countries"[MeSH Terms] OR ("developing"[All Fields] AND "countries"[All Fields]) OR "developing countries"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])
place of delivery and sub-saharan africa	(place[All Fields] AND ("delivery, obstetric"[MeSH Terms] OR ("delivery"[All Fields] AND "obstetric"[All Fields]) OR "obstetric delivery"[All Fields] OR "delivery"[All Fields]) AND ("africa south of the sahara"[MeSH Terms] OR ("africa"[All Fields] AND "south"[All Fields] AND "sahara"[All Fields]) OR "africa south of the sahara"[All Fields] OR ("sub"[All Fields] AND "saharan"[All Fields] AND "africa"[All Fields]) OR "sub saharan africa"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])
place of delivery and barriers and sub-saharan africa	(place[All Fields] AND ("delivery, obstetric"[MeSH Terms] OR ("delivery"[All Fields] AND "obstetric"[All Fields]) OR "obstetric delivery"[All Fields] OR "delivery"[All Fields]) AND barriers[All Fields] AND ("africa south of the sahara"[MeSH Terms] OR ("africa"[All Fields] AND "south"[All Fields] AND "sahara"[All Fields]) OR "africa south of the sahara"[All Fields] OR ("sub"[All Fields] AND "saharan"[All Fields] AND "africa"[All Fields]) OR "sub saharan africa"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])
place of delivery and developing countries	(place[All Fields] AND ("delivery, obstetric"[MeSH Terms] OR ("delivery"[All Fields] AND "obstetric"[All Fields]) OR "obstetric delivery"[All Fields] OR "delivery"[All Fields]) AND ("developing countries"[MeSH Terms] OR ("developing"[All Fields] AND "countries"[All Fields]) OR "developing countries"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])
place of delivery and barriers and developing countries	(place[All Fields] AND ("delivery, obstetric"[MeSH Terms] OR ("delivery"[All Fields] AND "obstetric"[All Fields]) OR "obstetric delivery"[All Fields] OR "delivery"[All Fields]) AND barriers[All Fields] AND ("developing countries"[MeSH Terms] OR ("developing"[All Fields] AND "countries"[All Fields]) OR "developing countries"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])

skilled birth attendance and sub-saharan africa	(skilled[All Fields] AND ("parturition"[MeSH Terms] OR "parturition"[All Fields] OR "birth"[All Fields]) AND attendance[All Fields] AND ("africa south of the sahara"[MeSH Terms] OR "africa"[All Fields] AND "south"[All Fields] AND "sahara"[All Fields]) OR "africa south of the sahara"[All Fields] OR ("sub"[All Fields] AND "saharan"[All Fields] AND "africa"[All Fields]) OR "sub saharan africa"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])
obstetric care access and haemorrhage and sub-saharan africa	(obstetric[All Fields] AND care[All Fields] AND access[All Fields] AND ("haemorrhage"[All Fields] OR "hemorrhage"[MeSH Terms] OR "hemorrhage"[All Fields]) AND ("africa south of the sahara"[MeSH Terms] OR ("africa"[All Fields] AND "south"[All Fields] AND "sahara"[All Fields]) OR "africa south of the sahara"[All Fields] OR ("sub"[All Fields] AND "saharan"[All Fields] AND "africa"[All Fields]) OR "sub saharan africa"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])
access and eclampsia and sub-saharan africa	(access[All Fields] AND ("eclampsia"[MeSH Terms] OR "eclampsia"[All Fields]) AND ("africa south of the sahara"[MeSH Terms] OR ("africa"[All Fields] AND "south"[All Fields] AND "sahara"[All Fields]) OR "africa south of the sahara"[All Fields] OR ("sub"[All Fields] AND "saharan"[All Fields] AND "africa"[All Fields]) OR "sub saharan africa"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])
obstetric care access and sepsis and sub-saharan africa	(obstetric[All Fields] AND care[All Fields] AND access[All Fields] AND ("sepsis"[MeSH Terms] OR "sepsis"[All Fields]) AND ("africa south of the sahara"[MeSH Terms] OR ("africa"[All Fields] AND "south"[All Fields] AND "sahara"[All Fields]) OR "africa south of the sahara"[All Fields] OR ("sub"[All Fields] AND "saharan"[All Fields] AND "africa"[All Fields]) OR "sub saharan africa"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])
obstetric care access and obstructed labour and sub-saharan africa	(obstetric[All Fields] AND care[All Fields] AND access[All Fields] AND obstructed[All Fields] AND ("labour"[All Fields] OR "work"[MeSH Terms] OR "work"[All Fields] OR "labor"[All Fields] OR "labor, obstetric"[MeSH Terms] OR ("labor"[All Fields] AND "obstetric"[All Fields]) OR "obstetric labor"[All Fields]) AND ("africa south of the sahara"[MeSH Terms] OR ("africa"[All Fields] AND "south"[All Fields] AND "sahara"[All Fields]) OR "africa south of the sahara"[All Fields] OR ("sub"[All Fields] AND "saharan"[All Fields] AND "africa"[All Fields]) OR "sub saharan africa"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])
access to abortion care and sub-saharan africa	(access[All Fields] AND ("abortion, induced"[MeSH Terms] OR "abortion"[All Fields] AND "induced"[All Fields]) OR "induced abortion"[All Fields] OR "abortion"[All Fields]) AND care[All

	Fields] AND ("africa south of the sahara"[MeSH Terms] OR ("africa"[All Fields] AND "south"[All Fields] AND "sahara"[All Fields]) OR "africa south of the sahara"[All Fields] OR ("sub"[All Fields] AND "saharan"[All Fields] AND "africa"[All Fields]) OR "sub saharan africa"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])
barriers to safe abortion care in sub-saharan africa	(barriers[All Fields] AND safe[All Fields] AND ("abortion, induced"[MeSH Terms] OR ("abortion"[All Fields] AND "induced"[All Fields]) OR "induced abortion"[All Fields] OR "abortion"[All Fields]) AND care[All Fields] AND ("africa south of the sahara"[MeSH Terms] OR ("africa"[All Fields] AND "south"[All Fields] AND "sahara"[All Fields]) OR "africa south of the sahara"[All Fields] OR ("sub"[All Fields] AND "saharan"[All Fields] AND "africa"[All Fields]) OR "sub saharan africa"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])
obstetric care barriers maternal morbidity in sub-saharan africa	(obstetric[All Fields] AND care[All Fields] AND barriers[All Fields] AND ("mothers"[MeSH Terms] OR "mothers"[All Fields] OR "maternal"[All Fields]) AND ("epidemiology"[Subheading] OR "epidemiology"[All Fields] OR "morbidity"[All Fields] OR "morbidity"[MeSH Terms]) AND ("africa south of the sahara"[MeSH Terms] OR ("africa"[All Fields] AND "south"[All Fields] AND "sahara"[All Fields]) OR "africa south of the sahara"[All Fields] OR ("sub"[All Fields] AND "saharan"[All Fields] AND "africa"[All Fields]) OR "sub saharan africa"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])
obstetric care barriers and pregnancy in sub-saharan africa	(obstetric[All Fields] AND care[All Fields] AND barriers[All Fields] AND ("pregnancy"[MeSH Terms] OR "pregnancy"[All Fields]) AND ("africa south of the sahara"[MeSH Terms] OR ("africa"[All Fields] AND "south"[All Fields] AND "sahara"[All Fields]) OR "africa south of the sahara"[All Fields] OR ("sub"[All Fields] AND "saharan"[All Fields] AND "africa"[All Fields]) OR "sub saharan africa"[All Fields])) AND ("2000/01/01"[PDAT] : "2015/12/31"[PDAT])

## Appendix II

### Quality assessment using the Mixed Methods Appraisal Tool (for systematic review)

#### 1) Qualitative studies

Qualitative studies	Afari et al. (2013)	Bazzano et al. (2008)	Bedford et al. (2013)	Chapman (2003)	Somé et al. (2014)	Atuoye et al. (2015)	Atuyambe et al. (2009)	Moyer et al. (2013a)	Moyer et al. (2013b)	Cham et al. (2005)	Crissman et al. (2013)	Chi et al. (2015)	Cofie et al. (2015)	Kaye et al. (2014)	Chapman et al. (2003)	Dahlberg et al. (2015)	De Allegri et al. (2015)	Echoka et al. (2014)	Essendi et al. (2015)	Essendi et al. (2010)	Garle et al. (2014)	Garle (2015)	Gebrehiwot et al. (2014)	Gebrehiwot et al. (2012)	Grossmann-Kendall et al. (2001)	Lori and Boyle, (2011)	Kawuwa et al. (2007)	
Source of data	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Methods of analysis	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Context	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Reflexivity	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	1	1	0	0	0	1	1	1	1	1	1	1	0
Overall	3	3	3	3	3	3	3	4	4	3	4	3	3	3	3	4	4	3	3	3	4	4	4	4	4	4	4	3

Qualitative studies	Kaye et al. (2000)	Keri et al. (2010)	Schack et al. (2014)	Seljeskog et al. (2006)	Sialabanje et al. (2015)	Spangler and Bloom. (2011)	King et al. (2015)	Kumbani et al. (2013)	Kwagala (2013)	Magoma et al. (2010)	Mahiti et al. (2015)	Mills and Bertrand (2005)	Mkoka et al. (2014)	Mselle et al. (2013)	Mwangome et al. (2012)	O'Donnell et al. (2014)	Okafor et al. (2014)	Petersson et al. (2003)	Ridge et al. (2010)	Roro et al. (2014)	Izugbara et al. (2009)
Source of data	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Methods of analysis	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Context	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Reflexivity	0	1	1	1	1	1	1	0	0	1	1	1	1	1	0	0	0	1	1	1	1
Overall	3	4	4	4	4	4	4	3	3	4	4	4	4	4	3	3	3	4	4	4	4

## 2) Quantitative descriptive studies

Quantitative descriptive	Adamu & Salihu, (2013)	Aarnio et al. (2013)	Adewemimo et al. (2013)	Alemayehu and Mekonnen (2015)	Joharifard et al. (2012)	Bayley et al. (2013)	Bayou and Gacho (2013)	Tam et al. (2007)	Teferra et al. (2012)	Chaibva et al. (2009)	De Allegri et al. (2011)	Faye et al. (2011)	Feinstein et al. (2013)	Sakeah et al. (2014)	Habte and Demissie (2015)	Kawakatsu et al. (2014)	Amano et al. (2012)	Anyait et al. (2012)	Azuogu et al. (2011)	Egbewale and Desele (2000)	Exavery et al. (2014)	Fekede and Gabremariam, (2007)	Fikre and Demissie, (2012)	Groen et al. (2013)	Hagos et al. (2014)	Rockers et al. (2009)	Ikeako et al. (2006)
sampling strategy	0	1	1	1	0	1	1	1	1	0	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	0	1
representative sample	0	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
appropriate measurements	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
response rate	1	1	1	0	1	0	1	1	1	1	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Overall	2	4	4	3	3	3	4	4	4	2	4	3	3	4	4	4	4	4	4	4	3	4	4	4	4	3	4

Quantitative descriptive	Tsegay et al. (2013)	Vallières et al. (2013)	Van den Boogaard et al. (2008)	van den Broek et al. (2003)	Wado et al. (2013)	Wanjira et al. (2011)	White et al. (2013)	Wilunda et al. (2013)	Worku et al. (2013a)	Worku et al. (2013B)	Kinuthia et al. (2015)	Jennings et al. (2015)	Harfouche et al. 2015	Wilunda et al. 2015a	Wilunda et al. 201b)	Lakew et al. (2015)	Mazalale et al. (2015)	Semali et al. (2015)	Telfer et al. (2002)	Nakua et al. (2015)	Ntambue et al. (2012)	Silal et al. (2014)	Ono et al. (2013)	Speizer et al. (2014)	Ildris et al. (2006)	Oguntunde et al. (2010)	Ejembi et al. (2004)
Sampling strategy	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1
Representative sample	1	1	0	1	1	0	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1
Appropriate measurements	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Response rate	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Overall	4	4	3	4	4	2	4	3	4	4	4	3	4	4	3	4	4	4	4	4	4	4	2	4	4	4	4

Quantitative descriptive	Kabakyenga et al. (2011)	Kruk et al. (2010)	Kujawski et al. (2015)	Lerberg et al. (2014)	Ng'anjo Phiri et al. (2014)	Lule et al. (2000)	Mbiza et al. (2014)	Medema-Wijnveen et al. (2012)	Mills et al. (2008)	Mpembeni et al. (2007)	Mugweni et al. (2008)	Olusanya et al. 2010	Onah et al. (2006)	Peltzer et al. (2006)	Peltzer et al. (2005)	Prudhomme O'Meara et al. (2013)
sampling strategy	1	1	0	1	0	1	1	1	1	1	0	0	1	1	0	1
representative sample	1	1	0	0	1	1	1	0	1	1	0	1	1	1	0	1
appropriate measurements	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
response rate	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Overall	4	4	2	3	3	4	4	3	4	4	2	3	4	4	2	4



Quantitative descriptive component	Anastasi et al. (2015)	Austin et al. (2015)	Braddick et al. (2015)	Conrad et al. (2012)	Ijadunola et al. (2010)	Birmeta et al. (2013)	Doctor et al. (2012)	Hailu and Berhe, 2014	Kyomuhendo (2003)	Tlebere et al. (2007)	Tita et al. (2005)	Silal et al. (2012)	Shiferaw et al. (2013)	Nyango et al. (2010)	Nwameme et al. (2014)	Mwaniki et al. (2002)	Mselle et al. (2011)	Tsawe and Susuman, (2014)	Oiyemhonlan et al. (2013)	Oguntunde et al. (2015)	Pfeiffer and Mwaipopo (2013)	MacKeith et al. (2003)	Asres and Davey, (2015)	Dutamo et al. (2015)	Stekelenburg et al. (2004)	Mriho et al. (2007)	Sorensen et al. (2011)	Singh et al. (2015)	Osubor et al. (2005)		
Sampling strategy	1	1	1	0	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0	0	0	1	1	0	1	0	1	1	0	
Representative sample	1	1	0	1	1	1	1	1	1	0	1	0	1	1	0	0	0	0	0	1	1	1	1	1	1	1	0	1	1	1	
Appropriate measurement	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Response rate	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Overall	4	4	3	3	3	4	4	4	4	3	4	3	3	3	3	3	3	3	2	3	3	3	4	4	3	4	2	4	3		

Mixed methods design	Anastasi et al. (2015)	Austin et al. (2015)	Braddick et al. (2015)	Conrad et al. (2012)	Ijadunola et al. (2010)	Birmeta et al. (2013)	Doctor et al. (2012)	Hailu and Berhe, (2014)	Kyomuhendo (2003)	Tlebere et al. (2007)	Tita et al. (2005)	Silal et al. (2012)	Shiferaw et al. (2013)	Nyango et al. (2010)	Nwameme et al. (2014)	Mwaniki et al. (2002)	Mselle et al. (2011)	Tsawe and Susuman, (2014)	Oiyemhonlan et al. (2013)	Oguntunde et al. (2015)	Pfeiffer and Mwaipopo (2013)	MacKeith et al. (2003)	Asres and Davey, (2015)	Dutamo et al. (2015)	Stekelenburg et al. (2004)	Mriho et al. (2007)	Sorensen et al. (2011)	Singh et al. (2015)	Osubor et al. (2005)	Storeng et al. (2007)	
Relevant design	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Integration of data	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1
Limitations	0	0	0	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Overall	2	2	2	3	3	2	2	3	2	2	3	3	2	1	2	1	2	2	1	2	2	1	2	2	2	2	2	3	2	2	2

### Appendix III: Characteristics of included studies (systematic review)

**Additional file 3: Table S1: Characteristics of included studies**

No	Author/year	Country	Study Design and data collection method	study population/ participants	Study objectives	Outcomes of interest to the review	Quality assessment score (%)
1	Adamu and Salihu, (2002)	Nigeria	Quantitative study: survey	107 pregnant women between gestational age range of 8–40 weeks	To identify sociocultural and economic factors that act as barriers to women's use of antenatal care services and hospital delivery	Economic, cultural and other barriers related to women's perception of their condition. They include limited financial means, religious reasons, husband's denial, low health literacy, negligence, ignorance, distance	50
2	Amano et al. (2012)	Ethiopia	Quantitative study: survey	Stratified cluster sampling used to select 855 mothers who gave birth 12 months before the study	To determine the level of institutional delivery service utilization and associated factors.	Low educational level, viewing home delivery as usual practice and feeling more comfortable with home delivery, long distance to health facility, labour being urgent, lack of money	100
3	Anyait et al. (2012)	Uganda	Quantitative study: survey	500 women who had a delivery in the two years before survey. Household socio-economic status was assessed.	To identify the independent predictors of health facility delivery	Being from households of low social economic status, having at least 4 births, limited access to transport. Also, women who made the decision to attend antenatal on their own were more likely to deliver in health facilities but women who had autonomy in deciding on place of delivery were less likely to deliver in health facilities.	100
4	Azuogu et al. (2011)	Nigeria	Quantitative study: survey	430 women (15 to 49 years) who had carried at least one pregnancy to term in the previous 5 years	To identify factors affecting utilization of antenatal care services	Low annual household income, low level of couple's education, perception that antenatal care was not different from facility care, being unaware of antenatal care, distance to facility, cultural beliefs, cost of care, and need for husband's permission	100

