

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

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SCHOOL OF PUBLIC HEALTH

**DEPARTMENT OF POPULATION, FAMILY AND REPRODUCTIVE
HEALTH**



**ASSESSING THE IMPACT OF GHANA'S FREE MATERNAL HEALTH
CARE POLICY ON MATERNAL MORTALITY: A RETROSPECTIVE
STUDY IN ST. FRANCIS XAVIER HOSPITAL**

BY

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SEPTEMBER 2019

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,
KUMASI**

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**DEPARTMENT OF HEALTH PROMOTION, EDUCATION AND
DISABILITY STUDIES**

**ASSESSMENT OF PERSONAL HYGIENE AND FOOD SAFETY
PRACTICES OF FOOD HANDLERS AMONG SELECTED SENIOR HIGH
SCHOOLS IN THE
KUMASI METROPOLIS, GHANA.**

BY

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(BSc. NURSING)

**A THESIS SUBMITTED TO THE DEPARTMENT OF HEALTH
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AND EDUCATION**

SEPTEMBER 2019

DECLARATION

I, Fidelis Yelsong Kon-Angna hereby declare that, except for references to other people's work which has been duly acknowledged, this work is my own original research produced under supervision and that no part of it has been presented elsewhere.

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Prof. Easmon Otupiri
(Head of Department) Signature Date

DEDICATION

This work is dedicated to my lovely wife (Nancy Tobopaalee) and my children for their love and support shown me all this while.

KNUST



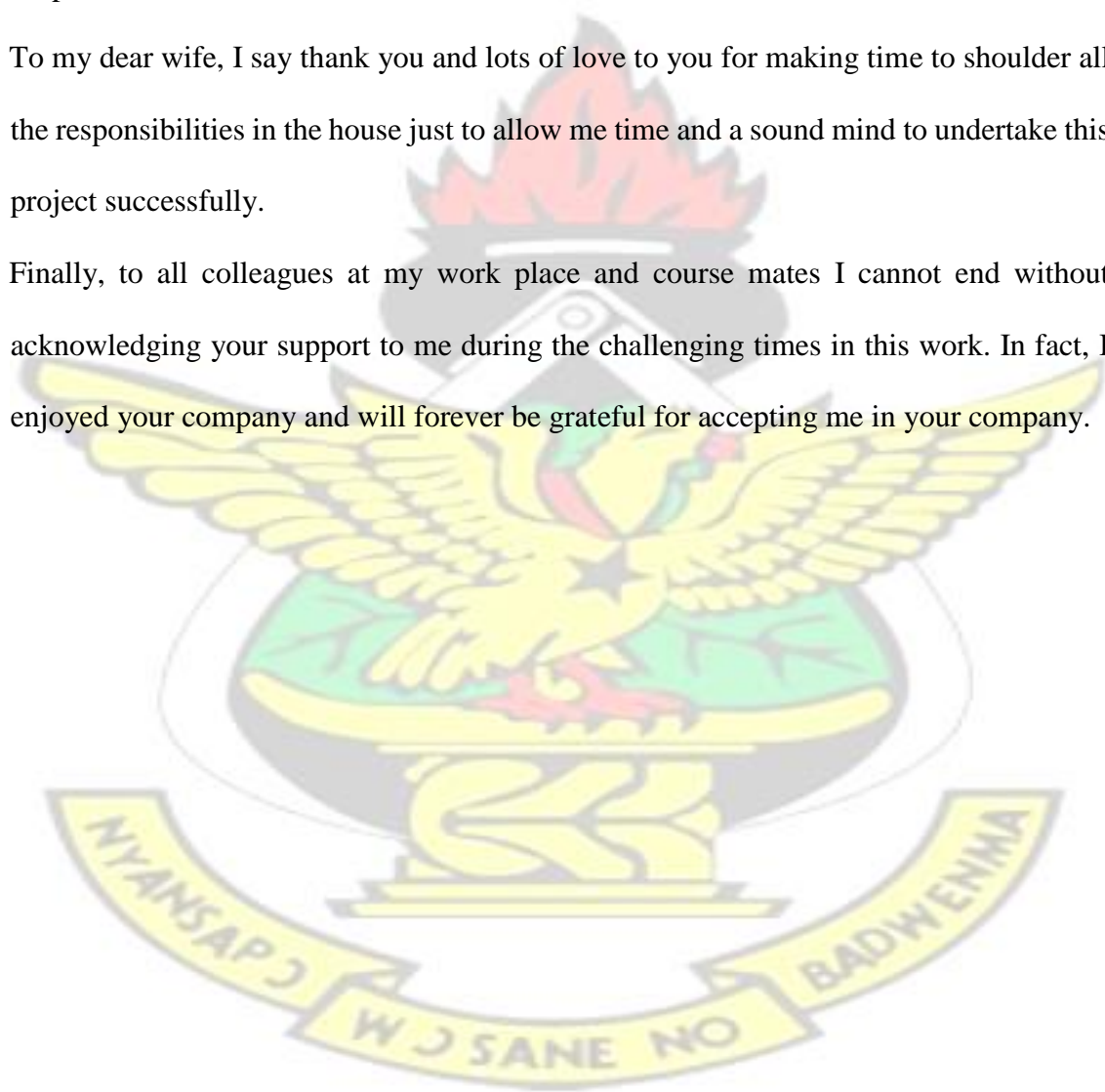
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My sincerest praise and appreciation go to God Almighty who has given me life and strength all these years and has seen me through a successfully completion of this study.

To my supervisor Dr Sam Newton, Daddy I say may God richly bless you and replace in double folds, all that you have lost (your precious time, your money spent on call credit and knowledge shared with me) to make sure this work is completed on time and in good shape.

To my dear wife, I say thank you and lots of love to you for making time to shoulder all the responsibilities in the house just to allow me time and a sound mind to undertake this project successfully.

Finally, to all colleagues at my work place and course mates I cannot end without acknowledging your support to me during the challenging times in this work. In fact, I enjoyed your company and will forever be grateful for accepting me in your company.



ABSTRACT

Access to quality maternal health care services before, during and after childbirth remains critical in the efforts by world leaders towards reducing maternal mortality. Whilst an estimated 90 percent of all births in most developed countries benefit from the services of trained healthcare professionals, less than half of births in developing countries (which accounts for 99 percent of the world's maternal deaths), benefit from trained maternal care service providers. Ghana, a middle-lower income country among other efforts targeted at reducing maternal mortality, implemented the free maternal health care policy initiative in July 2008 eliminating the barrier of financial access to quality maternal health care services. Twenty years on after the successful implementation of this policy initiative, this study seeks to examine the impact of the free maternal health care policy on maternal mortality in St. Francis Xavier Hospital in the Assin Foso Municipality. The study was a descriptive study which made use of secondary quantitative data collected from the biostatistics unit and maternal records from the maternity unit from 1997 – 2018. The free maternal care policy among other interventions, contributed to a reduction in maternal mortality ratio (pre and post policy MMR mean = 1332.68 /100000LB and 311/ 100000LB respectively). ANC coverage and distribution of midwives and registered nurses had a statistically significant impact on maternal mortality ratio ($p = 0.001, 0.036$ and 0.048). PNC coverage and institutional deliveries however had a statistically insignificant impact on maternal mortality ratio ($p = 0.883, 0.872$). The free maternal care policy over the years, has played a role in the decline of Ghana's national maternal mortality ratio and should be maintained and strengthened with the equipping of health facilities with trained health staff and logistics.

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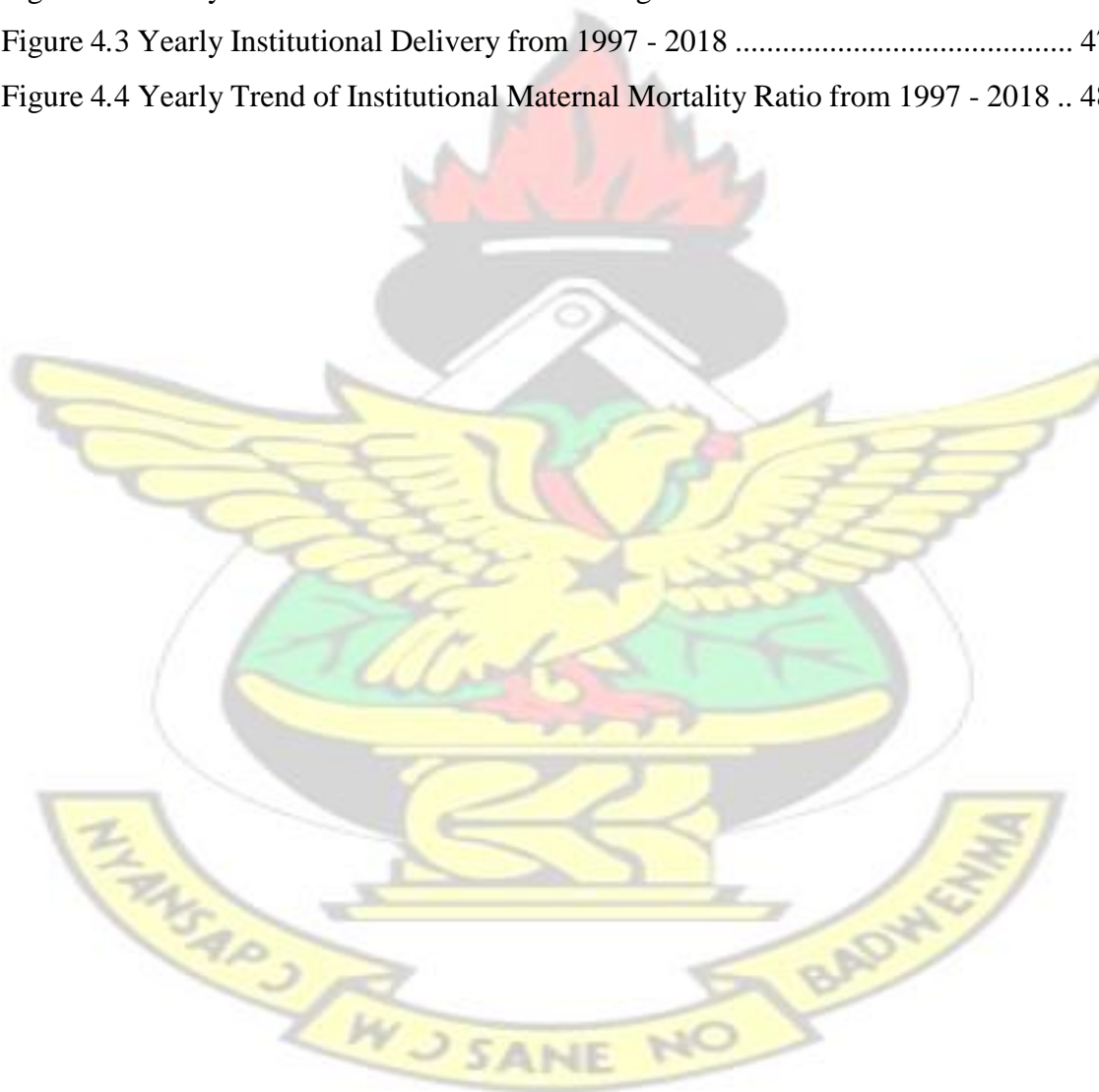
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LIST OF ABBREVIATIONS

ANC	Antenatal Care
MDGs	Millennium Development Goals
MMR	Maternal Mortality Ratio
MMDAs	Metropolitan Municipal and District Assemblies
SDGs	Sustainable Development Goals
SAP	Structural Adjustment Policies
SSA	Sub-Sahara Africa
UN	United Nations
WHO	World Health Organization
FDA	Food and Drugs Authority
NMC	Nurses and Midwifery Council
MDC	Medical and Dental Council
HIFRA	Health Institutions and Facilities Regulatory Agency
CHAG	Christian Health Association of Ghana
CHPs	Community-Based Health Planning and Services

DEFINITION OF TERMS

Antenatal Care Coverage: this refers to the total number of pregnant women visiting the antenatal unit for the first time with same pregnancy in a year divided by the total expected pregnancies for that same year multiplied by 100

Postnatal Care Coverage: Refers to the total number of mothers who have delivered and are within six weeks post delivery making a first visit after that delivery divided by the total number of live births for same year multiplied by 100

Maternal Mortality Ratio: this refers to the number of deaths of mothers occurring as a result of pregnancy or child birth in a period per 100000 live births of that same period

Institutional Maternal Mortality ratio: this refers to the number of deaths of women resulting from pregnancy or child birth in a health institution per 100000 live births in that same health institution.

Institutional or Skilled Delivery: this refers to the deliveries that are taking place in a health facility. Attended to by a trained health provider divided by the total expected pregnancies for the same time period multiplied by 100

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Although a very significant indicator of international development, maternal mortality continues a challenge for Africa and many other low-and lower-income areas of the globe as well as a global government health issue (WHO, 2018b). An approximately 303,000 females globally die from maternal causes, with around two-thirds (64%) happening in the African region of the WHO (WHO, 2018b). A number of global obligations and projects have committed to reducing maternal mortality over the past thirty years. While many nations have made strides in decreasing maternal mortality, in many nations with the greatest maternal mortality burden (Hunt and Mesquita, no date), progress has stagnated or been reversed. Pregnancy and childbirth are unique times for the African family, while maternal death is considered a harrowing and devastating event linked to the family's huge emotional, psychological and economic burden. Maternal mortality problems captured the world's attention in the 1980s when scientists highlighted deaths and complications related to pregnancy and childbirth in combination with the small attention paid to resolving these mainly preventable deaths and complications (Najman et al., 1980). Global efforts to increase policy interventions on maternal deaths began with the Safe Motherhood initiative launched in 1987 as a response to increasing awareness that measures to tackle maternal mortality have not been discovered to be sufficient to properly decrease the elevated rate of maternal mortality in many developing nations (Danso et al., 2014). Improving access to maternal health facilities as an action to reduce maternal mortality received extensive attention after Member States of the United Nations adopted the Millennium Development Goals (MDGs) in 2000 calling for a 75% decrease in maternal mortality between 1990 and 2015 (WHO, 2015b).

This was further reinforced in 2012 at the United Nations Conference on Sustainable Development with the MDGs developing into the Sustainable Development Goals (SDGs) directed at decreasing the worldwide maternal mortality ratio to below 70 per 100,000 live births by 2030 ; the main domestic goal is for each nation to decrease its maternal mortality rate by at least two-thirds by 2030. The secondary objective, which applies to nations with the greatest burden of maternal mortality, is that by 2030 no nation should have a maternal mortality ratio of more than 140 fatalities per 100,000 live births (Moran et al., 2016). The disparities in the health system between developing and developed nations are evident since maternal mortality is unfortunately prevalent in developing nations, particularly in sub-Saharan Africa, and uncommon in developed nations (WHO, 2014). Reports show that the inability of health schemes in most African nations to provide appropriate quality affordable health care combined with inadequate numbers of skilled and motivated health employees is one of the primary drivers of negative trends in female health indices (Dieleman and Harnmeijer, 2006). In addition, health care payment has also been asserted as a barrier to health care for most individuals, particularly the poor, preventing many individuals from accessing quality and essential health care facilities. Evidence from research link user charges to reduced use of qualified care during pregnancy and delivery, and there are signs that removing these charges may improve access to maternal health facilities and thereafter decrease complications and fatalities associated with childbirth and childbearing (Leone et al., 2016a). Therefore, the extensive focus on enhancing access to maternal health care facilities is not out of location. Study results from a number of Sub-Saharan African nations indicate that user fees for healthcare had led to a decrease in the use of healthcare facilities including qualified care during pregnancy and childbirth (Lagarde and Palmer, 2011; Mcpake et

al., 2013) indicating that removal of such charges could lead to increased access to maternal healthcare facilities and reduced maternal deaths.

1.2 Problem Statement

Financial barriers are believed to be one of the most important constraints to seeking skilled care during pregnancy in Ghana. Growing calls for the elimination of maternal health service user fees, as a strategy to improve access to maternal and child health services have been loud over the years (Grob and Kerstin, 2014) leading to the introduction of fee exemption health care policies targeting pregnant women and children in many Sub-Sahara African countries like Burkina Faso, Burundi, Ghana, Kenya, Senegal, and Niger (Yates, 2009).

Ghana introduced health care user fees as part of the economic recovery policies during the period 1983 to 1998 (Konadu-Agyemang, 2001) which led to significant rise in direct cost of child birth services, restricting access for many poor people, leading to reduction in the use of maternal health services and deteriorating perinatal health outcomes.

With supervised delivery at 35.1% and maternal mortality ratio at 224 per 100,000 live births in 2007, a free maternal health care policy was implemented by the government through integration into the national health insurance scheme (NHIS) in 2008 (Anafi *et al.*, 2018). With this, expectant mothers will have to register with the national health insurance scheme for membership card which will enable them access the following services: (1) Antenatal care, which include free service, medicines and two ultrasounds covering four to six clinic visits. (2) Delivery service, which include service and medicines on normal and assisted deliveries, episiotomies and caesarian sessions. (3) Postnatal care, which covers free services and medicines for two postnatal visits and (4)

Free care of the newborn covered by the mother's card for 3 months.

With the introduction of the maternal user fee exemption policy, cost barriers to facility delivery should be eliminated to increase access to the utilization of maternal care services to improve maternal survival through skilled attendants at time of birth. Maternal care exemptions would be expected to contribute to reducing maternal mortality by increasing access to antenatal care, supervised deliveries and postnatal care by expectant mothers.