5	Birmeta et al. (2013)	Ethiopia	Mixed methods study: survey and focus group discussions	419 women who had given birth in the past three years prior to survey and focus groups	To assess the determinants of maternal health care utilization	Reasons for non-attendance of antenatal clinic include absence of illness, no or little knowledge about antenatal care, being too busy, long waiting times, husband's disapproval, poor quality of service, long distances. Reasons for home delivery include having relatives nearby, mistreatment by health workers, trust in traditional birth attendants, transport problems, smooth labour, cost of care, high parity, low literacy status of women, lower average monthly family income, low media exposure, distance to health institutions	75
6	Chaibva et al. (2009)	Zimbabwe	Quantitative, non-experimental, descriptive research design	Purposive, non-probability sample of 80 adolescent mothers from the postnatal wards who had delivered their babies without attending antenatal care.	To identify factors influencing adolescents' non-utilisation of antenatal care services	Fear of disclosing the pregnancy, feeling well and the fact that the baby was kicking, no money to register for antenatal care, limited knowledge about antenatal care and its benefits, no required documents to register for antenatal care, attended clinic with traditional birth attendants and religious factors	50
7	De Allegri et al. (2011)	Burkina Faso	Quantitative: household survey	435 women who reported a pregnancy in the prior 12 months	To identify determinants of utilisation for ANC and skilled attendance at birth after a substantial reduction in user fees	Distance from a health facility, traditional African religion, ethnicity (specifically being Samo or Marka), and higher levels of household wealth were all negatively associated with antenatal care utilisation.	100
8	Doctor et al. (2012)	Nigeria	Mixed methods: survey, key informant interviews and focus group discussions	Survey of 6,882 married women, 119 interviews and 95 focus group discussions with community and local government	To determine reasons for low utilisation of antenatal and delivery care among women with recent	Most pregnant women had little or no contact with the health care system for reasons of custom, lack of perceived need, distance, lack of transport, lack of spousal permission, cost and/or unwillingness to see a male doctor, staff shortages, preference for privacy of their home	75

				leaders, traditional birth attendants, women who had attended maternity services and healthcare providers.	pregnancies, and the socio-cultural beliefs and practices that influenced them.		
9	Egbewale and Bamidele, (2009)	Nigeria	Quantitative: survey	387 adult women who were pregnant or had a child	To examine current level of utilisation of maternal health care in rural and peri-urban communities	Reasons for irregular or non-attendance of antenatal care included not feeling unwell, lack of finance or being busy Reasons for non-use of maternity services were lack of finance, perception that it was unnecessary, religious beliefs or being unaware of the need to use those services.	100
10	Ekele and Tunau, (2007)	Nigeria	Quantitative: Longitudinal study	1,080 pregnant women of low risk who initiated antenatal care at the University Teaching Hospital	To determine the proportion of pregnant women who had antenatal care and delivered in the hospital and the reasons for delivery elsewhere	Reasons for births outside a health facility were privacy lack of transport during labour, precipitate/'fast' labour, husband/in-law's choice, bad attitude of hospital staff, and cost of hospital delivery.	75
11	Exavery et al. (2014)	Tanzania	Quantitative: survey	915 women of reproductive age who had given birth in the two years prior to the survey.	To assess facilitators and barriers to institutional delivery in three districts of Tanzania.	Ethnic background, sudden onset of labour, distance to a health facility, unaffordability of transportation cost, woman's preference, poor quality of care at the facilities and facility not opened.	75
12	Fekede and Gabremariam, (2007)	Ethiopia	Quantitative: survey	360 pregnant women in six urban sub-cities	Assess antenatal utilisation and factors associated with non-attendance	Service costs, lack of respect from service providers, long waiting times, lack of knowledge about its importance, and lack of privacy	100
13	Fikre and Demissie, (2012)	Ethiopia	Quantitative: survey	506 women who gave birth in the last two years	Determine the prevalence of institutional delivery and understand the	Rural residence, low educational level, sudden onset of labour, lack of transport facilities, lack of money for transportation and social stigma of being considered as weak by the mother and the mother's family	100

					factors associated with institutional delivery	members for utilising a health facility for delivery. Low decision-making power of the women and lack of financial resources or income in the rural mothers	
14	Groen et al. (2013)	Sierra Leone	Quantitative: household survey	1,205 females of reproductive age (12–50 years of age)	To describe the current status of access to maternal care, family planning use, and place of delivery.	Financial constraints, having no time, care being unavailable, and difficulty organising transportation	100
15	Hagos et al. (2014)	Ethiopia	Quantitative: survey	4,949 women who delivered in the two years preceding the survey in 12 randomly selected villages	To determine the magnitude and identify factors affecting delivery at health institution in two districts	Lower maternal age, low educational status, lower wealth status, religion, occupation women autonomy, non-attendance of antenatal care services, and number of pregnancies, distance, quality and availability of services and perceived providers' competence.	100
16	Hailu and Berhe, (2014)	Ethiopia	Mixed methods: survey, focus group discussions and in-depth interviews	485 mothers selected systematically using multistage sampling technique; men and women (36 discussants in total) and six health extension workers in-depth interviews	To explore the determinants of institutional childbirth service utilization among urban and rural women	Lack of health care information, low decision-making autonomy, low level of education. Reasons for home birth included to get close attention from family, dislike institutional delivery service, feel comfortable when giving birth at home, labour being urgent, husband's influence, not being sick, other family members influence, bad approach of health workers, health facility being far, previous bad experience, previous home delivery was normal, lack of money for transport, traditional birth attendants being present/available	75

17	Hounton et al. (2008)	Burkina Faso	Quantitative: intervention study	A census of all women aged 12–49 years in two districts and all 43 health facilities in two districts. In one districts, a safe motherhood initiative to improve access to skilled care was implemented. Each health centre in an intervention and comparison district was assessed in terms of staffing and physical functioning.	To evaluate the relationships between accessibility, functioning of health centres and utilisation of delivery care	Distance to health facility, level of education and asset ownership were major determinants of delivery care utilisation, but no association was found between the functioning of health centres and institutional birth rates or births by Caesarean section.	100
18	Ijadunola et al. (2010)	Nigeria	Mixed methods: semi-structured questionnaire and non-participant observation	Census of all 152 health workers employed in the maternity units of public health facilities offering maternity care in 5 cities of 2 states and non-participant observation of maternity staff during antenatal clinic sessions using a structured checklist	To assess knowledge of maternity unit operatives about the concept of emergency obstetric care and investigated the contents of antenatal care counselling services	Staff had poor knowledge of EmOC and most did not provide specific client-centred messages such as birth preparedness and warning/danger signs of pregnancy and delivery in antenatal care sessions. Lack of competency-based in-service training programmes	75
19	Ikeako et al. (2006)	Nigeria	Quantitative: survey	1,095 women who had a delivery in the 3 months preceding the first day of data collection	To determine the current influence of formal maternal education and other factors on the choice of place of delivery by pregnant	Low educational status, rural residence, inability to afford cost of care, religious reasons, fear of caesarean delivery, the advice of husband, promptness of care, fear of blood transfusion and privacy.	100

					women		
20	Joharifard et al. (2012)	Rwanda	Quantitative: survey	895 women aged 18–50 who had given birth in the previous three years.	To quantify secular trends in health facility delivery and to identify factors that affect the uptake of intrapartum healthcare services.	Higher parity, low educational status, long distances to facility and a history of an offspring death	75
21	Kabakyenga et al. (2011)	Uganda	Quantitative: survey	759 women who had delivered within 12 months prior the date of the survey and had complete data on the outcome of interest (assistance by skilled birth attendant).	To assess the influence of birth preparedness practices and decision-making and assistance by skilled birth attendants	Rural residence, low levels of education, low socio-economic status, long distance to facility, non-attendance of antenatal care and lack of birth preparation. Where the women made the final decision in consultation with their husbands the likelihood of choosing assistance by skilled birth attendants was significantly higher than when women made the decision on location of birth alone.	100
22	Kruk et al. (2010)	Tanzania	Quantitative: survey	1205 women over the age of 18 with a delivery within the previous five years	To estimate the contribution of individual and community factors in explaining variation in the use of health facilities for childbirth	Having no health insurance, higher parity,	100
23	Lule et al. (2000)	Malawi	Quantitative: survey	Women aged between 15 and 49 years, who had delivered at least one child	To determine antenatal attendance and place of delivery of women and how they perceived the quality of health care provided	Family refusal of use of health facility, facilities at the health centre lack of privacy, lack of drugs, poor ambulance service, poor laboratory services, and long waiting time	100

24	Mbiza et al. (2014)	Malawi (rural)	Quantitative: survey	240 adolescents pregnant for the first time, between 13 and 19 years and those who delivered their first infant within the previous 6 months	Barriers to health-seeking practices during pregnancy among adolescents	Low decision-making autonomy, low level of education, low health literacy, psychological factors such as shyness, fear stigma and health service factors such as long distance to the facility, a lack of adolescent friendly services, and inaccessible roads.	100
25	Medema-Wijnveen et al. (2012)	Kenya	Quantitative: survey	1,777 pregnant women of at least 18 years old in their first 7 months of pregnancy, who were visiting the antenatal care clinic for the first time in their pregnancy and did not know their current HIV status were recruited at nine governmental health facilities.	To explore relationships between women's perceptions of HIV-related stigma and their attitudes and intentions regarding facility-based childbirth.	Anticipation of HIV-related stigma, being unmarried,	75
26	Mengesha et al. (2013)	Ethiopia	Quantitative: nested case control study	1065 mothers with 2 <sup>nd</sup> and 3 <sup>rd</sup> trimester pregnancy (213 cases and 852 controls).	To identify the determinants of skilled attendance for delivery	Low level of education, rural residence, low frequency of antenatal care visits and non-use of family planning services not owning a television.	100
27	Mills et al. (2008)	Ghana	Quantitative: survey	3,433 women with pregnancy outcomes in the Kassena-Nankana district	To assess the factors associated with the use of health professionals for delivery following implementation of a free obstetric care policy	Higher parity, low educational status, being a practitioner of African traditional religion, low level of autonomy, low socio-economic status, low exposure to mass media (listening to radio, reading newspaper, and watching television), low use of antenatal care, not receiving advise at antenatal clinic to give birth with health professionals, not being that birthing services were free, unplanned pregnancy	100
28	Mpembeni et al. (2007)	Tanzania	Quantitative: survey	A multistage cluster random sampling of 974 women who	Use pattern of maternal health services and	Long distance to the health facility, low health literacy, low socio-economic status, late initiation of antenatal care and lower	100

				gave birth within one year prior to survey	determinants of skilled care during delivery	than 4 attendances, not receiving advise to give birth in a health facility during antenatal care.	
29	Mselle et al. (2011)	Tanzania	Mixed methods: in-depth interviews and survey	Sixteen women affected by obstetric fistula who met the inclusion criteria and 151 women admitted in the fistula wards during the data collection period	To explore the birthing experiences of women affected by obstetric fistula and barriers to accessing adequate quality of care during labour and delivery.	Delays at the health facility, Decisions on where to seek care were most often taken by husbands and mothers-in-law, transportation difficulties, a lack of supportive care, neglect, poor assessment of labour and lack of supervision, unskilled birth care and poor referral routines.	75
30	Mugweni et al. (2008)	Zambia	Quantitative: survey	80 post-natal women, who had attended ante-natal clinics	To identify factors contributing to low institutional deliveries	Women's minimal expectations of cleanliness and non-interference during labour, institutional deliveries' costs, traveling expenses, losing family support and the inability to meet cultural expectations, women's lack of knowledge about danger signs of pregnancy and women's negative perceptions of nurses working at the institutions.	50
31	Mwaniki et al. (2002)	Kenya	Mixed methods study: survey and focus group discussions	200 mothers with children aged one and below attending child welfare clinic and groups of women from 4 clusters	To determine utilisation of antenatal and maternity services	Higher parity, distance to the facility, lack of transportation, delay in admission at hospital dissatisfaction with services as regards shortage of drugs and essential supplies, lack of commitment by staff, poor quality of food and lack of cleanliness in facilities and lack of money.	25
32	Nwameme et al. (2014)	Ghana	Mixed methods study: survey, in-depth interviews and a facility review checklist	390 antenatal care clinic attendees (multiparous women only) and in-depth interviews of principal healthcare personnel	To determine referral options available to women needing emergency obstetric care, assess constraints faced in accessing obstetric referral	Poor referral practices, lack of money, lack of trust in services, poor attitudes of nurses, fear of surgery, distance to referral centres, higher parity, inadequate staff strength, inadequate ambulance services, unavailability of bed spaces in referral centres, and lack of feedback from referral centres to care providers at the	75

					system and identify associated drawbacks	periphery.	
33	Nyango et al. (2010)	Nigeria	Mixed methods study: survey, in-depth interviews	54 certified Nurse-Midwives working in Primary Health Care clinics	To examine the knowledge and competencies of certified nurse-midwives in the five major areas responsible for maternal mortality	Poor quality care, inadequate knowledge and skills of nurse-midwives in obstetric care, poor referral systems and feedback mechanisms, lack of electricity, job dissatisfaction and inadequate basic EmOC facilities	25
34	Olusanya et al. (2010)	Nigeria	Quantitative: survey	6,465 mothers attending the Bacille Calmette-Guérin (BCG) immunization clinics in inner-city Lagos	Socio-demographic and obstetric characteristics of mothers attending the Bacille Calmette-Guérin (BCG) immunization clinics and their association with non-hospital delivery and use of unskilled attendants	Being a teenage mother, Muslim religion, low or middle social class, use of herbal drugs in pregnancy, ethnicity (Yoruba tribe), lack of tertiary education or full-time employment; accommodation with shared sanitation facilities and multiparity.	75
35	Onah et al. (2006)	Nigeria	Quantitative: survey	1095 women who had delivered within 3 months prior to date of data collection	To identify the factors which influenced choice of place of delivery by pregnant women	Rural residence, Muslim religion, a lack of formal education, low socioeconomic class.	100
36	Peltzer et al. (2006)	South Africa	Quantitative: survey	870 pregnant women who had delivered before recruited from five PMTCT clinics and surrounding	To investigate the utilization of delivery services in the context of PMTCT in a rural community in	Long distance health facility, transportation cost, having no access to telephone, being an older mother. Childbirth experiences of the mother or mother-in-law greatly influenced the delivery choices in terms of home delivery	100

				communities. Mothers, mothers-in-law, husbands or partners of the pregnant women were also recruited	South Africa		
37	Peltzer et al. (2005)	South Africa	Quantitative: survey	186 pregnant women (29.6% HIV positive and 70.4% HIV negative) in four clinics in a rural district	To identify factors influencing the utilisation of Prevention of Mother-to-Child Transmission services in a resource poor setting in South Africa	Transportation difficulties, a lack of means of communication with a health facility, long distance to a health facility, stigma,	50
38	Prudhomme O'Meara et al. (2013)	Kenya	Quantitative: survey	6,200 pregnant women across six districts	To understand demand-side factors related to use of antenatal care	Being divorced or separated, working outside the home for wages and having a higher number of children under five years in the household, and limited antenatal care attendance (as a barrier to facility birthing).	100
39	Regassa, (2011)	Ethiopia	Quantitative: survey	1,094 households from two agro climatic zones	Examine the prevalence and factors associated with antenatal care and postnatal care service utilisations.	Higher parity, being in polygamous marital relations, unplanned pregnancy, illiteracy, older maternal age women and having limited exposure to media.	75
40	Rockers et al. (2009)	Tanzania	Quantitative: survey  Community-based	1,204 women who had given birth within five years	To investigate whether the frequency of visits and select characteristics of antenatal care were associated with facility delivery.	Higher parity, higher maternal age, long distance to health facility, low frequency of antenatal care attendance as a barrier to facility birthing).	75

41	Sakeah et al. (2014)	Ghana	Quantitative: survey  Community-based (rural)	407 households/ women who had ever given birth in the three years prior to the survey	To determine the extent to which community health officer-midwives skilled delivery program achieved its desired outcomes	Ethnicity (Nankana ethnic group) and women with uneducated husbands were less likely to access skilled attendants at birth.	100
42	Shiferaw et al. (2013)	Ethiopia	Mixed methods: survey, in-depth interviews and focus group discussions.	Survey among 15–49 year old women, 3 focus group discussions with women, men and community health workers and in-depth interviews with six health care providers (physician, nurses, and a health officer) and two traditional birth attendants.	To understand why women might continue to prefer home delivery even when facility based delivery is available at minimal cost.	Belief that institutional delivery is not necessary and not customary, high cost of birthing services, distance to facility, lack of transportation, requiring permission from husband/family to go for treatment, distrust in service quality	75
43	Silal et al. (2012)	South Africa	Mixed methods: survey, and in-depth interviews	1,231 quantitative exit interviews with sixteen qualitative in-depth interviews with women (over 18) in two urban and two rural health sub-districts	To explore affordability, availability and acceptability barriers to obstetric care	Rural women faced the greatest barriers, including longest travel times, highest costs associated with delivery, and lowest levels of service acceptability, relative to urban residents. Negative provider-patient interactions, including staff inattentiveness, turning away women in early labour, shouting at patients, and insensitivity towards those who had experienced stillbirths, also inhibited access and compromised quality of care.	75
44	Spangler and Bloom, (2010)	Tanzania	Mixed methods: survey*, participant observation and in-depth interviews. *Survey not	Women ages 14 and up with prior childbirth experience as well as adult family members, providers of childbirth care (facility staff and	To examine women's use of biomedical obstetric care in two rural districts	Distance, lack of decision-making power, affordability/cost of services., abuse, neglect, or humiliation from providers, stigma (relating to ethnicity or family increased susceptibility to substandard treatment),	100

			included (based on secondary data)	TBAs), and local health officials.			
45	Spangler et al. (2014)	Kenya	Quantitative: longitudinal study	390 pregnant women attending rural antenatal clinics	To compare the use of PMTCT and maternal health services for all women by HIV status and disclosure category	Women living with HIV who had not disclosed to anyone had the lowest levels of maternity and PMTCT service utilization. Among HIV positive women, disclosure to a male partner had a particularly strong effect on the use of ARVs for PMTCT. Women's fears and experiences of HIV-related stigma may be driving decisions to not disclose HIV-positive status and resultant avoidance of health services.	100
46	Tann et al. (2007)	Uganda	Quantitative: community survey	413 women who reported a pregnancy in the previous five years	To examine the range of antenatal and delivery services received in health care facilities and at home.	Financial and transportation difficulties, low level of education.	100
47	Teferra et al. (2012)	Ethiopia	Quantitative: survey	371 mothers who gave birth in the last 12 months	To assess factors affecting institutional delivery service utilization among mothers	Wanting closer attention from family members and relatives during birthing, seeing home birthing as usual practice, unexpected labour, perception of not being sick or having no problem at the time of delivery, family influence, rural residence, older maternal age, low level of education, non-attendance of antenatal care, health illiteracy	100
48	Tita et al. (2005)	Cameroon	Mixed methods: survey and in-depth interviews	328 health workers providing reproductive health care and a subset for in-depth interviews	To examine the awareness and use of evidence-based reproductive health interventions and associated barriers	Overall, awareness of all four evidence-based interventions was low and for 12 of the 13 interventions, prevalence of awareness was higher than prevalence of use. Barriers to awareness was Deficiencies in education and training, a lack of access to educational resources, a lack of a habit of self-learning. Barriers to use of interventions were a lack of awareness of interventions, a lack of supplies, negative sociocultural beliefs, financial barriers, shortage of skilled health	100

						staff and widespread use of alternative interventions	
49	Tlebere et al. (2007)	South Africa	Mixed methods: semi-structured quantitative interviews, qualitative case studies and verbal autopsies	Semi-structured household interviews of 178 women, 57 case studies of women with no antenatal care and/or home birth, and verbal autopsies of maternal and infant deaths, conducted in three diverse sites across the country	To explore factors that impact utilization of maternal health services	A lack of financial resources for transport, accessibility of health services, in particular, the times services were offered, distance to services, and money needed for travel to services. Also reported was the negative attitude of some nurses.	75
50	Trani et al. (2011)	Sierra Leone	Quantitative: Cross sectional analytic survey	All adults who were identified as being disabled, as well as a control group of randomly selected non-disabled adults (235 women: 100 women with disabilities, 135 non-disabled women)	To compare health status and access to health care services between disabled and non-disabled people	Inequality in access to care was linked to wealth rather than impairment	100
51	Tsawe and Susuman, (2014)	South Africa	Mixed methods: survey and in-depth interviews	267 female participants and six health workers	To explore the main factors associated with access to and use of maternal health care services	Older maternal age, long distance, financial constraints, being unmarried, teenage (15 – 19 years), low educational level, being unemployed, having no knowledge of the services offered, Staff shortages and longer waiting times	75
52	Tsegay et al. (2013)	Ethiopia	Quantitative: survey	1113 rural women aged 15–49 years who had given birth at least once in the five years prior to the survey period. among	To determine the prevalence of maternal health care utilisation and explore its determinants	Being single or widowed, low level of education, long distance to the health facility cost of services, high parity. Others were “not feeling sick”, “lack of awareness of the benefits”, “feeling shame”, “workload”, “health facility too far away” “easy labour”, “transport problems”.	100