To evaluate the estimated effect of the free maternal health care policy on the targeted population, two key questions are asked. Did the free maternal health care policy increase receipt of needed maternal health care services (coverage) as prescribed in the policy? And consequently, did it contribute to a reduction in maternal mortality in the targeted population? Being the only hospital in the Assin Central Municipality and Assin North and South districts and have been implementing the free maternal health care policy since its inception in July 2008, this study thus seeks to assess the impact of the free maternal health care policy on maternal mortality in St. Francis Xavier hospital in the Assin Central Municipality in the Central Region of Ghana.

1.3 Research Questions

1. What is the trend of the coverage of antenatal care, postnatal care and births attended by skilled health care providers?
2. Has the implementation of the free maternal care policy influenced the trend of institutional maternal mortality?
3. What is the relationship between: Antenatal care coverage; Skilled attendant at birth; Postnatal care coverage; and institutional maternal mortality ratio pre and post policy implementation?

1.4 General Objective

To assess the impact of Ghana's free maternal health care policy implemented in 2008 on maternal mortality in St. Francis Xavier hospital.

1.5 Specific Objectives

1. To examine the trend in antenatal / postnatal care and skilled delivery coverage within the period of the study.
2. To examine the trend of institutional maternal mortality ratio in the hospital pre and post-free maternal health care policy implementation.
3. To examine the relationship between antenatal, /postnatal care service coverage, births attended to by skilled health care personnel and institutional maternal mortality before and after the implementation of the policy.

1.6 Rationale of the Study

The government of Ghana in July 2008, implemented the free maternal health care policy to enable expectant mothers access maternal health care services from skilled health care providers (Anafi et al., 2018b). This policy together with other interventions aimed to reduce the growing high maternal deaths. Since its inception, studies on the impact of the free maternal care policy has mostly focused on access and utilization of maternal health services with little attention on the overall impact of the policy on maternal mortality as an indicator of public health interest. Again, the St. Francis Xavier hospital has been implementing this policy since its inception but no study has so far been done in the hospital to assess the effect or impact of this policy on maternal health outcomes in the hospital.

It is therefore imperative that this study is carried out in the hospital to give first hand empirical evidence on the impact of the policy on maternal mortality in the hospital and by extension, the

municipality since it is the only big hospital in the municipality providing a wider range of maternal health services to the populace.

1.7 Profile of the Study Area

The site for this study was St. Francis Xavier hospital in the Assin Central Municipality, located in the Central region of Ghana. The municipality is among the 22 MMDAs in the Central region with its administrative capital as Assin Foso. According to the 2010 population and housing census, the municipality has a population of 161,341 made of 80,254 males and 81,087 females spread over 1500 km².

The 118-bed capacity hospital provides vital medical care, across many departments, to patients from a catchment area population of 207,000, as well as those referred from other regions. In addition, it has become a practical teaching hospital where medical and nursing students from the Korle-Bu teaching hospital, Cape Coast Medical school, as well as from the nursing school in Cape Coast and other different schools in Ghana, send their students to get their practical experience. St Francis Xavier Hospital is owned and run by the Archdiocese of the Cape Coast and Sisters Hospitallers. The Sisters Hospitallers took the final management role of the hospital in 1965 and it has been developed through the years into a District hospital serving Assin Central municipality, Assin North/South districts. It receives referral cases from health centers in the Municipality and other adjoining districts.

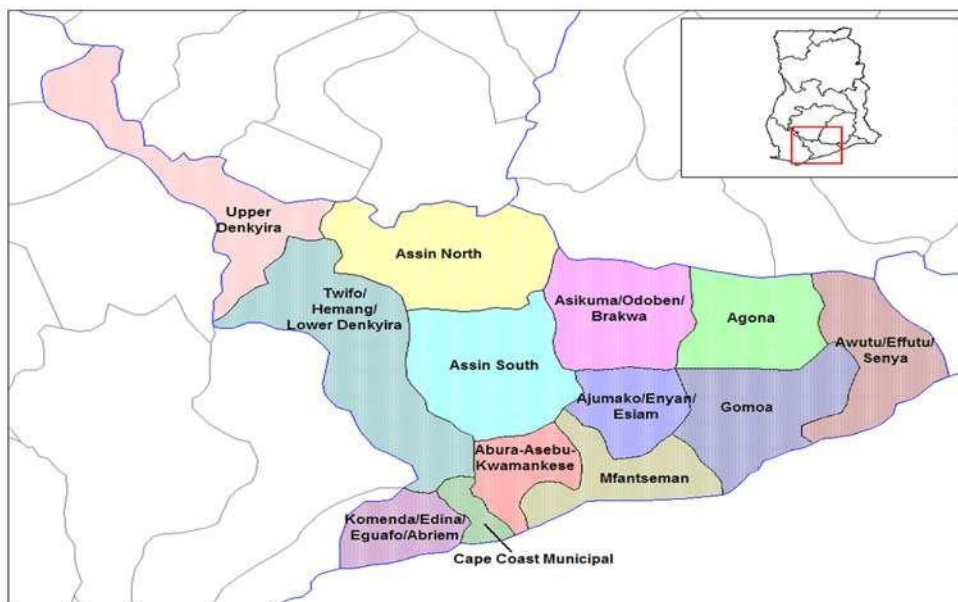


Figure 1.1 Map showing Municipalities and Districts in Central Regional

Fig 1-1 is map of the Central Region showing the location of Assin North District where the study site, St. Francis Xavier hospital is located. This map shows the District before it was divided in 2018 into present day Assin Foso Municipal and Assin North District. From the figure above, the District is bordered by Assin South to the south; Twifo / Hemang / lower Denkyira to the South-West; Upper Dendyira District to the West; Adansi south to the North; Berem and Asikuma / Odoben / Brakwa districts to the East.

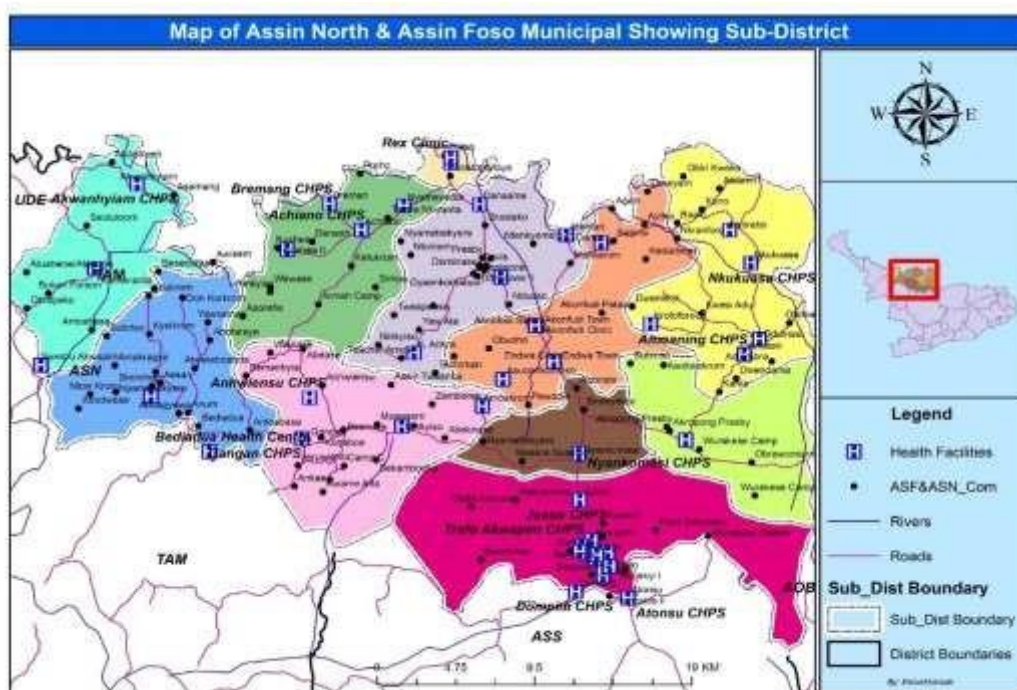


Figure 1.2 Map of Assin Foso Municipal and Assin North District showing SubDistricts and Health facilities

The above map, fig 1-2 shows the Sub-districts and health facilities within the Assin Foso Municipal and Assin North District. The two Districts are served by one district hospital (St. Francis Xavier Hospital), three private hospitals, two polyclinics, five health centres and 27 CHPS compounds. Majority (90%) of these health facilities were established after 2009.

1.8 Organization of Study

This study is made up of six chapters. Chapter one contains the introduction of the study which provides a background to the study topic, the problem statement, rationale for the study, the objectives, questions the research seeks to answer, the profile of the study area and the organization of the study. The second chapter reviewed literature relevant to the research on maternal health, the burden and impact of maternal mortality in the global and Ghanaian context, Ghana's health system and the strategies that have been instituted globally and in Ghana to reduce maternal mortality. Also, it provides literature on the

effects of Ghana's free maternal care policy on maternal mortality. Chapter three looks at the methodology that was used to collect and analyze the data to arrive at the findings. It includes the research methods and design, data variables of interest, sampling and method of data analysis. The fourth chapter contains the results of this research. Chapter five discussed the study findings by using the theoretical and empirical findings to point out the implications of the policy. In this chapter, the researcher answers the research questions using the findings from the study. The sixth and last chapter provides a conclusion of the study by recapping the analysis, giving the implication of the study and recommendations made to policy makers and other stakeholders.



CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Health care user fee was introduced as part of Structural Adjustment Policies (SAP) advanced by the World Bank in many low- and middle-income countries in the 1980s in response to declining national health budgets. User fees were offered as a measure of cost recovery of public health expenditure, as well as enhancing efficiency and equity (Ir and Bigdeli, 2009). The World Health Organization and the United Nations Children's Fund at the 1987 Bamako Initiative, argued that health care user fees would bring about additional revenue for the health sector, improve the quality of health care services through local retention of generated revenue and also aid efficient utilization of health services in Africa (James *et al.*, 2006; Dzakpasu, Powell-Jackson and Campbell, 2014). However, from the late 1990s, many countries began taking steps to either reduce or do away with user fees in their health facilities and introduce user fee exemption interventions for vulnerable groups in the population since user fees were seen to be impeding access to maternal health care services especially for the poor, while failing to realize its objective of raising revenue for the health sector (Robert and Ridde, 2013). User fees are instanced as a considerable barrier to women's care-seeking during and following pregnancy. A growing number of countries including Benin, Burkina Faso, Burundi, Cameroon, Ethiopia, Ghana, Kenya, Liberia, Mali, Nepal, Niger, Senegal, South Africa, Sudan, Uganda and Zambia have pursued health care user fee removal or exemption policies for delivery care and/or caesarean section (Witter, 2010). In Ghana, user fee in health care led to a significant rise in direct cost of childbirth services restricting access for the poor. This led to a reduction in the utilization of

maternal health services and deteriorating perinatal health outcomes. The Government of Ghana in its aim of ensuring access to maternal health services from skilled health care providers for expectant mothers, started a pilot of user fee exemption for delivery care in 2004; first in five regions and later rolled it out across the country. This policy was later superseded by a free maternal health care policy initiative for all pregnant women within the National Health Insurance Scheme (NHIS) in July 2008 (McPake *et al.*, 2013).

Given the background above, the literature review on this study focuses on an overview of previous studies on the effect of user fee exemption on ante- and post- natal care coverage trend, institutional delivery trend and maternal mortality trend. It also reviewed studies on the possible relationship between antenatal care coverage, postnatal care coverage, institutional delivery coverage and trained staff (Doctors, Midwives and Registered general Nurses) distribution as independent variables and maternal mortality as the dependent or outcome variable.

2.2 Maternal Health

Maternal health refers to the health of women during pregnancy, childbirth and the postpartum period (WHO, 2019). Global health leaders over the years have intensified initiatives to alleviate the number of maternal deaths. These initiatives includes the 1987 Safe Motherhood Initiative, the 1994 International Conference on Population and Development, and most notably the development of the fifth United Nations Millennium Development Goal (MDG 5) which aims to reduce the maternal mortality ratio (MMR) by three-quarters from 1990 to 2015 (International Conference on Population and Development, 1995; Obaid, 2009; United Nations General Assembly, 2000). Maternal health outcomes are a key indicator of societal development where low maternal mortality translates to better social services and higher rates of development

(WHO, 2009). Nonetheless, there is growing disparity among maternal health outcomes between developed and developing countries creating vast inequalities in health outcomes (WHO, 2009). Despite global attention aimed to improve maternal health outcomes, maternal mortality especially within sub-Saharan Africa (SSA) remains a major public health concern. Estimates suggest that Sub-Saharan Africa holds a disproportionate burden of the world's maternal deaths, ranging from 400 - 750 maternal deaths per 100 000 live births (WHO, 2012) representing globally the highest regional maternal mortality rate. Ghana has similar outcomes, with results placing the maternal death rate between 378 (GSS, 2009), 560 (WHO, 2009), and 819 deaths per 100,000 live births (Hogan et al., 2010).

2.2.1 Antenatal care

The WHO, (2016) defines Antenatal care (ANC) as the care provided by skilled healthcare professionals to pregnant women and adolescent girls in order to ensure the best health conditions for both mother and baby during pregnancy. The components of ANC include: risk identification; prevention and management of pregnancy-related or concurrent diseases; and health education and health promotion. The objective of antenatal care is to screen populations of pregnant women regularly during pregnancy. There are two groups of antenatal risk factors screened for during pregnancy:

- i. those associated with the women's medical, obstetrical and social history or circumstances;
- ii. those arising during the antenatal period.

The objective of screening for 'at risk factors' is to identify any pre-existing factors that could increase the risk of complications during pregnancy or delivery to the mother or the infant (Hart et al. 1990).

ANC reduces maternal and perinatal morbidity and mortality both directly, through detection and treatment of pregnancy-related complications, and indirectly, through the identification of women

at increased risk of developing complications during labour and delivery, thus ensuring prompt referral to an appropriate level of care (WHO, 2016)

Antenatal care is a part of the continuum of maternity care and a key part of the strategy to reduce neonatal and maternal deaths (Dzakpasu, Powell-Jackson and

Campbell, 2014). Within the continuum of reproductive health care, antenatal care (ANC) provides a platform for important health-care functions, including health promotion, screening and diagnosis, and disease prevention. It has been established that by implementing timely and appropriate evidence-based practices, ANC can save lives (WHO, 2016). Crucially, ANC also provides the opportunity to communicate with and support women, families and communities at a critical time in the course of a woman's life. The WHO recommends that all pregnant women initiate first ANC contact in the first trimester of their pregnancy (referred to as early ANC) which enables the early management of conditions that may adversely impact on pregnancy, thus potentially reducing the risk of complications for women and newborns during and after delivery (WHO, 2018b).

Inadequate care during pregnancy breaks a critical link in the continuum of care which can affect the outcome of pregnancy. In order for the pregnant woman to benefit adequately from the essential interventions designed for antenatal care, provision of a minimum of four visits at specified intervals is recommended for pregnant women with no underlying medical problems. While ANC coverage remains high, the coverage of at least four ANC visits remains lower at approximately 76 percent which, is a slight improvement over what was recorded in 2015.

2.2.2 Delivery

Skilled attendance during childbirth is a significant intervention at reducing maternal deaths which formed part of the indicators in MDG 5 and now in SDG 3 target 3.1.2.

Latest available data suggest that while in most high-income and upper-middle-income countries more than 90% of all births benefitted from the presence of a trained midwife, doctor or nurse, less than half of all births in several low-income and lower-middleincome countries were assisted by such skilled health personnel (WHO, 2018b).

Globally, about 80% of live births occurred with the assistance of skilled health personnel in the latest period 2012-2017 – up from 62% in the 2000-2005 period with largest progress occurring in the last 10 years (UN, 2018). Coverage however, and the rate of progress have varied across regions with Central and Southern reegions showing the greatest rate of progress from 40% coverage in the 2000-2005 period to 77% in the 2012-2017 period; Sub-Saharan Africa also showed progress over the same period with over 50% of births attended by skilled health personnel by 2012-2017 period (WHO, 2018a).

Improvements in the coverage of the proportion of births attended by skilled health personnel and their provision of care may have contributed to declines in maternal mortality between 1990 and 2015. However, the estimated coverage of births attended by skilled health personnel between 2012-2017 shows inequality between WHO regions as only 59% of the births in the Sub-Saharan Africa Region, where maternal mortality is highest, are attended by skilled health personal whereas in the other WHO regions over 68% to 99% of all births are attended by skilled health personnel (WHO, 2018a).

2.2.3 Postnatal care

The postnatal period is defined as the first six weeks after birth (Mahmood *et al.*, 2010; WHO, 2013). As a critical phase in the lives of mothers and newborn babies, major changes occur during this period which determine the well-being of mothers and newborns. A large number of pregnancy and childbirth related deaths (125000 women and 870000 newborns) in Africa annually, occur in the first week after birth (Mahmood

et al., 2010) with the first day being the time of highest risk for both the mother and the newborn (WHO, 2013). This is resulting from the fact that the leading cause of maternal mortality in Africa (haemorrhage), accounting for 34% of deaths, the majority of which occurs postnatally. Yet, the postnatal period is a neglected period. Health care providers across sub-Saharan Africa continue to advise mothers to come for a first check-up only after six weeks. This visit unfortunately, will be a visit for survivors. Although the optimum timing and number of postnatal visits has been a subject of debate especially in limited resource settings due to the absence of sufficient large-scale systematic reviews to determine this protocol, three to four PNC visits have been suggested. An analysis of 23 Demographic and Health Surveys (DHS) by Mahmood *et al.*, (2010) found two-thirds of mothers in sub-Saharan Africa giving birth at home, with only 13% of them receiving postnatal visit within two days after delivery. Ethiopian DHS data, found that 90% of mothers in that survey failed to receive PNC services within the first six weeks after birth. Eritrean DHS on its part, found 92% of women giving birth at home not receiving PNC services within the first six weeks after birth. Similarly, 85% of mothers with home delivery in Mali and 70% of mothers in same situation in Rwanda, received no PNC services at all, according to the most recent DHS country data. PNC indicator in demographic health surveys unfortunately does not give information on the quality of the visit. This is in contrast to antenatal care (ANC) where more comprehensive information is sought from mothers about the services they received, such as tetanus toxoid injections and blood pressure measurements