53	Turan et al. (2012)	Kenya	Mixed methods: Prospective cross-sectional survey and in-depth interviews	1,777 pregnant women with unknown HIV status and a sub-sample of women selected for follow-up (all women who tested HIV positive or were not tested for HIV, and a random sample of HIV-negative women, n = 598); in-depth interviews with community health workers, childbearing women, and family members (n = 48)	To examine the role of women's perceptions of HIV-related stigma during pregnancy and their subsequent utilization of maternity services.	Negative attitudes about persons living with HIV, low level of education, low household wealth, higher parity. Being in women in agricultural occupations, fewer antenatal clinic attendance.	100
54	Vallières et al. (2013)	Uganda	Quantitative: survey	392 households with at least one child under the age of 60 months	To examine the association between head of household education level and health seeking behaviours at delivery	Limited or a lack of formal education	100
55	Van den Boogaard et al. (2008)	Zambia	Quantitative: survey	1413 participants: parous women, their husbands, village headmen and elderly women	To analyse factors that contribute to the choice of traditional birth attendants or skilled birth attendants	Distance to health centre, transportation problems, socio-cultural reasons, when labour progressed fast (birth unpreparedness), and economic reasons.	75

56	van den Broek et al. (2003)	Malawi	Quantitative: survey	Women in 20,649 households (total population = 59,248) who delivered in the previous 12 months	To assess pregnancy outcome, maternal mortality and health-seeking behaviour in a rural African population and to assess the effects on these of women's education, distance from a health centre and household type.	Low educational level, long distance from the health centre,	100
57	Wado et al. (2013)	Ethiopia	Quantitative: survey	1370 women of age 15–49 years, with a live birth in the two years before the survey	Unintended pregnancies and the use of maternal health services	Having an unintended pregnancy, women's low decision-making autonomy, low level of education, low socioeconomic status, longer travel distance from a health facility, discovery of pregnancy after 12 weeks.	100
58	Wanjira et al. (2011)	Kenya	Quantitative: survey	409 women who had recently delivered while in the study area	To establish delivery practices and associated factors among mothers seeking child welfare services at selected health facilities	Low level of education, higher parity, low health literacy, perceived delays in being attended to and fear of episiotomy.	50
59	White et al. (2013)	Mali	Quantitative: survey	317 households: women who had given birth in the previous year, their husbands and their mothers-in-law.	To understand how intra-familial power dynamics and the attitudes of women, their husband and their mother-in-law are associated with maternal health	The preferences and opinions of mothers-in-law in favour of traditional practices	100

					practices.		
60	Wilunda et al. (2013)	Ethiopia	Quantitative: survey	760 women at discharge from the maternity ward (532 analysed)  Facility-based	Measure equity in utilization of emergency obstetric care and compare the wealth status of EmOC users with women in the general population.	Poverty, rural residence, transportation costs	75
61	Worku et al. (2013a)	Ethiopia	Quantitative: survey	1,668 eligible women who gave birth in the last 12 months preceding the study	To assess experiences related to obstetric complication and seeking assistance from a skilled provider among women	Inability to judge the severity of morbidities, distance/transport problems, lack of money/cost considerations and use of traditional options at home.	100
62	Worku et al. (2013b)	Ethiopia	Quantitative: linked facility and population-based survey	1668 women who had births in the year preceding the survey were selected for analysis	To assess the effect of individual, communal, and health facility characteristics in the utilisation of antenatal, delivery, and postnatal care by a skilled provider.	Higher birth order, low educational status of women and their husbands, low health literacy, women who belonged to communities with mixed (farming and trading) source of income used skilled attendance and postnatal care more than those who belonged to only farming as the main source of income, non-availability of all the six signal functions in the nearby basic essential obstetric care facility, service costs.	100
63	Kinuthia et al. (2015)	Kenya	Quantitative: survey	Women who had delivered an infant in the previous year were visited at home in 2011	To assess correlates of facility delivery among recently pregnant HIV-infected women participating in a community-based survey, and to determine	Cost of services, distance to health facility, fear of harsh treatment by health providers, being HIV-infected with lower socioeconomic status, late initiation of antenatal care (as a barrier to facility delivery), higher parity, fear of HIV testing at health facility, fear of caesarean section, rapid progression of labour, lack of transport, perceptions that facilities were closed at night	100

					whether these correlates were unique when compared to HIV-uninfected women from the same region.		
64	Austin et al. (2015)	Ethiopia	Mixed methods: quantitative survey, semi-structured, key informant interviews with providers	Twenty-nine, semi-structured, key informant interviews with providers from an urban referral network and quantitative survey data were collected from 111 providers,	To assess barriers to the provision of emergency obstetric care in Addis Ababa from the perspective of healthcare providers by analysing three factors: implementation of national referral guidelines, staff training, and staff supervision	A lack of transportation and communication infrastructure, overcrowding at the referral hospital, insufficient pre-service and in-service training, and absence of supportive supervision as key barriers to provision of quality emergency obstetric care.	75
65	Ravit et al. (2015)	Mali	Quantitative: case control study	190 women (95 deceased and 95 near-misses) who underwent caesarean interventions. Data were collected from the health workers and persons who accompanied the woman.	To evaluate the direct and indirect expenses associated with caesarean interventions performed in emergency obstetric and neonatal care and the factors associated with these expenses.	Women in the lowest socio-economic group faced barriers related to direct expenses for drugs, treatment and indirect expenses for transport and food.	75
66	Jennings et al. (2015)	Nigeria	Quantitative: survey  Community-based	Head of household and, if applicable, one woman aged 15–49 with a child of 23 months or less was	To examine if women with limited mobile phone access have differential odds	As compared to mobile users, women without mobile phone access had significantly lower odds of antenatal care utilisation, skilled birthing services, and modern contraceptive use after adjusting for	75

				randomly selected from household.	of maternal knowledge and health service utilisation as compared to female mobile phone users	demographic characteristics. They also had significantly lower knowledge of maternal danger signs and knowledge of antenatal and skilled delivery care	
67	Harfouche et al. (2015)	Malawi.	Quantitative: desk review of medical record (program evaluation)	Women having caesarean deliveries at Bwaila Hospital	To identify quality indicators of caesarean deliveries and determine their relationship to neonatal and maternal morbidity and mortality	Most delays were attributed to a busy operating theatre and delayed transfer to the operating theatre. Infrastructure and personnel limitations are major barriers to the improvement of quality of caesarean deliveries.	100
68	Wilunda et al. (2015a)	Ethiopia	Quantitative: survey	500 women aged 15–49 years with a delivery in two years prior to the survey	To determine the coverage of at least four antenatal care visits and delivery by a skilled birth attendant and to identify determinants of utilisation of these services in three districts	Time/distance to the health facility, birth unpreparedness, low socio-economic status, low health literacy, rural residence, higher parity, perception of poor/average quality of care at facilities.	100
69	Wilunda et al. (2015b)	Uganda	Quantitative: review of clinical records, survey and observation	All health facilities in Napak and Moroto districts – review of clinical records and registers, interviewing staff and women attending antenatal and postnatal clinics, and observation.	To establish the availability of maternal and neonatal healthcare services at different levels of health units; to assess their utilisation; and to determine the	There were gaps in the availability of essential infrastructure, equipment, supplies, drugs and staff for maternal care, as well as poor quality of care.	75

					quality of services provided.		
70	Dutamo et al. (2015)	Ethiopia	Mixed methods study: survey and Focus Group Discussions  Community - based	Survey of 623 women and 4 Focus Group Discussions	To identify the use of maternal health service over the course of pregnancy and child birth in a comprehensive manner	Perception of being healthy, work overload, feeling shame to attend antenatal care, poor quality of the service, not knowing the importance of antenatal care, cost of services, unintended pregnancy, higher parity, low level of education of woman/partner, low average family monthly income.	75
71	Bayu et al. (2015)	Ethiopia	Quantitative: community-based follow up study (survey)	Face to face interviews of 422 pregnant women in Debre Markos, who were in their second and third trimester of pregnancy at the time of survey	Pregnant women's preference and factors associated with institutional delivery service utilisation	Women's report of labour being accidental, 'no problem has occurred during labour at home', higher parity, having no formal education (woman/husband), non-attendance of antenatal care (as barrier to facility birthing).	100
72	Lakew et al. (2015)	Ethiopia	Quantitative: survey	798 women who gave birth within one year regardless of their delivery place.	To assess women's skilled assistance seeking behaviour for pregnancy complications among those who gave birth.	Being unable to understand the seriousness of the complications, viewing facility attendance as unnecessary, family disapproval, low monthly household income (below \$US25), limited access to transportation, non-attendance of antenatal care (as barrier to facility birthing), belonging to a a age group below 20 years.	100
73	Mazalale et al. (2015)	Malawi	Quantitative: survey	Women who had completed a pregnancy 12 months prior to the day of the survey and who were within two years postpartum	To identify factors associated with delivery outside a health facility in rural Malawi	Being unmarried, low socioeconomic status, rural residence, having no formal education and being a multigravidae	100
74	Asres and Davey, (2015)	Ethiopia	Mixed methods: survey and key informant	554 women aged 15-49 years, who had lived for at least 5 years in the study	To assess factors associated with safe delivery service utilisation	Being uneducated, higher parity, previous experience of pregnancy-related complication, poor infrastructure in the health facilities (the rooms are cracked, dirty	75

			interviews	area and had given birth at least once in the 5 years prior to the survey and six key informants who were working in maternal health services in the zone	among women	and with bad odour, no water supply, a lack of 24-hour electricity supply, no telephone service for emergency calls. Facilities were not adequately equipped with basic obstetric equipment and essential supplies or drugs.	
75	Semali et al. (2015)	Tanzania	Quantitative: survey	Randomly selected 744 households with children aged less than five years	To determine the role of social capital in facilitating health facility delivery.	Belonging to the lowest social capital quintile	100
76	MacKeith et al. (2003)	Zambia	Mixed methods study: survey and focus group discussions	1210 women who had been pregnant in the previous two calendar years and four focus groups composed of women with one child, women with more than one child and male partners of women with children	Examined access, coverage and quality of care in these maternity services	Poor quality care (such as reports of having been left alone for "too long" while in labour), belonging to a poor household, women reporting that they "felt well, non-availability of drugs, unaffordable cost of health services, reports that the labour advanced too quickly, poor equipment supply at facilities, and poor sanitation at facility toilets and bathrooms, poor attitudes of staff members	50
77	Pfeiffer and Mwaipopo (2013)	Tanzania	Mixed methods study: survey, focus group discussions and In-depth interviews	200 women (i) who had delivered in a health facility, and (ii) who delivered with the support of a traditional birth attendant were surveyed, 8 focus-group discussions and In-depth interviews	To describe (1) women's health-seeking behaviour and experiences regarding their use of antenatal and postnatal care; (2) their rationale behind the choice of place and delivery; and to learn (3) about the use of traditional practices and	Having no formal education, being younger (aged 15 to 22) Birth unpreparedness ('Unexpected delivery' 'realizing it too late'), long waiting time.	50

					resources applied by traditional birth attendants and how they can be linked to the biomedical health system.		
78	Telfer et al. (2002)	Gambia	Quantitative: survey	623 women who had recently given birth	Experiences of Mothers with Antenatal, Delivery and Postpartum Care in Rural Gambia	Reports of being too busy, feeling unwell, being away or travelled, inadequate health information provided at antenatal care	100
79	Liambila and Kuria, (2014)	Kenya.	Quantitative: case-control study	Women aged 15–49 years at the households (294 cases and 291 controls)	To assess the nature of childbirth related complications among the skilled and the non-skilled birth attendants in Western Kenya.	Undignified care, high service and transport costs, fear of hospital procedures such as HIV tests, undergoing unnecessary caesarean-section and mishandling of the placenta, poor quality of care (such as limited flexibility to choose birthing position, being taken care of by trainee nurses or students and lack of follow up by health facility staff). expectation to buy supplies such as cotton wool and gloves, not having the option to choose trusted persons to assist them during childbirth (one is assisted by any staff on duty), lack of services such food, warm beverages, and bath water in health facilities. Cultural perceptions that home birth gives a woman more dignity and is a sign that she is strong.	100
80	Mirkuzie et al. (2014)	Ethiopia	Quantitative: facility based intervention	10 randomly selected public health centers	To examine progress in the implementation of the basic emergency obstetric care in Addis Ababa and compared with the	Insufficient knowledge in diagnosing postpartum haemorrhage and birth asphyxia as well as poor skills in neonatal resuscitation	100

					2008 survey.		
81	Nakua et al. (2015)	Ghana	Quantitative: survey	Women attending post-partum care with children under-12 months	To assess the effect of an intervention addressing barriers in access to skilled obstetric care and identified factors associated with the use of unskilled birth attendants during delivery in a rural district of Ghana.	Use of insulting language by health workers, unavailability of transport, and confidence in traditional birth attendants, sudden labour, lack of partner involvement, lack of birth preparedness and lack of knowledge of the benefits of skilled delivery.	100
82	Ntambue et al. (2012)	Democratic Republic of Congo	Quantitative: survey	1762 women residing in Lubumbashi who had delivered during the 12 months prior to the survey	To determine the factors that influence the use of mother and child healthcare services in Lubumbashi, Democratic Republic of the Congo	Being a primiparous or grand multiparous woman, having an unplanned pregnancy	100
83	Oguntunde et al. (2015)	Nigeria	Mixed methods: survey, in-depth interviews and an inventory of equipment and supply in facilities	80 health facilities (80 service providers were interviewed), in-depth interviews with facility managers and an inventory of equipment and supply in facilities	To examine facilitators and barriers to the use of magnesium sulphate in the management of pre-eclampsia or eclampsia in health facilities in Bauchi and Sokoto States in Nigeria.	Inadequate numbers of skilled providers, frequent shortages of magnesium sulphate, lack of essential equipment and supplies, irregular supply of electricity and water, and non-availability of guidelines and clinical protocols at the health facilities. Technical support to providers was inadequate.	75
84	Silal et al. (2014)	South Africa	Quantitative: records review and survey	1,491 households with a woman over 18 years of age who had delivered in the	To assess the relative socio-economic inequalities in use	Long distance to facilities, poor access to ambulance services, high health expenses (transport, supplies, food, and childcare), poor health worker interpersonal	100

				preceding year and patient exit interview surveys	of hospital-based maternal delivery services within two rural sub-districts of South Africa.	relationships with clients (too busy to listen to their problems, show of disrespect)	
85	Aarnio et al. (2013)	Malawi	Mixed methods study: cross-sectional survey with qualitative component (type not specified)	389 ever married men whose wives were of reproductive age (15–49 years) and had been pregnant within the last 5 years	Explore how husbands perceive delivery care in rural Malawi.	Cost of services, long distance/transportation, birth unpreparedness, lack of knowledge about types of services offered, delayed decision-making within the family.	100
86	Adewemimo et al. (2014)	Nigeria	Quantitative: cross-sectional survey	400 women of reproductive age (15–49 years) who had given birth in the last two years preceding the study.	To determine the level and determinants for utilisation of skilled birth attendance	Lack of healthcare providers in the facility, lack of equipment and supplies, poverty, preference for home births, cost of care, long distances, transportation.	100
87	Afari et al. (2013)	Ghana	Qualitative study: semi structured interviews	Healthcare workers (8 midwives, 4 community health officers, 3 medical assistants, 2 emergency room nurses, 1 doctor) at different facility levels within the district	To describe healthcare worker identified system-based bottlenecks and the value of local engagement in designing strategies to improve referral processes related to emergency obstetric care in rural Ghana.	Poor referral transport system, inadequate communication systems, poor clinical skills, non-adherence to clinical protocols, and poor documentation	75
88	Alemayehu and Mekonnen (2015)	Ethiopia	Quantitative: cross-sectional survey	373 women who had delivered in 12 months prior to the study	To assess the prevalence of skilled birth attendant utilization and its correlates in	Low educational status, non-attendance of antenatal care, long distances	75

					North West Ethiopia		
89	Anastasi et al (2015)	Uganda	Mixed methods: Structured and semistructured interviews, focus group discussions	Structured antenatal care client entry and exit interviews [n = 139]; semi-structured interviews with women in their homes [n = 36], health workers [n = 10], and policymakers [n = 10]; and focus group discussions with women [n = 20], men [n = 20], and traditional birth attendants [n = 20].	To identify key factors underlying the gap between high rates of antenatal care attendance and much lower rates of health-facility delivery; examine the association between advice during antenatal care to deliver at a health facility and actual place of delivery; investigate whether antenatal care services in a post-conflict district of Northern Uganda actively link women to skilled birth attendant services	Fear of being neglected or maltreated by health workers; long distance and other difficulties in access; poverty, and material requirements for delivery; lack of support from husband/partner; health systems deficiencies such as inadequate staffing/training, work environment, and referral systems (poor ambulance services); and socio-cultural and gender issues such as preferred birthing position and preference for traditional birth attendants	75
90	Atuoye et al. (2015)	Ghana	Qualitative study: focus group discussions	Eight (8) focus group discussions involving males (n = 40) and females (n = 45)	To investigate transportation barriers in health access in a rural context based on perceived cause, coping mechanisms and strategies for a sustainable transportation system.	Poor road network, poverty, lack of emergency services and transport planning	75