2.3 The Health Care System in Ghana

This section provides an overview of the health care system in Ghana as it relates to infrastructure and maternal care services. The vision of the health sector of Ghana is to have a healthy population for national development and its goal is to have a healthy and

productive population that reproduces itself safely (MOH, 2014). To realize the above vision and goal, the Ministry of health is working through its twenty-two (22) agencies in conjunction with key sector partners like MDAs, MMDAs, DPs and the private sector. The agencies perform service delivery, regulatory, financing, research and training functions and are responsible for implementing policies of the Ministry (MOH, 2014). Initially, the Ministry of health assumed the role of the sole provider of services with collaboration from the missions and the Para government institutions such as the military, the police and the mines. Its services were more towards curative care than preventive care and involved programmes that were to a large extent donor driven. The Ministry of Health is mandated to formulate, coordinate and monitor the implementation of policies, programmes and processes for evaluation of the programme of work. This involves ensuring that strategic policy frameworks exist and are combined with effective oversight, coalition building, regulation, attention to system design and accountability. In the health sector, regulatory activities focus mainly on client protection by ensuring that the requisite and appropriate human resource for service delivery are available at all service delivery points including availability of appropriate products for service delivery and that service delivery outlets meet minimum prescribed standards. Regulatory agencies include: the Food and Drugs Authority (FDA) which controls the manufacturing, importation, exportation, advertisement, distribution and use of all food, drugs, cosmetics, medical devices and household chemical substances in the country; the Pharmacy Council charged with the primary responsibility of ensuring the highest standards in the practice of pharmacy; the Nurses and Midwifery Council (NMC) which is focused on the training and regulation of nursing and midwifery personnel and the Medical and Dental Council (MDC) responsible for ensuring the highest level of training of medical and dental practitioners and prescribes and enforces standards of professional

conduct. Other regulatory agencies include the Health Institutions and Facilities Regulatory Agency (HIFRA), which sees to issues of regulation, and monitors service delivery facilities in both public and private sectors. The traditional medicine practice council which is charged with the responsibility to promote activities that will strengthen the regulation and control of the marketing and utilization of traditional medical products in Ghana. The Centre for Research in to Plant medicine which is a WHO collaborating centre for research and development of traditional medicine, is responsible for conducting and promoting scientific research in to herbal medicine and provides quality control and technical support to institutions and individual herbalists.

Health service delivery in the country is carried out by both government and nongovernmental health facilities. The Ghana health service, the four teaching hospitals (Korle Bu, Komfo Anokye, Tamale and Cape Coast), quasi-government institutions and the Christian Health Association of Ghana (CHAG) are charged with the responsibility to provide health services in the country (Appiah-Denkyira, Ebenezer; Herbst, H. Christopher; Soucat, Agnes; Lemiere, Christophe; Saleh, 2013; MOH, 2014; Saleh, 2017).

Recognizing the importance of the private health sector, the government implemented the Private Health Sector Policy in 2003 to streamline and improve the activities of the private health sector, since the private health institutions provide over 40% of health services in Ghana (Saleh, 2017). The Ghana Health Service provides public health and clinical services at primary and secondary levels. As part of the efforts to improve access to health services, the community-based health planning and services (CHPs) initiative was designed as another level of health care delivery that combines public health and basic clinical activities. The Ghana Health Service also provides oversight responsibility for the operations of the mission and private facilities through the District Health

Administrations and thus collates information from these facilities as part of the district structure. The Christian Health Association (CHAG) facilities are based in the district and provide primary health care. The Teaching Hospitals provide tertiary and specialist services and serve as the main referral centres in the country.

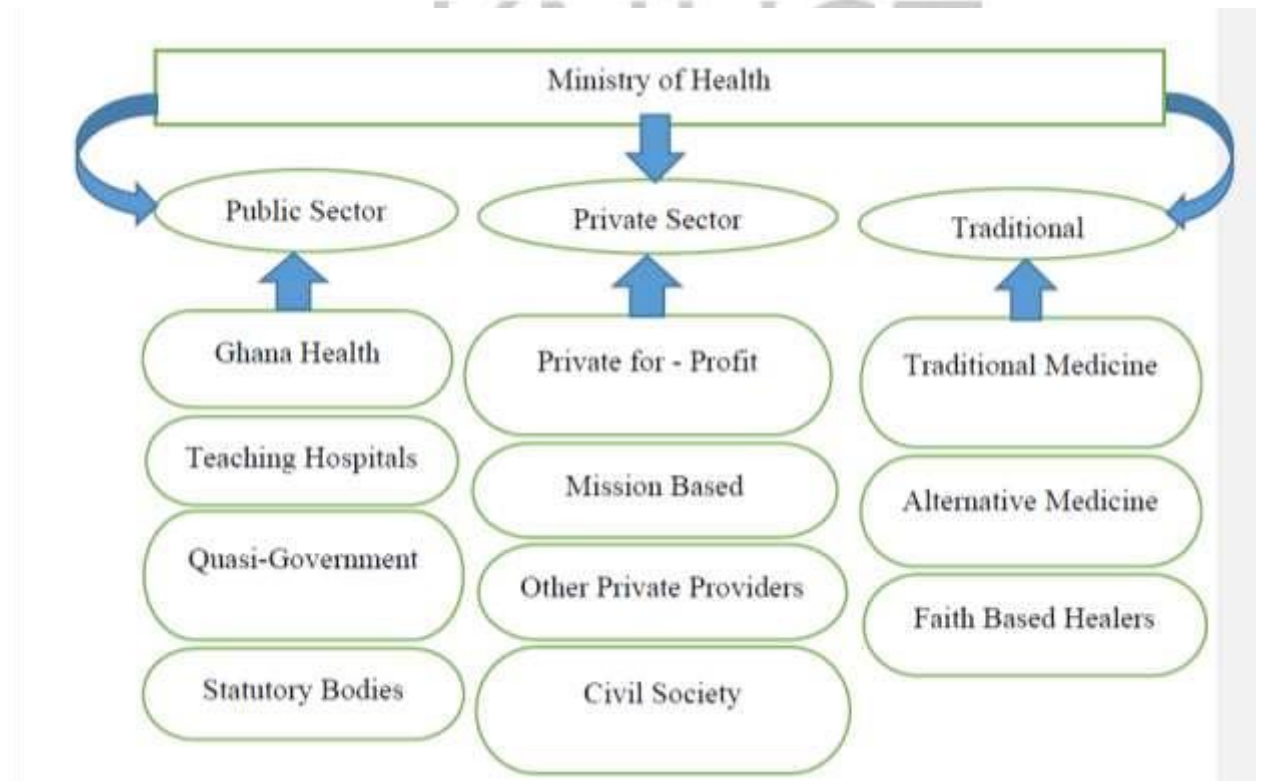


Figure 2.1 Structure of the Health System in Ghana

2.3.1 The Ghana Health Service and its Organizational Structure

The Ghana Health Service and Teaching Hospitals Act – 1996 (Act 525) established the Ghana Health Service (GHS) and granted autonomy to the teaching hospitals. Tasked with the responsibility of implementing public sector health services, the GHS officially began operations in February 2003. It operates to ensure access to health services at the community, sub-district, district and regional levels. Thus, the GHS is organized at the community level, sub-district level, district level, regional and national levels. Health facilities under the supervision and coordination of the GHS include Community-based

health planning and services (CHPS); sub-district health centres and clinics; district hospitals; regional hospitals; and specialized tertiary hospitals.

The GHS has eleven directorates at the national level which include: offices of the Director General and Deputy Director General; Public Health; Family Health; Finance; Internal audit; Policy, Planning, Monitoring and Evaluation; Health Administration and support services; Human Resources; Institutional Care; Research and Development and Supplies, Stores and Drugs Management. Each of the above sub-divisions is headed by a national divisional director. Operating at the national level is the Ghana Health Service Council, acting as an advisory and coordinating body to the service. Located in each of the regions of the country, is a regional health directorate, headed by a regional director of health services. These regional health directorates are supported by regional health management teams and regional health committees. The Figure below shows how the GHS is organized.