91	Atuyambe et al. (2009)	Uganda	Qualitative study: focus group discussions and key informant interviews	Focus group discussions among adolescent girls (10 to 19 years) and key informant interviews with health workers.	To explore adolescent health seeking behavior during pregnancy and early motherhood	Stigma (fear of going to health unit, ashamed on meeting peers), transportation difficulties, Cultural practices & beliefs about births, Lack of decision making power,	75
92	Bayley et al. (2013)	Malawi	Quantitative: Survey	Respondents included 42 nurse midwives, 1 clinical officer, 4 medical assistants and 5 other staff.	Assessed healthcare providers' knowledge of management of routine labour, emergency obstetric care and emergency newborn care; correlated knowledge with reported confidence and previous study or training; and measured perception of the care they provided.	Deficits in knowledge of correct monitoring during routine Labour, management of eclampsia and pre-eclampsia.	75
93	Bayou and Gacho (2013)	Ethiopia.	Quantitative: Cross sectional survey	229 mothers who resided in the villages and gave birth between January 01 to December 31, 2008 were the study subjects.	To assess utilization of clean and safe delivery service and associated factors	Low level of education, low health literacy, not confident in the ability of health extension workers, distance, health extension workers not available, fear of being badly treated, lack of money, increasing age and parity	100
94	Bayu et al. (2015)	Ethiopia	Quantitative: a community-based follow-up study	522 study participants made up of second- and third-trimester pregnant women who had	To identify factors affecting unplanned home delivery in urban settings, where	Single motherhood, illiteracy absence of antenatal clinic visits for indexed pregnancy, absence of obstetric complications during the index pregnancy, low autonomy, and absence of birth preparedness and	100

				planned for institutional delivery in South Tigray Zone	there is relatively good access in principle to modern healthcare institutions	complication readiness were significant predictors of unplanned home birthing.	
95	Bazzano et al. (2008)	Ghana	Qualitative component	Participant observation, interviews, case histories, and focus groups	To examine the social costs to women of skilled attendance at birth in rural Ghana.	Costs of birthing supplies, lack of confidence in health staff, transportation costs, cultural expectations and beliefs about having a home birth,	75
96	Bedford et al. (2013)	Ethiopia	Qualitative: semi-structured interviews	Mothers who had recently delivered (n = 30) or were pregnant (n = 16)	To identify reasons why women who access health facilities and utilise maternal new-born and child health services at other times, do not necessarily deliver at health facilities.	Cultural perceptions encouraging home birthing, inability to employ preferred birthing positions, Distance from home to health facility and lack of transport, the possibility of onwards referral and lack of immediate treatment, lack of decision-making power/autonomy, lack of confidence in health professionals	75
97	Cham et al. (2005)	Gambia	Qualitative: maternal death review	Review of 42 maternal deaths of women who actually tried to reach or reached health care services.	To describe the socio-cultural and health service factors associated with maternal deaths in rural Gambia.	underestimation of the severity of the complications, bad experience with the health care system, delay in reaching an appropriate medical facility, lack of transportation, prolonged transportation, seeking care at more than one medical facility and delay in receiving prompt and appropriate care after reaching the hospital.	75
98	Chapman (2003)	Mozambique	Qualitative: in-depth interviews and longitudinal pregnancy case studies	Key informant interviews with 83 women of reproductive age during pregnancy and after birth, life histories of a subset of 15 women from	To examine pregnant women's underutilization of clinic-based prenatal services	Cultural and religious beliefs	75

				the pregnancy case study group, and focus group sessions.			
99	Chi et al. (2015)	Burundi and Northern Uganda	Qualitative comparative case study: semi-structured in-depth interviews and 4 focus group discussions	Participants were 32 local health providers and 37 staff of non-governmental organizations working in the area of maternal health	To explore the barriers to effective delivery of emergency obstetric and neonatal care services in post-conflict Burundi and Northern Uganda	Shortage of qualified staff; lack of essential installations, supplies and medications; increasing workload, burn-out and turnover; and poor data collection and monitoring systems. Barriers unique to Northern Uganda were demoralised personnel and lack of recognition; poor referral system; inefficient drug supply system; staff absenteeism in rural areas; and poor coordination among key personnel. In Burundi, weak curriculum; poor harmonisation and coordination of training; and inefficient allocation of resources were the unique challenges	75
100	Cofie et al. (2015)	Ghana	Qualitative: birth narratives	Birth narratives of mothers (n = 20) who experienced pregnancy/labor complications, and fathers (n = 18) whose partners experienced such complications in their last pregnancy.	Explored the influence of birth location preference on women's pregnancy, labor and birth outcomes.	Perceptions of homebirth as a norm previous experience of homebirths, high costs of traveling to health facilities, and distance to such facilities.	75
101	Conrad et al. (2012)	Uganda	Mixed methods: semi-structured interviews, structured observations of provider-patient interactions, and	26 structured client-provider observations; semistructured interviews with 30 pregnant women and semistructured interviews with all midwives working at the four selected facilities.	To appraise the quality of antenatal care services in a rural district of Uganda	Ineffective organization of educational sessions; selective omission of certain services; lack of explanation of important clinical and laboratory procedures; failure to link the performed procedures with preventive information; and occasional lack of respect for clients	75

			infrastructure assessment of selected health facilities.				
102	Crissman et al. (2013)	Ghana	Qualitative: semi-structured interviews	Semi-structured interviews with 85 pregnant women attending an antenatal clinic in Akwatia,	To better understand the barriers to skilled birth attendance and healthcare facility delivery through the perspective of pregnant women.	Maltreatment by midwives; cost associated with facility-based delivery despite waived facility fees; the need for a support person for facility-based delivery; difficulties in transportation; and precipitous labour	100
103	Dahlberg et al. (2015)	Kenya	Qualitative: in-depth interviews and focus group discussions	25 in-depth interviews with mothers of children under 2 years (13) and healthcare staff (12) and held 10 focus group discussions with traditional birth attendants (6) and female relatives (4) rural community	To understand how place of childbirth is determined	Over- worked healthcare staff, under-staffed facilities, insensitivity at health facilities (harsh, arrogant, abusive, negligence), influence of female relatives on place of delivery, distance, costs.	100
104	De Allegri et al. (2015)	Burkina Faso	Mixed methods: in-depth interviews and household survey	Series of open-ended interviews with 55 purposely selected households and 13 village leaders; household survey on 1130 households.	To explore reasons for home delivery in rural Burkina Faso, where a successful user fee reduction policy is in place since 2007.	Lower socio-economic status, distance to the health facility, poor road networks, travel costs, and the cost-sharing fees at health facilities.	100
105	Echoka et al. (2014)	Kenya	Qualitative: In-depth interviews	30 women who experienced obstetric “near miss” at the	To explore barriers to emergency	A lack of birth preparedness, including failure to identify a health facility for delivery services, and to seek care promptly	75

				only public hospital with capacity to provide comprehensive EmOC services in the district	obstetric care (EmOC) services by women who experienced life threatening obstetric complications in Malindi District,	despite recognition of danger signs. Long distance and inconvenient transport to hospital, lack of money, long waiting times at health facilities and unavailability of doctors	
106	Essendi et al. (2015)	Kenya	Qualitative: Focus group discussions and key informant interviews	Focus group discussions with mothers and partners and key informant interviews with health care providers and community leaders. In total, 12 focus group discussions (6 in each site) and 4 key informant interviews (2 in each site) were conducted	To understand community and provider perceptions of the obstacles faced in providing and accessing maternal and newborn care at health facilities in their localities.	Lack of capacity by health facilities to provide around-the-clock services due to inadequate staffing and lack of resources to operate at night; lack of electricity and water; poor roads,	75
107	Essendi et al. (2010)	Kenya	Qualitative: Focus group discussions	Women aged between 12 and 54 years who had a pregnancy outcome in 2004–2005, had life-threatening obstetric complications and failed to seek health care were purposively sampled for focus group discussions. Their partners, opinion leaders, traditional birth attendants, and older women were also	To investigate views surrounding barriers to the uptake of formal obstetric services.	Ineffective health decision making at the family level, inadequate transport facilities and insecurity at night, high cost of health services, and inhospitable formal service providers and poorly equipped health facilities in the slums	75

				included. 16 focus group discussions were held with each of the groups			
108	Faye et al. (2011)	Senegal	Quantitative: cross-sectional survey	Three hundred and seventy-three women who gave birth in the last 12 months.	To study the link between patients' satisfaction about received services in health facilities and the choice of future delivery place of women who had delivered at least once in a facility	Women in a polygamous marriage and those with a parity greater than three were more likely to have a homebirth. Other factors were a lack of means of transport, distance of more than 5km from the health facility, unsatisfactory quality of care, delivery assisted by a man.	75
109	Feinstein et al. (2013)	Congo	Quantitative: cross-sectional survey	1221 women $\geq 18$ years old who had been pregnant within the prior three years.	To understand where and how women access reproductive healthcare services in Kinshasa.	Low participant and partner education and lack of certain assets, dissatisfaction with provider interactions	75
110	Feyissa and Genemo (2014)	Ethiopia	Quantitative: Retrospective unmatched case control study design	320 respondents (80 cases and 240 controls). Cases were women who gave birth to their last child in health institutions in the last five years. Controls were women who give birth to their last child at home in the last five years in East Wollega zone.	to assess determinants of institutional delivery in Western Ethiopia.	Low level of education, long distance to facility, higher parity, rural residence, lack of appropriate means of transport	100
111	Ganle et al. (2014)	Ghana	Qualitative: focus group discussions	185 expectant and lactating mothers and 20 healthcare	To explore health system factors that inhibit	Experiences of intimidation in healthcare facilities, unfriendly healthcare providers, cultural insensitivity, long waiting time	100

			and in-depth interview	providers in six communities	women's access to and use of skilled maternal and new born healthcare services in Ghana despite these services being provided free.	before care is received, limited birthing choices, poor care quality, lack of privacy at healthcare facilities, and difficulties in arranging suitable transportation	
112	Ganle (2015)	Ghana	Qualitative: focus group discussions	6 Focus group discussions with 94 Muslim women in three communities in northern Ghana	To explore the maternity healthcare needs and care experiences of Muslim women and the barriers to accessing and using maternal health services	A religious obligation to maintain bodily sanctity through modest dressing and the avoidance of unlawful bodily exposure or contact with certain people including male or alien caregivers, a lack of privacy, healthcare providers' insensitivity and lack of knowledge about Muslim women's religious and cultural practices, and health information that lacked the cultural and religious specificity to meet Muslim women's maternity care needs.	100
113	Gebrehiwot et al. (2014)	Ethiopia	Qualitative: in-depth interviews	Twelve in-depth interviews were carried out with eight health extension workers and four midwives.	To explore health-service providers' perceptions of facilitators and barriers to the utilization of institutional delivery in Tigray, a northern region of Ethiopia	'Delivery as a natural event', 'cultural tradition and rituals', 'inaccessible transport', 'unmet community expectation' and 'shortage of skilled human resources'	100
114	Gebrehiwot et al. (2012)	Ethiopia	Qualitative: focus group discussions	Six focus group discussions with 51 women to explore perceptions and experiences regarding delivery care.	To explore women's experiences and perceptions regarding delivery care in Tigray, a northern region of Ethiopia,	Transportation difficulties, uncertain quality of care, faith/religious beliefs, influence of older women in the household (preference for home births), distrust of health facilities.	100
115	Grossmann-Kendall et al.	Benin	Qualitative: in-depth	19 women aged 20-40 who had recently	Explore women's experiences of	Poor quality of care including not being able to ask questions or get any explanations,	100

	(2001)		interviews	given birth in a referral hospital	antenatal and emergency obstetric care	being mistreated and humiliated by health personnel	
116	Habte and Demissie (2015)	Ethiopia	Quantitative: survey	816 women who gave birth within the past 2 years and lived in Cheha district for minimum of one year prior to the survey	To measure the prevalence and to identify factors associated with institutional delivery service utilization among childbearing mothers in Cheha District, SNNPR, Ethiopia.	Rural residence, affordability, husband's negative attitude about facility, non-receipt of counselling on facility delivery during antenatal care for previous pregnancy,	100
117	Kawakatsu et al. (2014)	Kenya	Quantitative: survey	2,560 women who had children aged 12–24 months.	To identify the factors which influence the place of delivery in rural western Kenya	Low education level, poor health literacy. Low number of antenatal care attendance, long distance to health facilities	100
118	Kawuwa et al. (2007)	Nigeria	Qualitative: in-depth interviews	Thirty representatives of interest groups including traditional and religious leaders, local government administrators, teachers, civil servants, members of the national union of road transport workers, women community leaders and women non-governmental organizations and staff of the local government primary health care department.	To identify barriers to prompt and effective treatment of obstetric complications leading to maternal mortality	Lack of money, transportation difficulties and community's impression of the health facility's capability to handle their problems.	75

119	Kaye et al. (2014)	Uganda	Qualitative: in-depth interviews	16 participants - women who developed uterine rupture following obstructed labour.	To explore lived experiences of women who developed uterine rupture following obstructed labour.	Failure to recognise danger signs of obstructed labour, late decision making for accessing care, geographical barriers to health facilities, late or failure to diagnose obstructed labour at health facilities, and failure to promptly perform caesarean section	75
120	Kaye et al. (2000)	Uganda	Qualitative: Participatory observation, midwife and client interviews, records review, facility assessment and focus group discussions with clients and patients.	Patients admitted in the health units with pregnancy complications; attendants of patients; midwives delivering health care at the health units; pregnant women exiting from (after attending) antenatal clinics; and health unit records.	To determine the quality of care provided by midwives; and specifically, to identify training needs, gaps in knowledge and other barriers to accessibility of emergency obstetric care services in Soroti district	Inadequate pre-service and in-service training, lack of technical support supervision and absence of standard treatment guidelines, inability to identify and manage women with or at risk of pregnancy complications.	75
121	Keri et al. (2010)	Uganda	Qualitative: focus group discussions	Six focus groups were held in rural areas surrounding Kampala, the capital city of Uganda	To assess current beliefs, knowledge and practices of Ugandan traditional birth attendants and their pregnant patients regarding referral of obstructed labour and fistula cases	Reported abuse by doctors and nurses, and seeing fistula as a disease caused by hospitals.	100
122	King et al. (2015)	Ethiopia	Qualitative: semi-structured interviews and focus group discussions	Semi-structured Interviews with health workers, health extension workers and women.	To explore barriers and facilitators that enable women to access killed birth attendance in	Women's low status and restricted opportunities for decision-making, lack of confidence in health-care facilities, long distances, cost, domestic workload, and traditional practices which include a preference for birthing at home with a	100

					Afar Region, Ethiopia.	traditional birth attendant.	
123	Kujawski et al. (2015)	Tanzania	Quantitative: survey	Women on discharge from delivery at two hospitals.	Assessed the association between reported disrespectful treatment during childbirth and delivery satisfaction, perceived quality of care, and intention to deliver at the same facility in the future.	Disrespect/abuse from health care workers during childbirth	50
124	Kumbani et al. (2013)	Malawi	Qualitative: in-depth interviews	12 in- depth interviews with women who had delivered at home within the period December 2010 to March 2011	To explore the reasons why women delivered at home without skilled attendance despite receiving antenatal care at a health centre and their perceptions of perinatal care.	Onset of labour at night, rainy season, rapid labour, socio-cultural factors and health workers' attitudes.	75
125	Kwagala (2013)	Uganda	Qualitative: in-depth interviews with mothers, focus group discussions with mothers and fathers and key informant interviews.	10 key-informant interviews with health personnel, TBAs and local leaders; 9 in-depth interviews with selected mothers and 4 focus-group discussions with 10–12 participants each, of women and fathers (29–46 years)	Examined maternal health-seeking behaviour among the Sabinu people of Eastern Uganda in relation to health policy ideals	Limited decision-making power of women, cultural ideals associated with enduring pain (an endurance test and the marker of a real woman), lack of responsible persons with whom to leave older children, transportation challenges and poor roads, preference for TBA-assisted deliveries and the desire/need to follow local birthing and post-delivery practices, miscalculation of delivery date and a lack of waiting space at the health facilities for women in labour., inability to afford services	75
126	Kyomuhendo (2003)	Uganda	Mixed methods	24 focus group discussions	To enhance understanding of	Adherence to traditional birthing practices and beliefs that pregnancy is a test of	75

			study: focus group discussions, key informant interviews, a quantitative survey and maternal death enquiries	involving 240 participants (with men only and women only in each of five localities); 808 women with more than one birthing experience were interviewed in the quantitative survey; maternal death inquiries with relatives, kin of the deceased or the birth attendants of women who died of maternal causes in the community in the last 1–12 months preceding study	why, when faced with complications of pregnancy or delivery, women continue to choose high risk options leading to severe morbidity and even their own deaths.	endurance, perception that maternal death a sad but normal event, illiteracy, poverty, a lack of skilled staff at primary health care level, complaints of abuse, neglect and poor treatment in hospital and poorly understood reasons for procedures, health workers' views that women were ignorant,	
127	Lerberg et al. (2014)	Gambia	Quantitative: survey	432 women of reproductive age (15-49 years), living in North Bank East Region, who had given birth outside a health facility within the last six months prior to the day of data collection,	To identify the most important barriers for use of skilled attendance during childbirth by women in rural Gambia.	A lack of time, lack of transport, poor services at facilities, childbirth occurring before arrival of transport, poor roads.	75
128	Magoma et al. (2010)	Tanzania	Qualitative: key informant interviews and focus group discussions	Twelve key informant interviews and fifteen focus group discussions (key stakeholders in maternal health, users of antenatal, delivery, and post-delivery care, 36 total traditional birth	Examined beliefs and behaviors related to antenatal, labor, delivery and postnatal care among the Maasai and Watemi ethnic groups	Distance from health units, lack of reliable and affordable transport, lack of advanced planning for accessing delivery care units, widely held beliefs that pregnancies labelled as 'normal' during antenatal care visits will result in successful deliveries at home, failure of providers to convey information about the importance of skilled delivery care	100

				attendants and 16 elders		for all women, and women's low social status and inability to independently make labour and delivery decisions.	
129	Mahiti et al. (2015)	Tanzania	Qualitative: focus group discussions	15 focus group discussions with women attending a health facility after child birth	To explore women's views about the maternal health services (pregnancy, delivery, and postpartum period) that they received at health facilities in order to identify gaps in service provision that may lead to low-quality maternal care and increased risks associated with maternal morbidity and mortality	Availability and use of traditional birth attendants, long distances to facilities, shortage of maternal health workers, long waiting times and informal payments at health facilities, drug shortages, dirty health facility environment.	100
130	Mills and Bertrand (2005)	Ghana	Qualitative: focus group discussions	Eighteen purposively sampled homogenous groups in Kassena-Nankana District of northern Ghana participated in focus-group discussions	Explored the role of access versus traditional beliefs in the decision to seek obstetric care from health professionals	Late decision-making about place of delivery (generally after the onset of labour), cost of care, distance, transport, availability of health facilities, and nurses' attitudes	100
131	Mkoka et al. (2014)	Tanzania	Qualitative: in-depth interviews	17 health facility managers (14 from dispensaries and three from health centers); two members of the Council Health	To describe the experience of rural health facility managers in ensuring the timely availability of drugs and	Unreliability of obtaining drugs and medical supplies due to insufficient budget for drugs from central government, lack of accountability within the supply system and a bureaucratic process of accessing the locally mobilized drug fund	100

				Management Team and one member of the Council Health Service Board	medical supplies for emergency obstetric care		
132	Mselle et al. (2013)	Tanzania	Qualitative: Semi-structured interviews and focus group discussions	Semi-structured interviews involving 16 women affected by obstetric fistula and five nurse-midwives at maternity wards, and focus group discussions with husbands and community members	To describe the weaknesses in the provision of acceptable and adequate quality care through the accounts of women who have suffered obstetric fistula, nurse-midwives at both basic and comprehensive EmOC health facilities and local community members	Health providers experienced dissatisfaction with the working environment, lacked supportive supervision, seemed to lack motivation, as well as inadequate supplies Women in labour lacked support, experienced neglect, as well as physical and verbal abuse at health facilities, lack of trust in the health facility.	100
133	Mwangome et al. (2012)	Kenya	Qualitative: individual interviews and focus group discussions	Twelve discussion groups were with hospital staff and general community members (36 males and 54 females), individual interviews with 26 mothers who chose not to deliver their babies in hospital.	Identified attitudes to and beliefs about the uptake of hospital services for birthing.	A lack of financial resources to cover cost of services, a lack of means of transport, geographic distance to facility, fear of being verbally abused by hospital staff, fear of caesarean delivery, not being allowed to assume preferred positions during birthing, negligence by nurses, fear of being tested for HIV lack of knowledge about pregnancy and maternal health), negative influence of relatives.	75
134	Ng'anjo Phiri et al. (2014)	Kenya, Tanzania and Zambia	Quantitative: survey	1800 women who had childbirth in the previous five years	To investigate the underlying and proximate determinants of health facility childbirth in rural and urban areas of three districts in	Perceived quality and trust of local health services, perceived distance to facility	75

					Kenya, Tanzania and Zambia.		
135	O'Donnell et al. (2014)	Malawi	Qualitative: in-depth interviews and focus group discussions	27 in-depth interviews and 2 focus group discussions with 33 postnatal mothers and 10 healthcare providers from all 4 major hospitals in one district	To examine perceptions of the quality of care provided during childbirth in Malawi	Lack of autonomy and decision-making power is a barrier to quality of care and it exists both at the level of the patient (mother) and at the level of her caregiver with healthcare providers unable to influence decisions made by more senior staff or management. Lack of autonomy and demotivation, frustration, lack of empowerment to make change, resulting in a poor quality of care provided.	75
136	Oiyemhonlan et al. (2013)	Ghana	Mixed methods: survey, in-depth interviews and focus group discussions	Two emergency obstetric cases, 29 antenatal focus group discussants and 5 midwives at the maternity unit.	To identify obstetric emergencies and barriers to emergency care seeking; examine the perspective of midwives regarding their role in maternity care and management of obstetric emergencies, and explore women's knowledge and response to obstetric emergencies.	At the individual level, obstetric complications were poorly understood by antenatal women, there were also lack of readily accessible transportation, poverty, high illiteracy rates language and cultural barriers. Service challenges included insufficient staffing, inadequate equipment and physical space in the maternity ward.	50
137	Okafor et al. (2014)	Nigeria	Qualitative: focus group discussions	Focus group discussions with women of reproductive age group within a rural Local Government Area in Lagos state.	To determine the use of orthodox versus unorthodox maternity healthcare and determinants among rural women in southwest	Traditional beliefs and practices, a lack of financial resources,	75