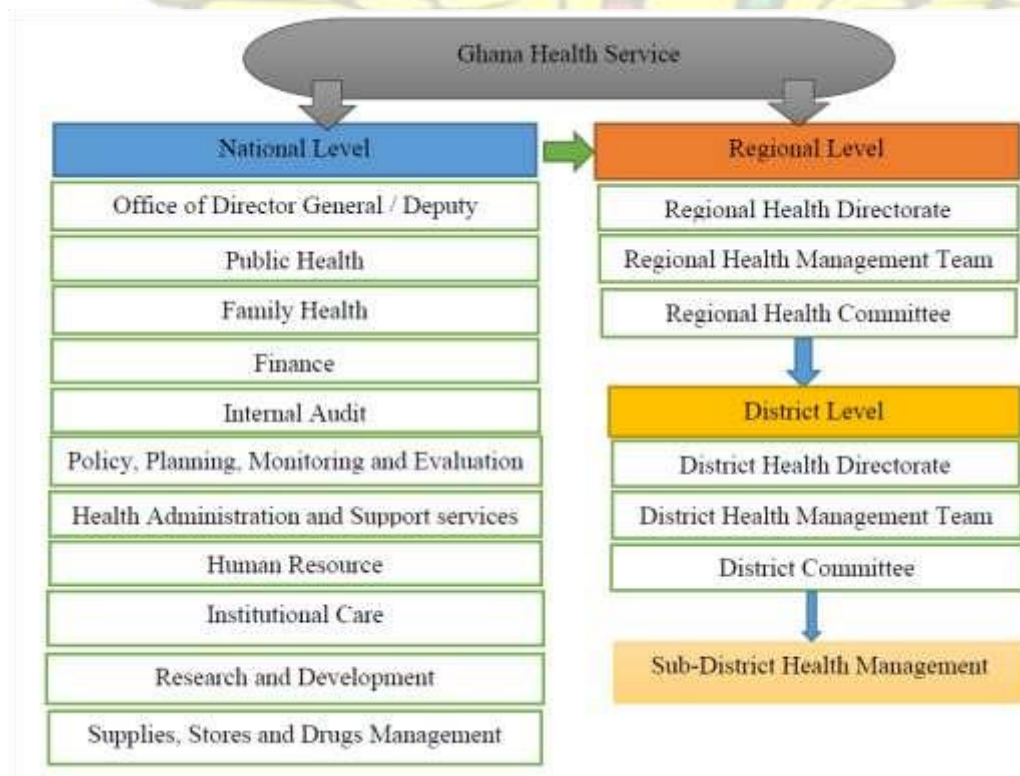


Figure 2.2 Organisational Structure of Ghana Health Service (Source: GHS 2017)

2.4 The Burden and Impact of Maternal Deaths

Pregnancy and childbearing complications are a leading cause of death and disability among women of childbearing age in developing countries (WHO, 2014).

Ending preventable maternal deaths remains an unfulfilled agenda and a global challenge despite significant progress over the past years. Although maternal deaths globally have decreased by 45% since 1990, 800 women still die every day from largely preventable causes before, during, and after child birth (WHO, 2015a). An estimated 99% of these deaths occurred in low-and middle-income countries (LMIC) and two-thirds (64%) in the WHO African region (WHO, 2018b). The annual number of maternal deaths decreased by 43% from approximately 532 000 in 1990 to an estimated 303 000 in 2015 with an approximate global lifetime risk of a maternal death falling considerably from 1 in 73 to 1 in 180 (WHO2015, UNICEf, 2015). There is however, an increased risk of maternal death among women living in rural areas and among poorer communities in low-and middle-income countries as evidenced by an estimated lifetime risk of maternal mortality in high-income countries at 1 in 3300 as compared to 1 in 41 in low-income countries (WHO 2015, UNICEf, 2015). Young adolescents face a higher risk of complications and death as a result of pregnancy than older women (WHO, 2014).

Ye *et al.*, (2012) in their study, concluded that the immediate direct costs of maternal deaths are extremely catastrophic for the rural households. This accession is mostly true as the cost of seeking health care for complications in pregnancy and childbirth can take considerable resources from families, given that women who experience complications may require multiple visits to health facilities, thus compounding the cost of transport, drugs and hospitalization. For instance, a study in Western Kenya found that households which had a maternal death spent about one-third of their annual per capita consumption

expenditure on health services compared to about 12% for households who had a healthy pregnancy and childbirth (Kes *et al.*, 2015). The study also reported that funeral cost for a maternal death was even higher compared to the cost of seeking health care services and hence households end up depleting their savings accounts, selling assets and going in for credits, thus leading to further impoverishment.

2.5 Strategies for The Reduction of Maternal Deaths

Maternal mortality had been recognized as a concern and discussed at the 1987 Safe Motherhood Conference (Nairobi, Kenya), the 1994 International Conference on Population and Development (Cairo, Egypt), the 1995 Fourth World Congress on Women (Beijing, China), and the 1997 Safe Motherhood Technical Consultation (Colombo, Sri Lanka), the MDG announcement provided significant technical and political impetus to improve maternal health. To assist in the monitoring of progress towards MDG 5, the UN's Maternal Mortality Estimation Inter-Agency Group (consisting of WHO, UNICEF, UNFPA, World Bank Group, and UNPD) has regularly produced estimates for maternal mortality, focusing on country-specific estimates dating back to 1990. As the final year for the MDG era, 2015 also marked the start of the Sustainable Development Goals (SDGs). The UN's Maternal Mortality Estimation Inter-Agency Group in estimating the progress that has been made in reducing the maternal mortality from 1990 to 2015, comprehensively assessed the maternal mortality ratio for 183 countries using a new Bayesian model¹⁰ (Alkema *et al.*, 2016).

Over the past decades Ghana has invested vigorously in maternal and reproductive health care and launched several high-level initiatives in the country to enhance maternal and reproductive health towards reduction of maternal and child mortality. Making Pregnancy Safer Initiative, campaign for the accelerated reduction of maternal mortality in Africa (CARMMA) and MDG5 acceleration framework (MAF) are

amongst the notable interventions. Ghana is a signatory and an unwavering supporter of a number of key frameworks that drive the Maternal and Reproductive Health global agenda such as the International Conference on Population and Development (ICPD) and its resulting Programme of Action (PoA), the Millennium Development Goals (MDG), Family Planning 2020 (FP2020) and lately the Sustainable Development Goals (SDGs). These commitments resulted in a considerable improvement of Maternal Health services and associated health outcomes; The percentage of births attended by a skilled provider has increased from 55% in 2007 to 79% in 2017 with 98% of women in Ghana receiving antenatal care from a skilled provider in 2017 as against 96% in 2007 (GSS, 2017).

Nevertheless, these commitments and initiatives have fallen short of putting the country on track to achieve the 75% reduction of the Maternal Mortality Ratio (MMR) required by the MDG5. According to estimates by the Maternal Mortality Estimation InterAgency Group (MMEIG), the MMR in Ghana has fallen from 634 per 100,000 live births in 1990 to 376 per 100,000 live births in 2005 and is currently 319 per 100,000 live births as of 2015.

Maternal Mortality in July 2008, was declared a national emergency. In responding to these concerns, the government of Ghana implemented the free maternal care policy to enable expectant mothers access maternal health care services from skilled health care providers. Ghana's MDG5 Acceleration Framework (MAF) was also developed by the Ministry of Health and Ghana Health Service in collaboration with development partners, particularly the United Nations Country Team and other stakeholders in Ghana in 2010. The focus of the MAF and its Operational Plan is primarily on improving access and quality of skilled delivery, EmONC and child spacing. It also focuses on improving maternal health at the level of both community and health care facilities using evidence-based, feasible and cost-effective interventions in order to achieve accelerated reduction

in maternal and newborn deaths. The three key priority interventions identified are improving family planning, skilled delivery and emergency obstetric and newborn care (MoH, 2016).

To achieve the ambitious target of maternal mortality of 70 per 100,000 live births in 2030 as stated in the SDGs, the UNFPA argues that the best way to achieve this is to ensure that all women have access to contraception to avoid unintended pregnancies; provide all pregnant women with skilled care in a safe environment during delivery; and make sure women with complications have timely access to quality emergency obstetric care. Reducing maternal mortality depends crucially on ensuring women have access to quality care before, during and after childbirth (WHO, 2018b)

2.6 Impact of Free Maternal Health Care or User Fees Exemption Policy on Maternal Health Services and Related Outcomes.

This section reviews literature on the effect of maternal health care user fees removal policy on antenatal care, facility or skilled deliveries, postnatal care and maternal deaths. As a result of most of the health care user fee policy changes occurring in Africa and other low- and middle-income countries, most of the literature comes from these areas.

2.6.1 Effects on Antenatal Care

Previous studies reviewed have shown that when maternal care user fees are removed, the use of maternal health care services including antenatal care increases (Johri *et al.*, 2014). The 2017 Ghana Maternal Health Survey (GMHS) indicates a slightly improved ANC coverage from 96% in 2007 to 98% in 2017 with almost two-thirds (64%) making their first visit in the first trimester as recommended and nine in ten women (89%) making four or more ANC visits. In 2007, 53% of women attending ANC, made their first visit in the first trimester with 77% making four or more visits (GSS, 2017). Though covered by the free maternal care policy, nearly half of women (45%) who received ANC

at a public facility were asked to make payments for ANC, with more than one-third (37%) paying for laboratory tests, 32% paid for drugs, 22% paid for other supplies, and 8% paid to see a provider (GSS, 2017).

2.6.2 Effects on Facility or Institutional Deliveries

User fee exemption has been associated with increased use of skilled deliveries and decline in the use of unskilled alternatives. A UNICEF (2011) study found a 45% increase in deliveries at formal clinics and hospital associated with the removal of user fees in Sierra Leone. However, there was an unspecified magnitude of decline in community deliveries by unskilled personnel. The study also found a 150% increase in the number of delivery complications treated in health units and the fatality rate due to delivery complications declined by 61% compared with the period before user fee exemption. By not specifying the magnitude of the decline in community deliveries, the study assumed that the increase at formal clinics was equivalent to a decrease in community deliveries, which may not be true for a before and after study. A study aimed at measuring the impact of user fee reforms on the probability of giving birth in a health institution or undergoing caesarian section in Ghana, Burkina Faso, Zambia, Cameroon and Nigeria for the poorest strata of the population by Leone *et al.*, (2016b) was reviewed. The study used quasi-experimental regression analysis to measure primary and secondary outcome data. Their findings showed a significant impact of the user fees reforms on child bearing in health facilities. The study concluded that a clear positive impact on access when user fees are removed. This assertion is supported by the 2017 GMHS, which shows an increase in skilled assistance during delivery from 54% in 2007 to 79% in 2017 (GSS, 2017). This achievement however, was not without out of pocket payments as more than half of women (52%) who delivered at a public health facility

were asked to make payments for delivery care, 39% paid for drugs, 32% for other supplies, 22% for laboratory tests, and 9% paid to see a doctor or nurse (GSS, 2017).

In Burkina Faso, user fee exemption for facility delivery and curative consultations for children was introduced in two health districts in the Sahel region in September 2008.

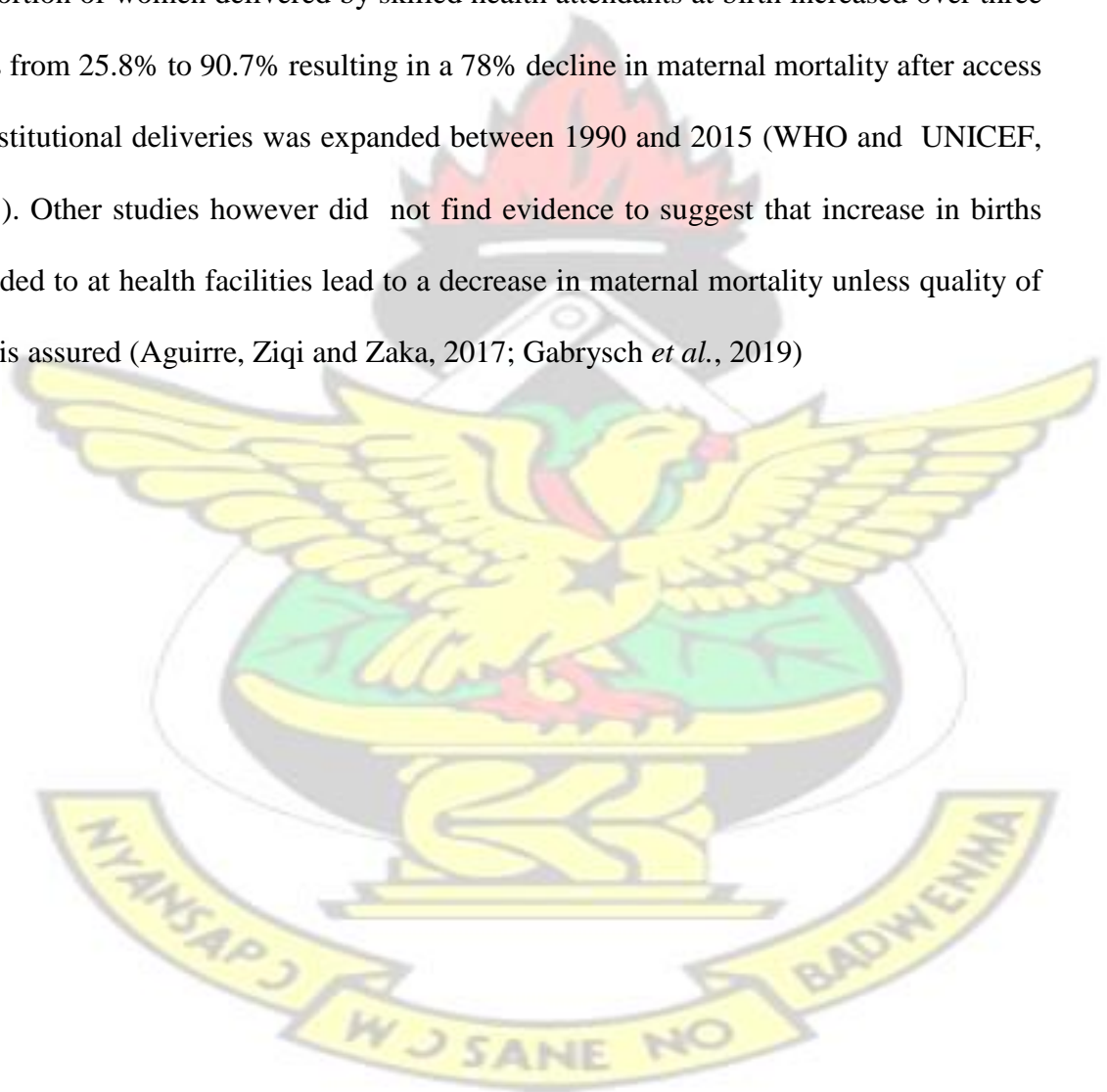
Johri *et al.*, (2014) conducted a before and after comparison of health care facility data to estimate the impact of the policy on maternal and child mortality. User fee exemption was associated with a significant increase in facility deliveries and may have contributed to a modest reduction in maternal mortality and child mortality (Johri *et al.*,

2014). This conclusion was also arrived at in a quasi-experimental study measuring the impact of user fee reforms on the probability of giving birth in an institution or undergoing caesarian section in Ghana, Burkina Faso, Zambia, Cameroon and Nigeria. The results showed a significant impact of user fee reforms on child bearing in health facilities indicating a clear positive impact on access when user fees are removed (Leone *et al.*, 2016a). Similarly, a retrospective review of charts data on deliveries before and after removal of user fees to describe service utilization and delivery outcomes before and after removal of user fees at St. Joseph's hospital in Roma, Lesotho revealed a 49% increase in deliveries attended to by skilled attendant and a decrease in maternal mortality from 138.1 to 88 per 100,000 live births after removal of user fees for hospital deliveries (Steele *et al.*, 2018). The effect of the removal of user fees for delivery at public health facilities on institutional deliveries in urban Kenya concluded with findings showing 86% institutional deliveries before the policy and a 95% institutional deliveries after the policy (Calhoun *et al.*, 2018).

2.6.3 Effects on Maternal Mortality

Good quality intrapartum and early postpartum care in a health facility as well as delivery under the supervision of trained personnel is associated with improved maternal and newborn health outcomes and decreased mortality (Ameh *et al.*, 2012; Henry *et al.*, 2019)

. The association between childbirth in a health facility and improved maternal and newborn health outcomes has been documented (Gülmezoglu *et al.*, 2013; Moyer, Adanu and Engmann, 2013). Women who deliver in health facilities which provide basic and comprehensive emergency obstetric care are more likely to have improved health outcomes than women who deliver outside the health facility. When disparities in accessing delivery services are reduced, there are fewer maternal deaths. In Rwanda, the proportion of women delivered by skilled health attendants at birth increased over three folds from 25.8% to 90.7% resulting in a 78% decline in maternal mortality after access to institutional deliveries was expanded between 1990 and 2015 (WHO and UNICEF, 2015). Other studies however did not find evidence to suggest that increase in births attended to at health facilities lead to a decrease in maternal mortality unless quality of care is assured (Aguirre, Ziqi and Zaka, 2017; Gabrysch *et al.*, 2019)



CHAPTER THREE

METHODOLOGY

This chapter is concerned with the procedures employed in the collection of data needed to achieve the study objectives. It introduces the study setting, describes the study sample and data source, and statistical methods used for the analysis.

3.1 Research Method and Design

This study is largely a descriptive study conducted using secondary quantitative data. In a descriptive study, things are measured as they are, no attempt is made to change conditions or behavior. It is designed to provide insight into the research problem by describing the variables of interest and for defining, estimating, predicting and examining associative relationships. **Secondary data analysis** is the use of existing data to investigate research questions other than the main ones for which the data were originally gathered. Existing data on antenatal care attendance, postnatal care attendance, births attended to by trained health care personnel and maternal mortalities from medical records in the statistics department and maternal registers of the hospital were analyzed. Data from annual reports and maternal health registers spanning the period, 1997 and 2018 (i.e. eleven years before and after the free maternal care policy implementation) were assessed and analyzed. The variables of interest include; the coverage of antenatal care and postnatal care services, trend of births attended to by trained health care personnel and the trend of institutional maternal mortality before and after the implementation of the free maternal care policy.