					Nigeria.		
138	Ono et al. (2013)	Kenya	Quantitative: survey Facility-based	303 mothers who brought their babies to the health center for immunization within their first year of life.	To explore determinants of association between social support and place of delivery.	Being married, unmarried women without support in housework from family (mother or sisters), married women with support from husbands and neighbours, not receiving advice on health facility delivery from mother-in-law or health staff	50
139	Osubor et al. (2006)	Nigeria	Mixed methods study: survey and focus group discussions	225 randomly selected mothers (age 15–49 years), six focus group discussions — four for community women and two for health workers	To assess maternal health services and health-seeking behaviour in a rural community	Irregularity of staff at work, poor quality of services, ignorance about warning signs in pregnancy, and preference for traditional birth attendants due to greater accessibility, better interpersonal relationship, lower cost, greater convenience, and freedom to use traditional birthing positions,	75
140	Pettersson et al. (2004)	Angola	Qualitative: focus group discussions	Ten focus group discussions with pregnant and non-pregnant women residing in suburban areas of Luanda	To explore how various factors influenced women's decisions regarding place of confinement in Luanda, Angola.	Demand for informal user fees, perceived low quality of care, dissatisfaction with services of midwives and obstetricians, women's inability to choose their positions during delivery, impact of socio-psychological effects of migration from war-affected areas, shame of poverty, family's influence to adhere to traditional practices, reluctance by midwives to care for complicated cases, women's own decision to avoid institutional care.	100
141	Ridge et al. (2010)	Zambia	Qualitative: observation and records review	A 'fishbone' (Ishikawa) diagram listing probable facilitators to the availability and use of MgSO <sub>4</sub> , a walk through observational exercise and a review of available undergraduate medical and midwifery education and training	To identify barriers to the availability and use of MgSO <sub>4</sub> in the Zambian Public Health System.	Lack of procurement by the Ministry of Health, a lack of demand by health professionals at the health centre level and a lack of in-service training in the use of MgSO <sub>4</sub> . Where there was demand by obstetricians, magnesium sulphate injection was being procured from the private sector by the hospital pharmacy despite not being registered and licensed for use for the treatment of severe pre-eclampsia and eclampsia by the national Pharmaceutical Regulatory Authority.	100

				materials			
142	Roka et al. (2013)	Kenya	Quantitative: case control study	Seventy cases and 140 controls were included in the study (Cases were patients who had fistula following delivery within the previous five years. Controls were systematically selected from women who attended obstetrics and gynaecology clinics at these hospitals, and did not have present or past history of fistula.)	To identify risk factors associated with developing obstetrics fistula in order to guide implementation of appropriate interventions	Delays in care seeking including delay in making decision to seek delivery services after six hours of labour onset, taking more than two hours to reach a health facility, and having no formal or primary education.	100
143	Roro et al. (2014)	Ethiopia	Qualitative: focus group discussions	Eight focus group discussions - four with women and four with men groups were conducted involving 81 residents of the Butajira district	To make an in-depth assessment of reasons why mothers do not use health facilities for child delivery.	A lack of decision-making power on place of delivery, reliance on traditional birth attendants, misconception about services provided at health facility, inability of family members to be present at time of labour and delivery, lack of privacy, traditional and/or spiritual factors, economic factors and accessibility to health care facilities, poor reception at health facility, refusal of admission, information gap, poor competence and shortage of staff and materials at health facilities	100
144	Schack et al. (2014)	Ghana	Qualitative: in-depth interviews	Twelve in-depth interviews were conducted with labor ward midwives who all had previous training in active management of the third stage of labour	To gain an in-depth understanding of midwives' experiences about active management of the third stage of labour	Knowledge gaps in Active management of the third stage of labour protocol, insufficient staff overage,	100

				Facility-based			
145	Seljeskog et al. (2006)	Malawi	Qualitative: in-depth interviews and non-participatory observation	Six women who had given birth (three at home and three in a health facility)	To determine factors influencing women's choice of place of delivery	Sub-optimal quality of care such as poor communication, poor attitudes; long distance to facility, poor access to transportation, costs, influence from decision-makers, perception of danger signs, traditional views on pregnancy and birthing.	100
146	Sialubanje et al. (2015)	Zambia	Qualitative: in-depth interviews and focus group discussions	Ten focus group discussions (n = 100) with women of reproductive age (15–45 years) and 30 in-depth interviews were conducted comprising 5 traditional birth attendants, 4 headmen, 4 husbands, 4 mothers, 4 neighbourhood health committee members, 4 community health workers and 5 nurses.	To identify reasons motivating women to giving birth at home and seek the help of traditional birth attendants.	Women's lack of decision- making autonomy regarding child birth, dependence on the husband and other family members for the final decision, and various physical and socioeconomic barriers including long distances, lack of money for transport, the requirement to bring baby clothes and food while staying at the clinic, socio-cultural norms regarding childbirth, and negative attitude towards the quality of services provided at the clinic	100
147	Singh et al. (2015)	Ghana	Mixed methods: survey, in-depth interviews and focus group discussions	Household survey (n = 1267 women), a quantitative community leader survey (n = 62), qualitative birth narratives with mothers (n = 20) and fathers (n = 18), key informant interviews with health care workers (n = 5) and focus groups (n = 3)	To describe women's experiences with the National Health Insurance Scheme and to study associations between insurance and skilled facility delivery, antenatal care and early care-seeking for sick children.	Transportation barriers, fear of unknown facilities, expenses not covered or believed to be not covered by insurance, extreme poverty, low level of education, challenges regarding registration for the health insurance, and lack of understanding of who and what services were covered for free.	100

				with community leaders and stakeholders.			
148	Somé et al. (2014)	Burkina Faso	Qualitative: in-depth interviews and focus group discussions	Thirty in-depth interviews, 8 focus group discussions and 6 non-participant observations were carried out. Participants were women from 15-49 years.	To describe barriers which prevent women from sustainable use of maternal care	Cultural barriers (low status of women, traditional beliefs, women's low decision-making power, distance to health facility, lack of transport means, inability to afford service and drugs costs, and poor quality of care provided to women	75
149	Sorensen et al. (2011)	Tanzania	Mixed methods: survey and in-depth interviews	Survey and semi-structured in-depth interviews were carried out with 97 providers and users of delivery care for 31 births at home, at village-based health facilities and at Kagera Regional Hospital	To analyse the main dynamics and conflicts in attending and providing good quality delivery care in a local Tanzanian rural setting	Long distance to facilities, availability of means of transport costs, poor quality of care	50
150	Speizer et al. (2014)	Ghana	Quantitative: survey	1,606 includes all women who had a birth three years prior to the survey date and who had no missing data.	To examine the psychological and social barriers to institutional delivery, namely women's decision-making autonomy and their perceptions about social support for institutional delivery in their communities	Women's low decision-making autonomy,	100
151	Storeng et al.	Burkina	Mixed	Ethnographic study	To compare the	High cost of emergency obstetric care, low	75

	(2007)	Faso.	methods study: in-depth interviews and cohort study	of 82 women nested in a prospective cohort study of 1013 women	experiences of women who survived life-threatening obstetric complications ('near-miss' events) with women who delivered without complications in hospitals.	socioeconomic status households.	
152	Idris et al. (2006)	Nigeria	Quantitative: survey	496 women who had delivered at least once	To assess the role of some health, socio-economic and demographic factors in determining the place of delivery among women in a semi-urban setting	Low mother's educational status, father's unemployment status, age of first pregnancy before 18 years	100
153	Oguntunde et al. (2010)	Nigeria	Quantitative: survey	332 women who had delivered within two years of the survey	Assessed antenatal care (ANC) coverage, place of delivery and use of skilled birth assistants in three communities in Kaduna State	Low educational status, poor quality and coverage of antenatal and birthing services	100
154	Ejembi et al. (2004)	Nigeria	Quantitative: survey	655 married women of reproductive years (10 to 49 years)	To document level and pattern of utilisation of selected maternal health services among Hausa women	Perception that antenatal care was not necessary, husband's refusal, being unaware of services, culturally unacceptable hospital practices, geographical inaccessibility, high costs of services, negative staff attitudes.	100
155	Moyer et al. (2013a)	Ghana	Qualitative: in-depth interviews and	72 in-depth interviews with mothers, Traditional	To explore the impact of social factors on place of	Traditional religions, illiteracy, requiring permission before traveling to a health facility, Lower socioeconomic status,	100

			focus group discussions	Birth Attendants, herbalists, other local healers, nurses, midwives, medical assistants, medical doctors. and 18 focus group discussions with grandmothers, household heads, and compound heads	delivery in northern Ghana	difficulties obtaining transportation, the cost of transportation, and the cost of care-seeking	
156	Moyer et al. (2013b)	Ghana	Qualitative: in-depth interviews and focus group discussions	Focus groups and 43 individual interviews were conducted with community members, and 13 individual interviews were conducted with healthcare providers	To explore community and healthcare provider attitudes towards maltreatment during delivery in rural northern Ghana and compare findings against The White Ribbon Alliance's seven fundamental rights of childbearing women.	Physical abuse, verbal abuse, neglect, discrimination and denial of traditional practices.	100
157	Lori and Boyle, (2011)	Liberia	Qualitative: in-depth interviews and participant observation	Semistructured, in-depth interviews with postpartum women who experienced a maternal complication, community and family members of women who died from a pregnancy or childbirth	To provide an understanding of childbirth and maternal illness and death through the lens of women, communities, and families	Lack of decision-making autonomy, distrust of the health care system, fear of routines or procedures of the hospital	100

				complication. Participant observation was used to understand and interpret cultural behavior			
158	Izugbaga et al. (2009)	Kenya	Qualitative: focus group discussions	12 focus group discussions involving 74 purposefully selected women from two slums in Nairobi	To investigate the attractions of and deterrents to hospital-based deliveries	Poverty, cost of services, transportation cost, harsh and uncaring attitudes of hospital-based providers, fear of HIV testing, providers lack the requisite training and skills	100
159	Mrisho et al. (2007)	Tanzania	Mixed methods: In-depth interviews, focus group discussions, participant observation and survey	Thirty-two in-depth interviews, 2 focus group discussions, participant observation and survey of 21,600 randomly chosen households (all women aged 15–49 years were asked about all children born in the 3 years prior to the survey)	Combines an understanding of gender issues relating to health and help-seeking behaviour with epidemiological knowledge concerning place of delivery.	A lack of money to pay for delivery kits, transport fare and food, lack of means of transport, sudden onset of labour or short labour, poor staff attitude including abusive language, denying women service, lacking compassion and refusing to assist properly, lack of privacy, traditional beliefs and culture, low level of education, ethnicity, older maternal age	75
160	Stekelenburg et al. (2004)	Zambia	Mixed methods: survey, focus group discussions and records review	332 women interviewed using semi-structured questionnaires. Focus group discussions were held and hospital data and registers were checked.	To determine the level of use of maternal health services and to identify and assess factors that influence women's choices where to deliver in Kalabo District, Zambia	Long distances, lack of transport, user fees, lack of adequate health education given during antenatal clinic attendances, poorly staffed and ill-equipped institutions with poorly skilled personnel.	75

**Appendix IV: PRISMA checklist (systematic review)**

Section/topic	#	Checklist item	Reported on page #
<b>TITLE</b>			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
<b>ABSTRACT</b>			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2, 3
<b>INTRODUCTION</b>			
Rationale	3	Describe the rationale for the review in the context of what is already known.	3, 4
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	4,5
<b>METHODS</b>			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	3, 5
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	5, 6
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	5,6
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Additional file 1
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	5, 6

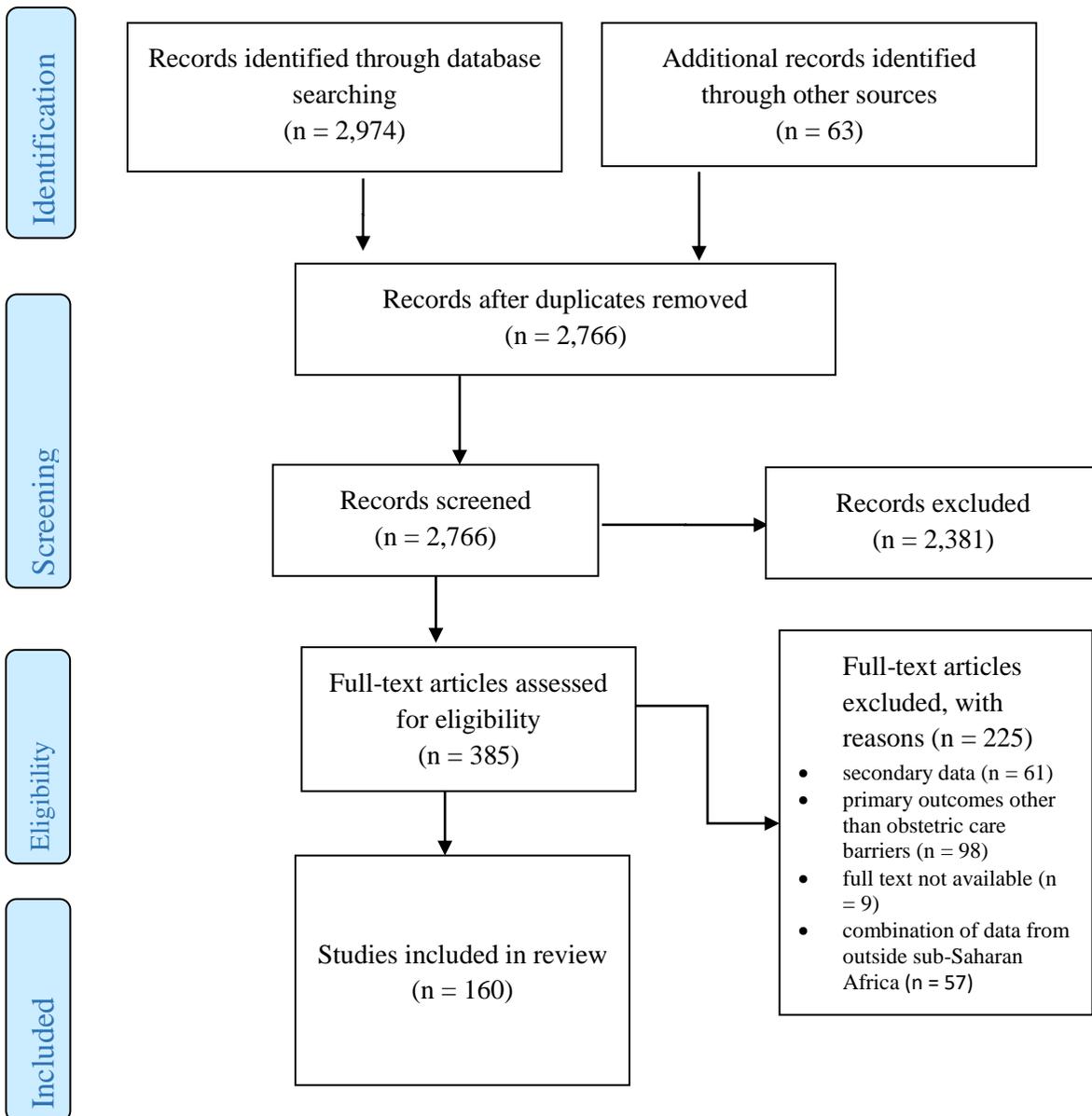
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	5, 6
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	4 – 8, and Additional File 3
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	6, 7
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	N/A (narrative synthesis)
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., $I^2$ ) for each meta-analysis.	6, 7
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	N/A
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	N/A
<b>RESULTS</b>			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	7 and 8, Additional File 5
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	Additional File 3
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	P8 and Additional file 2
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	N/A (narrative synthesis)

Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	N/A (narrative synthesis)
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	N/A
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	Table 1. Pp 38 - 39
<b>DISCUSSION</b>			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	14 - 18
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	18, 19
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	20 - 22
<b>FUNDING</b>			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	23

*Source:* Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

## Appendix V: PRISMA flow chart

Additional file 5: Figure S1: Study selection and elimination



**Appendix VI Data Abstraction Instrument (Cohort Study)**

Facility: \_\_\_\_\_

Facility ID: \_\_\_\_\_

District: \_\_\_\_\_

Sub-District: \_\_\_\_\_

Client Information and History											
DOB/ Age	Location (suburb)	Maternal Height	NHIS Status	Gravida & Parity	Trimester at Registration	Hb & VDRL at registration	VDRL Treatment	PMTCT	Sickle Cell Status	Past Obstetric History	Expected Date of Del. (EDD)
		< 150cm (5ft.) <input type="checkbox"/>	Insured <input type="checkbox"/>	Grav: _____	1 <sup>st</sup> <input type="checkbox"/> ----- Wks	Hb: _____	Yes <input type="checkbox"/>	Test done? Yes <input type="checkbox"/> No <input type="checkbox"/>	Positive <input type="checkbox"/>		_____
		>= 150cm (5ft.) <input type="checkbox"/>	Not Insured <input type="checkbox"/>	Par: _____	2 <sup>nd</sup> <input type="checkbox"/> ----- Wks	VDRL: _____	No <input type="checkbox"/>	Test Results _____			
					3 <sup>rd</sup> <input type="checkbox"/> ----- Wks		N/A <input type="checkbox"/>	Counselled: Yes <input type="checkbox"/> No <input type="checkbox"/>	Negative <input type="checkbox"/>		
								Treatment Yes <input type="checkbox"/> No <input type="checkbox"/>			

Estimated blood loss: \_\_\_\_\_

Partograph Use \_\_\_\_\_

Perineum: \_\_\_\_\_

Antenatal Care (ANC) Visits															
	ANC1	ANC2	ANC3	ANC4	ANC5	ANC6	ANC7	ANC8	ANC9	ANC10	ANC11	ANC12	ANC13	ANC14	Hb at 34wks
Date of ANC visit															_____
Blood pressure															
Weight (Kg)															
Gest. Age (Wks)															
Urine Test (P/G)	/	/	/	/	/	/	/	/	/	/	/	/	/	/	
Location (F:H:O)															
Referred															

Delivery (Birthing)							
Delivery Information		Apgar Score	Place of Delivery	Delivered By			
Date of Del.: _____	Placental Exam: Yes <input type="checkbox"/> No <input type="checkbox"/>	Child 1:	Gov't Hosp. <input type="checkbox"/>	Doctor <input type="checkbox"/>	CHO/CHN <input type="checkbox"/>		
Duration of Preg: _____wks	Births: Live birth <input type="checkbox"/> Fresh still birth <input type="checkbox"/> Macerated still birth <input type="checkbox"/>	1min____ 5min____	Private Hosp. <input type="checkbox"/>	Medical Asst. <input type="checkbox"/>	TBA, trained <input type="checkbox"/>		
Mother's Age at Del: _____	<input type="checkbox"/>		Health Centre <input type="checkbox"/>	Midwife <input type="checkbox"/>	TBA, untrained <input type="checkbox"/>		
Mode of Del: Normal <input type="checkbox"/> Vacuum <input type="checkbox"/> <input type="checkbox"/> C/Section <input type="checkbox"/> Forceps <input type="checkbox"/>	Outcome: Single <input type="checkbox"/> Twins <input type="checkbox"/>	Child 2: 1min____5min ____	Comm. Health Clinic/ CHPS <input type="checkbox"/>	(Private/Gov't) <input type="checkbox"/>	Friend/Relative <input type="checkbox"/>		
	Other:_____		Home <input type="checkbox"/>				
	Drug: Oxytocin <input type="checkbox"/> Ergometrin <input type="checkbox"/>						
	Birth Hx: Primipara <input type="checkbox"/> Multipara <input type="checkbox"/>						

Delivery (Birthing) Cont'd		Birth Outcome (Infant)					
Delivery & Immediate Postpartum Related Complications	Status at Discharge (mother)		Sex	Weight, Head Circ, Length	Birth Abnormality	ARV Prophylaxis	Infant Status at Discharge
Eclampsia <input type="checkbox"/>	Date of Disch: _____	<b>Child 1</b>	Male <input type="checkbox"/>	< 2.5kg <input type="checkbox"/> >=2.5kg <input type="checkbox"/>		At Birth <input type="checkbox"/>	Alive <input type="checkbox"/>
Puerperal Infection/sepsis <input type="checkbox"/>	Status: Alive <input type="checkbox"/> Dead <input type="checkbox"/> Referred <input type="checkbox"/>		Female <input type="checkbox"/>	Head Circ: _____		At disch. <input type="checkbox"/>	Dead <input type="checkbox"/>
PPH (total blood > 500ml) <input type="checkbox"/>			Length: _____	Refused <input type="checkbox"/>		Referred <input type="checkbox"/>	
Ruptured uterus <input type="checkbox"/>		<b>Child 2</b>	Male <input type="checkbox"/>	< 2.5kg <input type="checkbox"/> >=2.5kg <input type="checkbox"/>		At Birth <input type="checkbox"/>	Alive <input type="checkbox"/>
Puerperal psychosis <input type="checkbox"/>			Female <input type="checkbox"/>	Head Circ: _____		At disch. <input type="checkbox"/>	Dead <input type="checkbox"/>
Vesicovaginal fistula <input type="checkbox"/>			Length: _____	Refused <input type="checkbox"/>		Referred <input type="checkbox"/>	
Other, specify _____ _____ _____						N/A <input type="checkbox"/>	

**Abbreviations:**

NHIS – National Health Insurance Scheme

TBA = Traditional Birth Attendant

Location (F;H;O) – F=Facility; H = House; O = Outreach

VDRL – Venereal Disease Reference Laboratory Testing (for Syphilis)

D & C = Dilatation and Curettage

CHO/CHN = Community Health Officer/Community Health Nurse

Urine Test (P/G) – Protein and Glucose in urine

Hb – Haemoglobin

MVA = Manual Vacuum Aspiration

CHPS - Community-based Health Planning and Services

PMTCT – Prevention of mother-to-child transmission (for HIV/AIDS)

**Appendix VII: Health facility review questionnaire**

**Box A: Facility's Possible EmOC Status**

To be done at **district** level  
before completion of this form.

*Tick ONE*

**Comprehensive EmOC**  
**Basic EmOC** \_\_\_

1. Location of facility: \_\_\_\_\_
2. Type of locality: \_\_\_\_\_
3. Type of facility: a) Hospital \_\_\_      b) Maternity home \_\_\_      c) Health Centre  
\_\_\_  
d) Clinic ---      e) Community-Based Health Planning and Services \_\_\_
4. Facility ownership: a) Public \_\_\_      b) Private \_\_\_\_\_

**Box B: Facility's Actual EmOC Status**

To be done at **facility** level  
after completion of this form.

*Tick ONE*

**Comprehensive EmOC**  
**Basic EmOC** \_\_\_

<i>Check Yes or No for <u>each</u> of the following items (a-h)</i>		
<b>5. Were the following services performed at least once during the last 3 months?</b>	Yes	No
(a) Parenteral antibiotics		
(b) Parenteral oxytocics		
(c) Parenteral sedatives/anticonvulsants		
(d) Manual removal of placenta		
(e) Removal of retained products		
(f) Assisted vaginal delivery		
(g) Blood transfusion		
(h) Caesarean section		

**Box: Determination of EOC status**  
*(Use Q5. Check only ONE.)*

**! If ALL of 5a–h = Yes, check:**  
\_\_\_ **COMPREHENSIVE EOC**

**! If ALL of 5a–f = Yes AND 5g OR 5h = No, check:**  
\_\_\_ **BASIC EOC**

**! If ANY of 5a–f = No, check:**  
**NOT EOC**

**6. Does this facility offer normal maternity care services?**

Yes..... 1

No..... 2

**7. Is there a trained health provider present at the facility at all times (24 hours/day)?**

Yes, trained provider always present .....1

No .....2      If yes, skip to 9

**8. Is there a trained health provider available on call at all times after hours?**

Yes, ..... 1

No..... 2

**9. Routinely, how many days each week is this facility/unit open for maternity care services?**

Number of days.....

**10. Is a person with midwifery skills present at the facility or on call 24 hours a day, including weekends, to provide delivery care? (If Midwife (MW) or Doctor (MD) not ALWAYS presents or on-call, but someone with midwifery skills is, circle the NON-MIDWIFE responses).**

a) Non MW or MD present ..... 1

b) Yes MW or MD on call..... 2

c) Yes, non-midwife present.....3

d) Yes, non-midwife on call ..... 4

e) No ..... 5

**11. Does this facility have a health personnel who can perform a caesarean section present in the facility or on-call 24-hours a day (including weekends)?**

- Yes, present ..... 1
- Yes, on call.....2
- No.....3

**12. Does this facility currently provide post-abortion care?**

- Yes.....1
- No.....2

**13. Do midwives/care providers routinely provide home birth assistance or attend home birth emergencies as a part of the facility's services?**

- Yes, routinely.....1
- Yes, emergency only..... 2
- No..... 3

**14. Does the facility have a system for routinely reviewing maternal deaths or "near-miss deaths"?**

- Yes, .....1
- No.....2

**15. What is the most commonly used means by which women are transported from home to this facility during obstetric emergencies?**

- Carried by people.....1
- Animal drawn vehicle .....2
- Motor vehicle.....3
- Bicycle .....4
- Combination of above.....5
- Other (specify)\_\_\_\_\_6
- Don't know ..... 7

**16. Does this facility have a procedure for transporting women to another facility (if necessary), in an obstetric emergency? Record “not applicable” if facility is a tertiary (receiving) facility.**

- Yes .....1
- No..... 2
- Not applicable.....9

**17. Is a printed referral form sent with referrals from this facility? (If the facility is a referral (receiving) facility, then circle “4” for referral facility).**

- Yes ..... 1
- No form, use letter head ..... 2
- No..... 3
- Referral facility ..... 4
- Don’t know ..... 8

**18. Circle for each of the following, the most commonly available means used by this facility for emergency transportation:**

- a) Emergency vehicle onsite at facility
- b) Multi-use vehicle available at facility. May be used for emergencies
- c) Call other facility to send emergency vehicle
- d) Rental/hire vehicle arrangement when needed (with some financial support from facility)

	24 hours	Normal Facility hours (< 24 hours)	No set times	Not used
a) Emergency vehicle onsite at facility	1	2	3	8
b) Multi-use vehicle available at facility. May be used for emergencies	1	2	3	8
c) Call other facility to send emergency vehicle	1	2	3	8
d) Rental/hire vehicle arrangement when needed (with some financial support from facility)	1	2	3	8

**19. In recent times, how long has the vehicle been operational?**

- Vehicle not operational.....1
- Under one month.....2
- One to three months.....3

- Three to six months.....4
- Six to nine months.....5
- Nine months to one year.....6
- One year and over.....7

**20. What is the most commonly used means for transporting pregnant women from this facility to the nearest referral facility during an obstetric emergency?**

- Carried by people ..... 1
- Animal drawn vehicle.....2
- Motor vehicle .....3
- Combination of above .....4
- Other (specify) \_\_\_\_\_5
- Don't know.....6

**21. How long does it take, using this form of transportation, to get to the nearest referral**

**facility?** (Note: if call elsewhere to obtain vehicle, record average time from call to patient arrival at referral facility)

- Minutes \_\_\_\_\_
- Don't know.....9

**22. Does this facility have a working phone or short-wave radio?**

- Yes .....1 If yes, go to 24
- No..... 2

**23. Is there a phone or short-wave radio within five minutes distance from the facility that staff can use in an emergency? IF YES: Is that phone or short-wave radio available 24 hours a day?**

- Yes, available 24 hours.....1
- Yes, not available 24 hours .....2
- No, none within 5 minutes.....3

**24. In your opinion, is the skill mix in this facility appropriate to cope with the patient flow and case mix received?**

Yes .....1

No..... 2

**25. In your opinion, are the maternity wards adequately equipped to offer designated maternity care services?**

Yes .....1

No..... 2

**26. Is the operating theatre (if any) in good repair and fully equipped with drugs and surgical equipment to perform life-saving procedures, when required?**

Yes .....1

No..... 2

None available.....3

**Appendix VIII: Service provision questionnaire**

**Section A: Respondents' Professional Background**

- 1) *What is your highest level of education?* .....
  
- 2) *What is your current professional/technical qualification?*  
Public health nurse..... 1  
Registered midwife..... 2  
Registered nurse..... 3  
Enrolled nurse..... 4  
Community health nurse..... 5  
Health Care Assistant..... 6  
Community Health Officer..... 7  
Traditional birth attendant ..... 8  
Other \_\_\_\_\_..... 9
  
- 3) *What is your age in years?* .....
  
- 4) *For how many years in total have you conducted deliveries? (May be from another facility). If less than one year, record "00".*                      Years .....
  
- 5) *In the last 6 months, approximately how many births have you assisted as the main attendant?* .....

**Section B: Obstetric Care/Practice**

**6) Have you received in-service training in the last three years in any of the following? (If no go to Q8)**

	Yes	No
a) Safe motherhood health education -----	[ ]	[ ]
b) Care during labour or delivery -----	[ ]	[ ]
c) Use of partograph -----	[ ]	[ ]
d) Management of risks in pregnancies -----	[ ]	[ ]
e) Life-saving skills/emergency complications -----	[ ]	[ ]
f) Safe Motherhood/Clinical Skills -----	[ ]	[ ]
g) Post Abortion Care/Manual Vacuum-----	[ ]	[ ]
h) Manual vacuum aspiration-----	[ ]	[ ]
i) Infection prevention-----	[ ]	[ ]
j) Management of ante- and post-partum bleeding-----	[ ]	[ ]
k) Administration of intravenous fluids and blood products--	[ ]	[ ]
l) Management of prolonged and obstructed labour -----	[ ]	[ ]
m) Management of puerperal sepsis -----	[ ]	[ ]
n) Management of pregnancy induced hypertension-----	[ ]	[ ]
o) Other (specify)_____		

**7) Did you receive this training in the last 12 months? (please indicate)**

	Yes	No
a) Safe motherhood health education -----	[ ]	[ ]
b) Care during labour or delivery -----	[ ]	[ ]
c) Use of partograph -----	[ ]	[ ]
d) Management of risks in pregnancies -----	[ ]	[ ]
e) Life-saving skills/emergency complications -----	[ ]	[ ]
f) Safe Motherhood/Clinical Skills -----	[ ]	[ ]
g) Post Abortion Care/Manual Vacuum-----	[ ]	[ ]
h) Manual vacuum aspiration-----	[ ]	[ ]

- i) Infection prevention----- [ ] [ ]
- j) Management of ante- and post-partum bleeding----- [ ] [ ]
- k) Administration of intravenous fluids and blood products-- [ ] [ ]
- l) Management of prolonged and obstructed labour ----- [ ] [ ]
- m) Management of puerperal sepsis ----- [ ] [ ]
- n) Management of pregnancy induced hypertension----- [ ] [ ]
- o) Other  
(specify)\_\_\_\_\_

**8) *When was the last time you used a partograph?***

- a) Never..... 0
- b) Within the last one month..... 1
- c) Between one and two months ago . .... 2
- d) Between two and three months ago..... 3
- e) Between three and four months ago .....4
- f) Between four and five months ago .....5
- g) Six months or longer.....6

**9) *Is there an accepted procedure for admissions in this birthing facility?***

- Yes .....1
- No..... 2 (If no, go to Q12)
- Not applicable .....9

**10) *Does the admissions procedure in this birthing facility have any guidelines for examination and identification of complications?***

- Yes .....1
- No..... 2 (If no go to Q12)
- Not applicable .....9

**11) What are the admissions guidelines based on?**

- Health facility guidelines ..... 1
- Instruction from superiors ..... 2
- Experience and intuition .....3
- Other, specify \_\_\_\_\_ 10

**12) Have you received in-service training to manage post-partum bleeding?**

- Yes .....1
- No..... 2 (If no, go to Q14)
- Not applicable .....9

**13) When did you receive this training? \_\_\_\_\_**

**14) How do you manage patients with post-partum haemorrhage? Please specify**

---

---

**15) Have you received in-service training in the administration of intravenous fluids and blood transfusion?**

- Yes .....1
- No.....2 (If no, go to Q17)
- Not applicable .....9

**16) When did you receive this training? \_\_\_\_\_**

**17) In practice, do you administer intravenous fluids, blood and blood products?**

- Yes .....1 (If no, go to Q19)
- No..... 2
- Not applicable ..... 3

18) *Please explain why*

---

---

19) *Have you received in-service training in the management of prolonged or obstructed labour?*

Yes .....1

No..... 2 (If no, go to Q21)

Not applicable .....9

20) *When did you receive this training?* \_\_\_\_\_

21) *How do you manage patients with obstructed labour? Please specify*

---

---

22) *Have you received in-service training in the application of infection prevention practices during maternity care?*

Yes .....1

No..... 2 (If no, go to Q24)

Not applicable .....9

23) *When did you receive this training?* \_\_\_\_\_

24) *In your opinion, do you feel that you have received adequate training to provide maternity care services aseptically?*

Yes .....1 (If yes go to Q26)

No.....2

25) *Please explain why*

---

---

**26) Have you received in-service training to recognise and manage puerperal sepsis?**

Yes .....1

No..... 2 (If no, go to Q28)

Not applicable .....9

**27) When did you receive this training?** \_\_\_\_\_

**28) How do you manage patients with puerperal sepsis? Please specify**

\_\_\_\_\_  
\_\_\_\_\_

**29) Are you trained to manage women with pregnancy-induced hypertension?**

Yes ..... 1

No..... 2 (If no, go to Q31)

Not applicable .....9

**30) When did you receive this training?** \_\_\_\_\_

**31) How do you manage patients with pregnancy-induced hypertension? Please specify** \_\_\_\_\_

\_\_\_\_\_

**32) Have you received in-service training in the early recognition and treatment of incomplete abortion?**

Yes ..... 1

No..... 2 (If no, go to Q34)

Not applicable .....9

**33) When did you receive this training?** \_\_\_\_\_

**34) How do you manage patients with incomplete abortion? Please specify**

---

---

**35) What other problems do you frequently face in providing care to pregnant women?**

*Please specify* \_\_\_\_\_

---

**36) What measures could best improve maternity care in your unit/practice? Please specify** \_\_\_\_\_

---

**Section C: Client Referrals**

**37) Are there any specific criteria for referring patients?**

Yes .....1

No..... 2 (If no go to Q39)

**38) Please specify criteria**

---

---

**39) Do you make referral decisions?**

Yes .....1 (If yes, go to Q41)

No..... 2

**40) Who makes referral decisions?**

*Specify* \_\_\_\_\_

**41) Do you routinely follow any procedure in the identification of complications in pregnant women?**

- Yes .....1
- No..... 2 (If no, go to Q43)
- Not applicable .....9

**42) What is the procedure based on?**

- Health facility guidelines .....1
- Instruction from superiors ..... 2
- Experience and intuition ..... 3
- Other, (specify) \_\_\_\_\_ 10

**43) Do you routinely refer patients to other facilities for further care?**

- Yes .....1
- No..... 2 (If no, go to Q54)
- Not applicable .....9

**44) Are you able to provide care to stabilise a woman before referral?**

- Yes .....1
- No..... 2
- Not applicable .....9
- Other (specify) \_\_\_\_\_

**45) What is the average time (in minutes) for processing a pregnant woman for referral after identifying an obstetric complication?**

\_\_\_\_\_minutes

**46) Are referrals to other facilities communicated to them before transfers?**

- Yes .....1
- No..... 2 (If no, go to Q49)
- Not applicable .....9

**47) What is the primary means of communicating with referral facilities?**

Please specify \_\_\_\_\_

**48) Is this means of communication frequently available?**

- Yes .....1
- No..... 2
- Most of the time ..... 3
- Rarely ..... 4
- Not applicable .....9

**49) Is there a means of transportation available on a 24-hour basis for referrals?**

- Yes .....1
- No..... 2
- Not applicable .....9

**50) Is there a qualified member of staff on-call to accompany complicated cases to the referral hospital, when necessary?**

- Yes .....1
- No..... 2
- Most of the time ..... 3
- Rarely ..... 4
- Not applicable .....9

**51) Do referred patients continue to receive care while being transferred to referral facilities?**

- Yes ..... 1
- No..... 2
- Most of the time ..... 3
- Rarely ..... 4
- Not applicable ..... 9

**52) What other problems do you often face when making referrals of pregnant women with complications?**

*Please specify* \_\_\_\_\_  
\_\_\_\_\_

**53) What measures could best improve maternity referrals in your unit/practice?**

*Please specify* \_\_\_\_\_  
\_\_\_\_\_

**54) In your opinion, are there any other factors that might influence maternal health in this region?**

.....  
.....  
.....

## Appendix IX: Correspondence to Dr. Awoonor (field supervisor)

---

**From:** Minerva Kyei-nimakoh  
**Sent:** 08 November 2013 15:09  
**To:** Koku Awoonor  
**Subject:** RE: Research

Dear Dr. Awoonor,

My name is Minerva, a postgraduate student at Victoria University, Melbourne. I made an initial contact recently and would like to make an enquiry on a separate but related matter. My study topic is "Management and Referral of Obstetric Complications: A Study of Maternity Care Services in the Upper-East Region of Ghana" The study will involve a retrospective cohort study on obstetric outcomes and a survey of maternity care workers.

It has been recommended that I identify a suitable person based in Ghana to provide support in terms of supervision while undertaking the fieldwork. Given your expertise and experience in this area, I will be grateful if you would consider serving this role during my fieldwork.

The second issue is, I will need to provide a preliminary/informal statement to the effect that approval will be granted for access to data on maternity outcomes in the Region and for access to health workers for the survey (I am aware that I have to seek ethical approval through the Ghana Health Service and will do so).

I look forward to hearing from you. Thank you.

Kind Regards,  
Minerva

.....

Minerva Kyei-Nimakoh,  
PhD Student,  
School of Nursing and Midwifery,  
Victoria University, P. O. Box 14428,  
Melbourne 8001,  
Australia.

Phone: (+61) 478674794  
Email: [minerva.kyeinimakoh@live.vu.edu.au](mailto:minerva.kyeinimakoh@live.vu.edu.au)

## Appendix X: Letter from Dr Awoonor-Williams

### ***Our Core Values***

People Centred  
Professionalism  
Team Work  
Innovation  
Discipline  
Integrity  
*Ref GHS/UE*  
*Your Ref. No*



Regional Health Directorate  
Ghana Health Service  
Private Mail Bag  
Bolgatanga, UER  
GHANA  
26<sup>th</sup> November, 2013  
Tel: (03820) 22335  
Fax: (03820) 24390  
E-mail [ghs-uer@4u.com.gh](mailto:ghs-uer@4u.com.gh)

Minerva Kyei-Nimakoh,  
PhD Student,  
School of Nursing and Midwifery,  
Victoria University, P. O. Box 14428,  
Melbourne 8001,  
Australia.  
*Phone: (+61) 478674794*

*Email: [minerva.kyeinimakoh@live.vu.edu.au](mailto:minerva.kyeinimakoh@live.vu.edu.au)*

Dear Minerva,

This is in response to the enquiry on your proposed research in the Upper East Region of Ghana on the topic '*Management and Referral of Obstetric Complications - A Study of Private and Public Maternity Care Services in the Upper East Region of Ghana*'.

This study fortunately is equally of great interest to the Regional Health Directorate as well as we are making every effort to address MDGs 4 & 5 in the region. I am happy to confirm that you will be able to access data on maternity outcomes in the region and also survey maternity health workers for your study. I am equally happy to be a contributor to your study.

I wish to assure you that I will provide full supervisory support to you over the duration of your fieldwork. Look forward to hearing from you in the coming months.

Best Regards,



**J. Koku Awoonor-Williams MD, MPH, MPP**  
(Regional Director of Health Services, Upper East)

## Appendix XI: Correspondence with field supervisor



Regional Health Directorate  
Ghana Health Service  
Private Mail Bag  
Bolgatanga, UER  
GHANA

22<sup>nd</sup> December 2013

Dear Doctor Awoonor-Williams,

Thank you for your generous offer of assistance and support for Minerva Kyei Nimakoh, who will be collecting data in Ghana for her doctoral study '*Management and Referral of Obstetric Complications - A Study of Private and Public Maternity Care Services in the Upper East Region of Ghana*'.

Minerva's fieldwork involves access to maternal outcome data for the region, for one full year, and also to survey maternity health workers of different backgrounds.

Please feel free to contact me if you have any concerns or questions, or if you would like to discuss any aspect of Minerva's study.

Once again, thank you for your assistance with this important work,

Kind regards,

Mary Carolan-Olah,

Mary Carolan-Olah PhD, MPH, BN, CM  
Professor of Midwifery,  
Nursing and Midwifery,  
College of Health and Biomedicine  
Victoria University, PO Box 14428,  
Melbourne 8001, Australia  
Email: mary.carolan@vu.edu.au

## **Appendix XII: Victoria University Ethics Approval**

### **Quest Ethics Notification - Application Process Finalised - Application Approved**

quest.noreply@vu.edu.au

Thu 24/07/2014 15:44

To: mary.carolan@vu.edu.au <mary.carolan@vu.edu.au>;

Cc: Minerva Kyei-Nimakoh <minerva.kyeinimakoh@live.vu.edu.au>;

Terence.McCann@vu.edu.au <Terence.McCann@vu.edu.au>; kawoonor@gmail.com  
<kawoonor@gmail.com>;

Dear PROF MARY CAROLAN-OLAH,

Your ethics application has been formally reviewed and finalised.

» Application ID: HRE14-074

» Chief Investigator: PROF MARY CAROLAN-OLAH

» Other Investigators: PROF TERENCE MCCANN, DR John Koku Awoonor-Williams,  
MS Minerva Kyei-Nimakoh

» Application Title: Management and Referral of Obstetric Complications - A Study of  
Private and Public Maternity Care Services in the Upper-East Region of Ghana

» Form Version: 13-07

The application has been accepted and deemed to meet the requirements of the National Health and Medical Research Council (NHMRC) 'National Statement on Ethical Conduct in Human Research (2007)' by the Victoria University Human Research Ethics Committee. Approval has been granted for two (2) years from the approval date; 24/07/2014.

Continued approval of this research project by the Victoria University Human Research Ethics Committee (VUHREC) is conditional upon the provision of a report within 12 months of the above approval date or upon the completion of the project (if earlier). A report proforma may be downloaded from the Office for Research website at:

<http://research.vu.edu.au/hrec.php>.

Please note that the Human Research Ethics Committee must be informed of the following:

any changes to the approved research protocol, project timelines, any serious events or adverse and/or unforeseen events that may affect continued ethical acceptability of the project. In these unlikely events, researchers must immediately cease all data collection until the Committee has approved the changes. Researchers are also reminded of the need to notify the approving HREC of changes to personnel in research projects via a request for a minor amendment. It should also be noted that it is the Chief Investigators' responsibility to ensure the research project is conducted in line with the recommendations outlined in the National Health and Medical Research Council (NHMRC) 'National Statement on Ethical Conduct in Human Research (2007).'

On behalf of the Committee, I wish you all the best for the conduct of the project.

Secretary, Human Research Ethics Committee

Phone: 9919 4781 or 9919 4461

Email: [researchethics@vu.edu.au](mailto:researchethics@vu.edu.au)

### **Appendix XIII: Ethics approval (Ghana Health Service)**

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



Navrongo Health Research Centre  
Institutional Review Board  
Ghana Health Service  
P. O. Box 114  
Navrongo, Ghana  
Tel/Fax: +233-3821-22348  
Email: [irb@navrongo-hrc.org](mailto:irb@navrongo-hrc.org)

My Ref. App/ObsComp/12/2014  
Your Ref:

1<sup>st</sup> December, 2014

Ms. Minerva Kyei-Nimakoh  
School of Nursing and Midwifery  
Victoria University, P. O. Box 14428  
Melbourne 8001, Australia

**ETHICS APPROVAL ID: NHRCIRB189**

Dear Ms. Kyei-Nimakoh,

**Approval of protocol titled *Management and referral of obstetric complications – A study of private and public maternity care services in the Upper East Region of Ghana***

The Navrongo Health Research Centre Institutional Review Board (NHRCIRB) carried out an expedited review on the above named protocol and finds the study relevant considering the aims and objectives of the study as outlined in the protocol. I am therefore, pleased to grant you approval to carry out the study.

The documents that were reviewed and approved are;

- The New Protocol Submission Form
- Summary of study protocol
- Study protocol
- Consent forms – English version
- Study questionnaire
- Interview guide
- Curriculum Vitae – Principal Investigator and Co-Investigators

Please note that any amendment to this approved protocol must receive ethical clearance from the NHRCIRB before its implementation.

Should you require a renewal of your approval, a report should be submitted two (2) months before the expiration date.

You are also to note that this approval expires on 30<sup>th</sup> November, 2015

The Board wishes you the best in the study.

Sincerely,



Dr. (Mrs.) Nana Akosua Ansah  
(Vice Chair, NHRCIRB)

Cc: The Director,  
NHRC, Navrongo

## **Appendix XIV: Recruitment flyer**

### **PARTICIPANTS WANTED**

You are invited to take part in a survey about the care of women during pregnancy and child birth. This study is being carried out in healthcare facilities in the Upper-East Region of Ghana.

#### **Project Title:**

---

Management and Referral of Obstetric Complications - A Study of Private and Public Maternity Care Services in the Upper-East Region of Ghana

#### **Investigators:**

Chief Investigator: Professor Mary Carolan-Olah

Associate Investigator: Professor Terence McCann

Associate Investigator: Dr. J. Koku Awoonor-Williams

Student Researcher: Minerva Kyei-Nimakoh

#### **Who Can Take Part?**

---

If you are a health care worker who attends to pregnant women during pregnancy and child birth, you may be eligible to be part of the study.

#### **What will I be asked to do?**

---

If willing to take part in this study, you will be given a form to sign to show that you have agreed to be part. You will then be given a set of written questions to respond to or assisted by the student researcher to do so, if required. The activity will be carried out at a time and location that suits you. Responding to the questions is expected to last about 45 minutes.

#### **For Further Information Please Contact**

Minerva Kyei-Nimakoh

Email: [minerva.kyeinimakoh@live.vu.edu.au](mailto:minerva.kyeinimakoh@live.vu.edu.au)

Phone: 0244995328

## **Appendix XV: Information to participants involved in research**

### **You are invited to participate**

---

You are invited to take part in a study about the care of women during pregnancy and child birth. This project is being carried out in the Upper-East Region of Ghana by a student researcher Minerva Kyei-Nimakoh, working under Prof Mary Carolan-Olah of the School of Nursing and Midwifery, College of Health and Biomedicine, Victoria University.

### **Project explanation**

---

In Ghana, a West African country, a high number of women die from pregnancy-related problems each year. The purpose of this study is to understand problems related to the care of pregnant women and likely factors leading to the high number of pregnancy-related deaths. This will help in finding practical solutions to the problem. The study will be carried out in the Upper East Region of Ghana. Information about services provided to pregnant women during birth will be collected from child birth attendants/health care workers in the region.

The purpose, possible harm and benefits of the study, will be clearly explained in a language you understand. You will be given the chance to ask questions and answers given. You will be given some time to think about the information and make your decision. Contact information of those carrying out this study will also be given to you for any further concerns.

### **What will I be asked to do?**

---

If willing to take part in this study, you will be given a form to sign to show that you have agreed to be part or you may express your agreement orally. You will then be given a set of written questions to respond to or assisted by the student researcher to do so, if required. The activity will be carried out at a time and location that suits you. Responding to the questions is expected to last about 45 minutes.

### **What will I gain from participating?**

---

You will not be paid for taking part in this study. However, the likely benefits of the study include finding out information that will improve the care of pregnant women in Ghana, and in time, reduce deaths related to child birth.

### **How will the information I give be used?**

---

The information you provide will not be made known to anyone outside the research team and a statistician. The information it cannot be traced back to you as it will be reported all together. The results will also be published as a thesis and in academic journals.

### **What are the potential risks of participating in this project?**

---

This study has minimal risks; therefore, it is not expected to cause any harm to you beyond those encountered in daily life.

### **How will this project be conducted?**

---

The project involves two stages, that is, looking at medical records to understand the types and nature of birth outcomes (Phase I) and a survey (Phase II). You are invited to take part only in Phase II. Phase II will collect information about births and related services from birth attendants in the region. The information collected will be studied to help understand problems associated with childbirth in the Upper-East Region of Ghana.

### **Who is conducting the study?**

---

Organization:

Victoria University, PO Box 14428, Melbourne, VIC, 8001, Australia.

Email: [researchethics@vu.edu.au](mailto:researchethics@vu.edu.au) or Phone (03) 9919 4781 or 4461.

Chief Investigator:

Dr. Mary Carolan-Olah, Professor of Midwifery.  
Discipline Leader, Midwifery and Women's Health,

Victoria University,

College of Health and Biomedicine,  
School of Nursing and Midwifery  
Hospital

Melbourne, Australia

Email: [mary.carolan@vu.edu.au](mailto:mary.carolan@vu.edu.au)

Phone: + 61 3 9919 2585

Australia.

Associate Investigator:

Dr. Terence McCann.  
Professor of Mental Health  
Nursing

College of Health and  
Biomedicine

Victoria University, Level 3  
CHRE Building - Sunshine

PO Box 294

176 Furlong Road

St Albans, Victoria 3021,

Associate Investigator (Local Contact):

Dr. J. Koku Awoonor-Williams MD MPH, MPP  
Regional Director of Health Services, Upper-East  
Regional Health Directorate, Victoria University,

Ghana Health Service, Private Mail Bag,

Bolgatanga – UER, Ghana

Tel: (+233) 3820 22335

Student Researcher:

Minerva Kyei-Nimakoh,  
PhD Student,

College of Health and  
Biomedicine, School of  
Nursing and Midwifery,

Melbourne

Email: [minerva.kyeinimakoh@live.vu.edu.au](mailto:minerva.kyeinimakoh@live.vu.edu.au)

Phone: (+61) 478674794

Any questions about your involvement in this project may be passed on to the Chief Investigator or the associate investigator (local contact) listed above.

If you have any queries or complaints about the way you have been treated, you may contact the Ethics Secretary, Victoria University Human Research Ethics Committee, Office for Research, Victoria University, PO Box 14428, Melbourne, VIC, 8001, email [researchethics@vu.edu.au](mailto:researchethics@vu.edu.au)

or phone (03) 9919 4781 or 4461.

## Appendix XVI: Consent form for participants involved in research

### Information to participants:

We would like to invite you to be a part of a study about the care of women during pregnancy and child birth in the Upper-East Region of Ghana.

The purpose of this study is to understand problems related to the care of pregnant women and likely factors that lead to pregnancy-related deaths. This will help in finding practical solutions to the problem. Information about services provided to pregnant women during birth will be collected from childbirth attendants/health care workers in the region using questionnaires. The study does not carry risks to anyone who takes part.

### CERTIFICATION BY SUBJECT

I, \_\_\_\_\_ of  
\_\_\_\_\_

certify that I am at least 18 years old\* and that I am voluntarily giving my consent to take part in the study "*Management and Referral of Obstetric Complications - A Study of Private and Public Maternity Care Services in the Upper-East Region of Ghana*" being conducted at Victoria University by: Minerva Kyei-Nimakoh, Prof Mary Carolan-Olah, Dr Terence McCann and Dr. J. Koku Awoonor-Williams.

I certify that the objectives of the study, together with any risks and safety measures associated with the study listed hereunder to be carried out in the research, have been fully explained to me by: Minerva Kyei-Nimakoh and that I freely consent to taking part in the below mentioned procedure:

- Survey

I certify that I have had the opportunity to have any questions answered and that I understand that I can withdraw from this study at any time and that this withdrawal will not put at risk me in any way.

I have been informed that the information I provide will be kept confidential.

Signed:

Date:

Please contact the Minerva Kyei-Nimakoh with any concerns you may have on 0244995328.

Alternatively, you may contact the Chief investigator Prof Mary Carolan-Olah on + 61 3 9919 2585 or Dr. J. Koku Awoonor-Williams (Local Contact), an Associate Investigator on, 03820 22335.

If you have any queries or complaints about the way you have been treated, you may contact the Ethics Secretary, Victoria University Human Research Ethics Committee, Office for Research, Victoria University, PO Box 14428, Melbourne, VIC, 8001, email [Researchethics@vu.edu.au](mailto:Researchethics@vu.edu.au) or phone (03) 9919 4781 or 4461.

## Appendix XVII: Introductory letter

### OUR CORE VALUES

- People-Centered
- Professionalism
- Team work
- Innovation
- Discipline
- Integrity

*My Ref*

*Your Ref. No*



Regional Health Directorate  
Ghana Health Services  
Private Mail Bag  
Bolgatanga  
UER, GHANA  
25<sup>th</sup> March, 2015  
Tel: (03820)-22335  
Fax: (03820)-24390  
E-mail: ghs-uer@4u.com.gh

TO WHOM IT MAY CONCERN

### STUDY ON MATERNAL OUTCOMES IN THE UPPER EAST REGION

The Victoria University is collaborating with the Regional Health Directorate of the Ghana Health Service in Health Services Research. Under this arrangement, Minerva Kyei-Nimakoh, a doctoral student of Victoria University, Melbourne, who is working under Prof Mary Carolan-Olah, Prof Terence McCann and the RDHS Dr. Awoonor-Williams, is carrying out a study on maternal outcomes in the Upper East Region. The purpose of this study is to understand problems related to the care of pregnant women and the likely factors associated with adverse maternal health outcomes.

This phase of the project involves a medical records review, to gather data on the types and nature of birth outcomes in the region. It will require access to the health facility maternal birth registers for extraction of relevant data. A trained research assistant will visit your facility to collect these data.

This letter is to introduce the research team to you and to seek your collaboration and assistance. I hope you will be willing to support this study, which will hopefully help us better understand problems associated with childbirth in the Upper-East Region and also inform maternity care.

Please accord the team all the support they need. Please find attached the list of facilities involved. Counting on your usual cooperation

Sincerely,

**DR J. KOKU AWOONOR-WILLIAMS**  
REGIONAL DIRECTOR OF HEALTH SERVICES, UER

## Appendix XVIII: Correspondence with editor (BMC Health Services Research)

BHSR-D-16-00027

"Review of essential emergency obstetric care interventions in health facilities in the Upper East Region of Ghana: a questionnaire survey"

Minerva Kyei-Nimakoh, Mary Carolan-Olah, Terence V McCann, John Koku Awoonor-Williams  
BMC Health Services Research

Dear Ms. Kyei-Nimakoh,

Thank you for your email and revised submission.

We have sent your manuscript to be re-assessed by the original reviewer(s). Unfortunately, they have not been able to return a re-review report. We have approached the handling editor to suggest an alternative course of action to provide a decision. Our sincerest apologies for this delay, please be assured that we will do everything we can to ensure a decision can be reached as soon as possible.

Should you have further concerns, please do not hesitate to contact us.

Best regards,

Rina

**Ms. Rina Dionson**

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-----Original Message-----

From: em.bhsr.1bb2.5230f1.bd547910@editorialmanager.com

[mailto:em.bhsr.1bb2.5230f1.bd547910@editorialmanager.com] On Behalf Of Minerva Kyei-Nimakoh

Sent: 30 March 2017 05:11

To: BMCSeriesEditorial2

Subject: BMC Health Services Research, BHSR-D-16-00027 - from Author to Editorial Office

BHSR-D-16-00027

"Review of essential emergency obstetric care interventions in health facilities in the Upper East Region of Ghana: a questionnaire survey"

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BMC Health Services Research

Dear BMC Health Services Research Editorial Office,

We would like to request information on the status of the above article resubmitted in October, 2016. Thank you.

Kind Regards,  
Minerva (on behalf of all authors)

## **Appendix XIX: Correspondence with editor (BMC Women's Health)**

BMC Women's Health, BMWH-D-17-00044 - From Editorial Office to Author

BMWHD-17-00044

Obstetric outcomes in the Upper East Region of Ghana: a retrospective cohort study  
minerva kyei-nimakoh; Mary Carolan-Olah, PhD; Terence V McCann, PhD; John Koku Awoonor-Williams  
BMC Women's Health

Dear Ms. Kyei-nimakoh,

Thank you for your status request for the manuscript detailed above.

Please accept my sincerest apologies for the delay to your manuscript. We are still seeking an handling Editor to handle the peer review process, as unfortunately a number of handling Editors have been unable to assist us. Given the time elapsed since your submission, I will bring the manuscript to the attention of the Section Editor, who will suggest a course of action.

Please do not hesitate to contact us if you have any questions.

Kind regards,

Mary Ann Cantabeja

Editorial Office

BMC Women's Health

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## **Appendix XX: Criteria and Standards in Hulton's Framework (Hulton et al. 2000)**

<b>Human and Physical Resources</b>			
<b>Criteria</b>	<b>Standards</b>	<b>Suggested basis for indicators</b>	<b>Sources</b>
The skill mix is appropriate with the patient flow	appropriate to cope	<ul style="list-style-type: none"> <li>•No. of qualified staff (experience, qualifications)</li> <li>•Terms and conditions of staff (hours, income, conditions) to cope with the patient flow</li> <li>•Normal level of supervision and case mix at the facility.</li> <li>•Staff attitudes (morale, job satisfaction)</li> <li>•Actual day-to-day staffing levels</li> <li>•Staff turnover</li> <li>•Staff training (quantity, content and attendance)</li> </ul>	Provider Interviews Observation Facility Records
The maternity wards are adequately equipped to perform their function effectively and consistent with internationally recognised good practice	‘adequately’ ‘effectively’ ‘consistent with internationally recognised good practice’	<ul style="list-style-type: none"> <li>•Number of beds, blinds, toilets, handbasins etc. per delivery</li> <li>•Quantity of essential drugs by sell-by dates</li> <li>•State of essential equipment</li> <li>•Nature of sterilisation procedures</li> <li>•Layout of wards</li> <li>•Diagnostic and therapeutic capabilities</li> </ul>	Provider Interviews Observation Facility Records
The operating theatre is in good repair and fully equipped with drugs and surgical equipment to perform life saving procedures when required	‘good repair’ ‘fully equipped’	<ul style="list-style-type: none"> <li>•Physical layout of operating theatre/location</li> <li>•Quantity of essential surgical equipment</li> <li>•State of repair of equipment</li> <li>•Number and availability of qualified staff</li> <li>•Access to blood stocks</li> <li>•Quantity of essential medical supplies</li> </ul>	Provider Interviews Observation Facility Records
The general infrastructure of the facility is of sufficient size and state to cope with demand and essential support services are reliable	sufficient’ ‘reliable’	<ul style="list-style-type: none"> <li>•Structural features of physical infrastructure</li> <li>•Identify essential support services (electricity, running water, transport)</li> <li>•Reported reliability versus observed reliability</li> <li>•Frequency of maintenance of physical assets, vehicles and</li> </ul>	Provider Interviews Observation Facility Records Exit interviews

		<p>equipment</p> <ul style="list-style-type: none"> <li>•State of furniture, medical and office supplies, warehousing and storage conditions</li> </ul>	
<p>The organisational and management structure of the labour, delivery and postpartum suite ensures most efficient use of resources</p>	<p>‘most efficient use’</p>	<ul style="list-style-type: none"> <li>•Nature of management capabilities</li> <li>•Evidence of management plan</li> <li>•Reported and observed administrative red tape</li> <li>•Financial inputs</li> <li>•Spending breakdown</li> <li>•Use of wasteful technologies</li> <li>•Over prescription or inappropriate use of drugs and interventions</li> <li>•Financial capacity</li> <li>•Transparency</li> </ul>	<p>Provider Interviews Observation Facility Records</p>
<p>Staff should always be adequately protected from risks associated with their work.</p>	<p>‘always’ ‘adequately’</p>	<ul style="list-style-type: none"> <li>•A written policy on violence to staff</li> <li>•Provision of security personnel where required</li> <li>•The existence and application of policies and practices for minimising exposure to body fluids</li> <li>•The existence and application of policies and practices for safe disposal of sharps</li> <li>•The existence and application of policies for the management of needle-stick injuries</li> <li>•The provision of Hepatitis B vaccination</li> <li>•Availability of HIV testing and post-exposure prophylaxis</li> </ul>	<p>Provider Interviews Observation Facility Records</p>
<p>Effective systems for maintaining the quality of the human resource base should be in place at all facilities</p>	<p>effective’ ‘all’</p>	<ul style="list-style-type: none"> <li>•Appropriate and fair systems of reward and promotion</li> <li>•Listing of available training opportunities</li> <li>•The provision of study leave</li> <li>•The uptake of training courses</li> <li>•Evidence of in-service training including skill certification or</li> </ul>	<p>Provider Interviews Observation Facility Records</p>

		portfolios	
All facilities should have a clear management structure and transparent lines of accountability	‘all’ ‘clear’ ‘transparent’	<ul style="list-style-type: none"> <li>•Job descriptions for all positions</li> <li>•The existence and use of an organisational structure chart</li> <li>•Timeliness of salary payments</li> <li>•Staff knowledge of their responsibilities and the responsibilities of other staff members</li> <li>•Managers knowledge of their job descriptions and responsibilities</li> </ul>	Provider Interviews Observation Facility Records
<b>Referral system</b>			
<b>Criteria</b>	<b>Standards</b>	<b>Suggested basis for indicators</b>	<b>Sources</b>
An admissions procedure which ensures the timely examination and referral of a woman presenting with a complication	‘timely’	<ul style="list-style-type: none"> <li>•Admissions procedure: theory and practice</li> <li>•Referral procedure: theory and practice</li> <li>•Actual waiting times</li> <li>•Level of coordination between levels of care</li> <li>•Staff knowledge of referral procedure</li> </ul>	Facility Guidelines Provider Interviews Observation Exit interviews Case notes
Experienced staff and essential drugs are available at accessible hours at referring facility to stabilise a woman before referral	experienced’ ‘essential’ ‘available 24 hour basis’	<ul style="list-style-type: none"> <li>•Staff complement: actual vs theoretical</li> <li>•Quantity of essential drugs by use by dates</li> <li>•Number and style of repair of essential equipment</li> </ul>	Facility Records Provider Interviews Observation
Reliable transport is available on a 24-hour basis.	‘reliable’ ‘24 hour basis’	<ul style="list-style-type: none"> <li>Availability of transport and driver: theoretical and actual</li> <li>•Observed versus reported reliability</li> <li>•Vehicle in working order (fuel, parts and regularly serviced)</li> <li>•Average travel time from referral to arrival at referral facility</li> </ul>	Facility Records Provider Interviews Observation Exit Interviews
There is a reliable, functioning communication system to enable staff to communicate	reliable’ ‘functioning’  ‘available’ ‘essential’	<ul style="list-style-type: none"> <li>•Primary means of communicating with referral facilities (eg. phone or radio)</li> <li>•Observed versus experienced reliability (eg. ability to get an</li> </ul>	Provider Interviews Observation Exit Interviews Case Notes

with the referral hospital of first choice to establish availability of essential staff and equipment.		<p>outside line in an emergency)</p> <ul style="list-style-type: none"> <li>•Experienced efficiency of switchboard at referral hospital</li> <li>•Average time taken to communicate with relevant health professional at referral centre</li> <li>•Average non-travel time from referral to arrival at referral facility</li> </ul>	
There is a qualified member of staff on call to accompany complicated cases to the referral hospital when necessary	‘qualified’ ‘on call’	<ul style="list-style-type: none"> <li>•Normal procedure (specify grade of staff usually accompanying referral)</li> <li>•Observed/experienced procedure</li> <li>•Actual versus theoretical availability of qualified staff</li> <li>•Percentage of referred women accompanied</li> </ul>	<p>Facility Guidelines Provider Interviews Observation Exit Interviews Case Notes</p>
<b>Maternity Information Systems</b>			
<b>Criteria</b>	<b>Standards</b>	<b>Suggested basis for indicators</b>	<b>Sources</b>
Basic registers in facilities are designed to record data that is sufficient to monitor and evaluate activities effectively.	‘sufficient’ ‘effectively’	<ul style="list-style-type: none"> <li>•Nature of existing proformas normally completed by facility staff from admission to discharge</li> <li>•Space available on existing proformas to record information on nature of complication and treatment</li> </ul>	Facility Records
Current procedures for recording information result in complete and accurate data entry.	‘complete’ ‘accurate’	<ul style="list-style-type: none"> <li>•Completeness of past proformas</li> <li>•Legibility of past records (case notes, admissions registers and so on)</li> <li>•Accuracy and consistency of past records</li> <li>•Nature of supervisory mechanism in place</li> </ul>	<p>Facility Records Case Notes Provider Interviews Observation</p>
A review process is in place to ensure data is comprehensive and used effectively to improve patient management and service delivery.	‘comprehensive’ ‘effectively’	<ul style="list-style-type: none"> <li>•Nature of review process, official and actual</li> <li>•Frequency of data analysis</li> <li>Frequency and content of reporting procedures</li> <li>•Examples from staff of use of data to improve practice</li> <li>•Examples of changes in</li> </ul>	<p>Provider Interviews Facility Records Observation</p>

		procedures/supplies following review of records <ul style="list-style-type: none"> <li>•% of staff who report having received training in information collection and use</li> <li>•Number and type of training devoted to maternity information system, past and planned</li> </ul>	
Each complicated case (severe morbidity or mortality, maternal or infant) is effectively reviewed, analysed and avoidable factors identified.	‘effectively’ ‘avoidable’	Facility procedures in the event of death or severe morbidity <ul style="list-style-type: none"> <li>•Observed investigation procedure</li> <li>•Examples by staff of lessons learned from past poor outcomes</li> <li>•Public access to records</li> </ul>	Provider Interviews Facility Records Case Notes Observation
<b>Appropriate Technologies (clinical procedures)</b>			
<b>Criteria</b>	<b>Standards</b>	<b>Suggested basis for indicators</b>	<b>Sources</b>
The following procedures are not used either routinely, or most of the time. <ul style="list-style-type: none"> <li>•Pubic Shaving</li> <li>•Enema</li> <li>•Intravenous Infusion</li> <li>•Episiotomy for Primiparas</li> <li>•Supine Position for Delivery</li> </ul>	‘not used’ ‘routinely’ ‘most of the time’	<ul style="list-style-type: none"> <li>•Recommended use in hospital guidelines</li> <li>•Reported use by staff</li> <li>•Percentage of women reporting use of procedure in labour</li> <li>•Recorded use</li> </ul>	Facility Records Provider Interviews Exit Interviews Case Notes Survey
The use of vaginal examination of the uterus to assess the progress of labour is kept to the minimum necessary	‘minimum necessary’	<ul style="list-style-type: none"> <li>•Reported use by staff</li> <li>•Average actual use from time between arrival at hospital and delivery: observed and reported</li> </ul>	Provider Interview Exit Interviews Case Notes
Intramuscular oxytocin is not used to speed up labour	‘not used’	Records of supplies and use of ergometrine and oxytocin <ul style="list-style-type: none"> <li>•Evidence of reported use by staff</li> <li>•Evidence of actual use (reported by women, recorded in case)</li> </ul>	Facility Records Provider Interviews Case Notes Exit Interviews

		notes and observed) •Facility’s capacity to perform Caesarean sections at anytime	Observation
The use of Caesarean section falls within reasonable limits.	‘reasonable limits’	•The Caesarean section rate • Caesarean section rate by recorded indication	Facility Records Case notes
Effective pain relief is always provided for operative procedures.	‘effective’ ‘always’	•Percentage of women reporting feeling pain during an operative procedure •Type of pain relief routinely provided for operative procedures •Number and availability of personnel trained to administer relevant pain relief •Supplies of basic drugs and equipment	Facility Records Case Notes Provider Interviews Exit Interviews Survey
<b>Indicators of Good Practice</b>			
<b>Criteria</b>	<b>Standards</b>	<b>Suggested basis for indicators</b>	<b>Sources</b>
Magnesium Sulphate is the drug of first choice for the treatment of eclampsia.	first choice’	•Identify drug of first choice as reported by staff •Evidence of use from stocks, supplies, case notes •Identify type and comparative use of alternatives	Facility Records Provider Interviews Case Notes
Women are actively considered for a vaginal delivery after one Caesarean section.	‘actively’	Facility protocol/recommendations •Staff responses to normal procedure for previous Caesarean section •Evidence of practice (percentage of women with previous c-section going on to have a subsequent Caesarean delivery) •Evidence that women are actively given the opportunity to deliver vaginally (unless otherwise indicated)	Facility Records Provider Interviews Exit Interviews Case Notes Observation
Prophylactic antibiotics are used routinely at the time of an emergency	‘routinely’	Facility guidelines •Reported normal use of antibiotics at the time of an emergencyCaesarean section by	Facility Records Provider Interviews Exit Interviews

Caesarean section.		<p>staff</p> <ul style="list-style-type: none"> <li>•Actual use (percentage of women with emergency Caesarean section who are given antibiotics around time of operation)</li> </ul>	Case Notes
Ventouse delivery is the instrument of first choice for an instrumental delivery.	‘first choice’	<ul style="list-style-type: none"> <li>•Facility guidelines</li> <li>•Instrument of first choice as reported by staff</li> <li>•Evidence of comparative use from facility records (number of forceps deliveries vs ventouse deliveries)</li> <li>•Evidence of actual use</li> </ul>	<p>Facility Records</p> <p>Provider Interviews</p> <p>Case Notes</p>
When repairing perineal wounds polyglycolic acid suture should be the favoured option	‘favoured option’	<ul style="list-style-type: none"> <li>•Suture material most commonly used as reported by staff</li> <li>•Evidence of supplies and use of all suture materials</li> </ul>	<p>Facility Records</p> <p>Provider Interviews</p>
For a non-complicated delivery women are always allowed to adopt whatever position they choose for delivery.	‘always’	<ul style="list-style-type: none"> <li>•Normal practice as reported by staff</li> <li>•Evidence of actual delivery positions (percentage delivered in supine position, percentage standing, squatting, other)</li> <li>•Percentage of women reporting choosing of delivery position of her choice</li> </ul>	<p>Provider Interviews</p> <p>Exit Interviews</p> <p>Survey</p>
Women are always allowed social support of her choice during labour and birth.	‘always’	<ul style="list-style-type: none"> <li>•Facility guidelines</li> <li>•Normal practice as reported by staff</li> <li>•Percentage of women who report being accompanied in labour and delivery by person of her choice</li> <li>•Observed practice</li> </ul>	<p>Facility Guidelines</p> <p>Observation</p> <p>Staff Interviews</p> <p>Exit Interviews</p> <p>Survey</p>
Throughout labour a woman’s physical wellbeing should be regularly assessed.	‘regularly’	<p>Number and timing of blood pressure measures</p> <ul style="list-style-type: none"> <li>•Number and timing of temperature and pulse measurements</li> </ul>	<p>Labour Notes</p> <p>Provider Interviews</p> <p>Exit Interviews</p> <p>Observation</p>

		•Quantity of fluid intake vs urine output noted	Survey
<b>Management of Emergencies</b>			
<b>Criteria</b>	<b>Standards</b>	<b>Suggested basis for indicators</b>	<b>Sources</b>
Sufficient stocks of oxytocics should be available at all facilities and relevant health staff should be effectively trained to administer them by injection as a first aid measure for postpartum haemorrhage	‘sufficient’ ‘all’ ‘relevant’ ‘effectively trained’	Number of units of oxytocics in store within expiry date •Number and timing of specialist training courses in administration of oxytocics per individual staff post in past two years/five years •Percentage of deliveries in which oxytocics were administered •Refrigerator working and system for dealing with power cuts in place •Case fatality rate for haemorrhage over time	Facility Records Provider Interviews Labour Notes Observation
Health workers of an appropriate level are effectively trained in clinical skills to manage ante and postpartum haemorrhage	‘appropriate level’ ‘effectively’	Number and timing of staff training courses dedicated to management of haemorrhage per individual staff post in past two/five years •Recall by staff of key procedures •Evidence of major haemorrhage protocol in the unit •Case fatality rate for haemorrhage over time	Facility Records Provider Interviews Labour Notes Observation
Intravenous fluids are available at all facilities and blood transfusion services should be available at comprehensive essential obstetric care facilities on a 24-hour basis	‘all available’ ‘24 hour’	Number of units of intravenous fluids in store within expiry date •Availability of blood supplies (by time of day, type, cost, distance) •Availability of staff trained to administer blood transfusion (by time of day)	Facility Records Provider Interviews Observation
The partograph is used effectively to assess progress of labour where staff	‘effectively’ ‘appropriate’	Number of labours whose progress was assessed by partograph •Number of staff trained to use	Facility Records Labour Notes Provider Interviews

with appropriate skills are available		partograph •Number of labours assessed by partograph as prolonged by subsequent interventions	Observation
The appropriate range of services required to manage prolonged or obstructed labour are available at reasonable hours at each stage of the referral chain	‘appropriate’ ‘available’ ‘reasonable’	<ul style="list-style-type: none"> <li>•Evidence that first level health centres have facilities and trained staff to: empty bladders; give antibiotics; rehydrate and refer women</li> <li>•Evidence that second level health centres have facilities and trained staff to rupture membranes if required and perform a vacuum extractor delivery</li> <li>•Evidence that CEOC hospitals have trained staff, essential drugs and equipment to perform additional interventions, such as oxytocics, antibiotic and the capacity to perform Caesarean section on a 24-hour basis</li> <li>•Percentage of women referred from first level health centre who go on to have instrumental delivery or caesarean section</li> <li>•Case fatality rates for obstructed labour over time</li> <li>•Perinatal death rates attributed to birth asphyxia over time</li> </ul>	Facility Records Case Notes Exit Interviews Provider Interviews Observation
All birth attendants are aware of the requirements for a clean delivery and follow them effectively.	all’ ‘aware’ ‘effectively’	<ul style="list-style-type: none"> <li>Observance of asepsis at all times</li> <li>•Hands always cleaned before and after any contact with woman</li> <li>•Delivery surface sterilisation procedure</li> <li>•Sterilisation procedure for instruments</li> </ul>	Facility Records Provider Interviews Exit Interviews Observation
Health staff are effectively trained to recognise puerperal sepsis and manage it appropriately or refer.	‘effectively trained’ ‘appropriately’	<ul style="list-style-type: none"> <li>Percentage of staff who have attended specialist training in puerperal sepsis</li> <li>•Percentage of staff who can accurately describe the signs, symptoms and treatment of puerperal sepsis</li> </ul>	Facility Records Provider Interviews Observation

		•Case fatality rate for puerperal sepsis	
All facilities should be able to provide the necessary treatment for puerperal sepsis	‘All’ ‘necessary’	Availability of thermometers and antibiotics per facility	Facility Records Provider Interviews Observation
Health staff are effectively trained to manage and to refer women with pregnancy induced hypertension	‘effectively trained’	Percentage of staff who have attended specific training in recognition and management of pregnancy induced hypertension within past two or five years •Percentage of staff able to accurately recount signs, symptoms and course of action •Case fatality rate for pre-eclampsia and eclampsia	Facility Records Provider Interviews Observation Labour Notes
The full range of services required to manage severe preeclampsia and eclampsia is available at comprehensive EmOC facilities	‘full range required to manage	•Sphygmomanometers, stethoscopes and urine testing reagents readily available •Magnesium sulphate, intravenous and oral anti-hypertensive agents available in store with expiry dates •Capacity to undertake emergency Caesarean section (availability of staff and equipment)	Facility records Provider Interviews Observation
Health workers are effectively trained in the early recognition and treatment of abortion-related complications	‘effectively trained’	Access to laboratory services for haematology and biochemistry Facility Records	Facility Records Provider Interviews Observation
Evacuation of the uterine contents, antibiotic therapy and intravenous fluids are available at all facilities and surgical treatments at all comprehensive	‘available at all facilities’ ‘all’	Percentage of staff who have attended specific training in recognition and treatment of abortion-related complications within past two/five years •Percentage of staff who can recount signs and symptoms of abortion-related complications and	Facility Records Provider Interviews Observation

EmOC hospitals		appropriate course of action •Availability of antibiotic therapy, intravenous fluids and skills and equipment to evacuate uterine contents	
Treatment is always followed by appropriate counselling and contraception information and services	‘always appropriate’	<ul style="list-style-type: none"> <li>•Percentage of women who received counselling after an abortion</li> <li>•Percentage of women who received contraceptive information and services after an abortion</li> <li>•Percentage of staff trained in counselling</li> </ul>	Facility Records Provider Interviews Exit Interviews Observation Survey