Raw figures on annual antenatal care registrants, postnatal care registrants, number of institutional deliveries, live births and the annual total estimated population served by the hospital were obtained from the biostatistical unit of the hospital. The annual

expected pregnancies was calculated from the annual estimated populations by finding 4% of the population. The annual expected pregnancies were then used as the denominator for determining the annual antenatal care and skilled delivery or institutional delivery coverages. The total annual live births in the hospital was also used as the denominator for determining the institutional maternal mortality ratio and postnatal care coverage. These coverages were then used in the analyses in the study to examine annual coverage trends and possible associations.

The study site, St. Francis Xavier Hospital was conveniently sampled for the purposes of this study. St. Francis Xavier Hospital is the District hospital serving Assin Central municipality including Assin North and South Districts. It serves as a referral facility for health facilities within the municipality and the two districts including other adjoining districts such as Adansi South, Twifo Hemang Lower Denkyera and Berem North.

3.2 Sample

The study covered data which had been collected over a period of 22 years. 11 years (1997 to 2007) before and 11 years (2008 to 2018) after the introduction of the maternal care policy. Maternal deaths were identified by screening registers and clinical notes of all deaths involving women aged 15-49 years in all units of the hospital. These deaths were further screened for those related to pregnancy and childbirth. The total live births in the study period were also obtained in order to calculate the maternal mortality ratios (MMR) for the successive years in the study period.

3.3 Study Variables

3.2.1 Description of the Outcome Variables

An outcome variable refers to the variable whose value is being investigated evaluated.

The value of the outcome/dependent variable depends on other variables; the independent explanatory variables. In this study, institutional maternal mortality ratio was used as the dependent variable.

3.2.2 Description of the Independent or Explanatory variables.

As mentioned above, the outcome/dependent/ response variable depends on explanatory/independent/predictor variables. These variables determine or predict the value of the outcome variable. The explanatory variables for this study were Antenatal care coverage, skilled delivery, postnatal care coverage and staff distribution.

3.4 Data Analysis

Statistical software, Stata version 13.0 was used to analyze the data. Unit root test was performed on the data to know whether the data is stationary or not. Summary of descriptive analysis, trend analysis and correlation was performed to know the behavior of the yearly time series data. Regression analysis was performed, maternal mortality ratio was used as dependent variable and postnatal care coverage, institutional delivery, antenatal care coverage, and staff distribution (registered nurses and midwives) used as independent variables. Post estimation test such as heteroscedasticity, multicollinearity, auto correlation would be performed to check the reliability of the regression result.

3.5 Diagnostic test

3.5.1 Normality test

As noted in Brooks (2008) a normal distribution is not skewed and is defined to have a coefficient of kurtosis of 3. One of the most commonly applied test for normality is Jarque Bera. Brooks (2008) also states that, if the residuals are normally distributed, the histogram of the residual should be in the form of a bell-shaped and the Bera- Jarque statistic would not be significant at 5 percent.

3.5.2 Multi-collinearity

To test the independence of the explanatory variables or to detect any multi-collinearity problem in the regression model. The study used variance inflation factor to detect any problem of multi-collinearity. The problem of multi-collinearity usually arises when certain explanatory variables are highly correlated. Usually, as noted by Hair et al., (2006), correlation coefficient below 0.9 may not cause serious multi-collinearity problem. In contrary to this, Kennedy (2008) argued that as any correlation coefficient above 0.7 could cause a serious multi-collinearity problem leading to inefficient estimation and less reliable results.

3.5.3 Heteroscedasticity test

To test for the presence of heteroscedasticity in time series data, the popular Breusch – pagan test for heteroscedasticity was employed in the study. The test involves testing the null hypothesis that the variance of the error term is constant (homoscedasticity) or no heteroscedasticity. The alternative hypothesis also states that variance of the error term is not constant. The general rule for this test state that, if the probability chi2 is greater than 0.05 we do not reject the null hypothesis, it means there is no heteroscedasticity in the model.

3.5.4 Auto-correlation test

In time series data we check whether the residual contain an autocorrelation which is the violation of the third assumption of the Classical Linear Regression Model. The Breusch – Godfrey LM test for autocorrelation would be employed in this study. The null hypothesis state that the residual has no serial correlation and the alternative hypothesis state that the residual has serial correlation. The general rule is that if the probability chi2 is greater than 0.05 significant level, we do not reject the Null hypothesis.

3.6 Model Specification

The study looked at the impact of Ghana's free maternal care policy implemented in 2008, on maternal mortality in St. Francis Xavier Hospital. Maternal mortality ratio was used as a dependent variable and institutional delivery, antenatal care, postnatal care, and the distribution of registered nurses and midwives were used as independent variables. Multiple linear regression model was employed to find out the impact of the free maternal care policy on maternal mortality in the hospital. Below is the regression model for the study.

$$MMR_t = \beta_0 + \beta_1 Instdel_t + \beta_2 PNC_t + \beta_3 ANC_t + \beta_4 RGN_t + \beta_5 MdW_t + e_t$$

Where:

MMR_t is maternal mortality ratio at time t (time series data)

Instdel_t is institutional deliveries (skilled deliveries) at time t,

PNC_t is postnatal care coverage at time t

ANC_t is antenatal care coverage at time t

RGN_t is the number of registered nurses at time t

MdW_t is the number of midwives at time t

e_t is the residual at time t

3.7 Ethical Consideration

To ensure ethical compliance, the research complied with all ethical guidelines and approval was sought from the study site (St. Francis Xavier Hospital Ethical Committee) and the KNUST ethical board, Committee for Human Research Publication and Ethics (CHRPE) prior to conducting this study.

The study bore no direct risk to individuals and did not expose any personal information of clients in the data collection process. The data was obtained in aggregated form

through annual reports and where confirmation is needed from the source registers, the personal information of the clients involved were protected by anonymizing the data. No respondents were used in this study. The data was collected included; annual antenatal attendance, skilled deliveries, postnatal attendance maternal mortality records and human resource numbers and distributions in the hospital for the study period (1997 to 2018). Any data or information collected during this study was solely used for the purposes of this study and kept safe with the researcher.

In the event that the study concludes that the free maternal mortality has a positive influence on maternal mortality leading to reduction of it, a recommendation would be made for the hospital and the government to scale up the policy to include other services and also tackle challenges that the policy might be faced with to benefit a wide majority. If the researcher also conclude that the policy has not been beneficial in reducing the maternal mortality, recommendations would be made for the hospital to repackage its maternal care services and make them attractive to clients.

3.8 Limitations of Study

Data generated in the hospital before 2014 were in hard copies and not in electronic form making retrieval very difficult since the researcher and his team had to spend days searching through the archives to obtain the needed information for the purposes of this study. The data obtained was not also consistent throughout the study period. The form in which some data were captured in previous years saw some changes in subsequent years due to modifications been made to the data capture tools. Fore instance, the researcher wanted to collect data on the average ANC and PNC visits but this data was absent in the years before 2015 making it difficult for this data to be collected.

CHAPTER FOUR

DATA PRESENTATION AND RESULT DISCUSION

4.1 Introduction

This section presents the results of the Secondary data analyses of institutional data generated from 1997-2018. This was provided by the statistics department of St. Francis Xavier Hospital. Results were analyzed using Stata version 13.0.

This section analyses the data to determine trends of antenatal care coverage, postnatal care coverage, institutional deliveries and institutional maternal mortality ratio. The analyses sought to investigate possible associate between the above-mentioned variable and institutional maternal mortality ratio. The section includes a summary of descriptive analysis (mean, standard deviation, minimum and maximum), Correlation Matrix, trend analysis of Maternal Mortality, Institutional Delivery or skilled delivery, Ante- and Post-natal care coverage to know the characteristics or the behavior of such variables over the study period (1997-2018). Regression was performed to know statistically, the influence of all the independents variables on institutional maternal mortality ratio.

Table 1 Raw figures of Ante- and Post- natal care registrants, Institutional deliveries, Live births, Maternal deaths and Expected pregnancies from 1997 to 2018.

Years	Number of maternal deaths	Live births	Antenatal care registrants	Postnatal care registrants	Institutional Delivery	Expected Pregnancies in the Municipality	Total Population of the Municipality
1997	13	1182	8542	716	1206	4388	109699
1998	20	1202	9017	1058	1432	4519	112975
1999	33	1402	9345	1406	1704	4654	116349
2000	19	1321	7913	3955	1583	4789	119723
2001	19	1326	7913	3955	1583	4928	123195
2002	13	1028	7760	1440	1190	5071	126768
2003	13	1294	6628	1372	1294	5218	130444
2004	11	1955	2222	2117	2039	5369	134227
2005	9	2197	1949	8553	2197	5525	138120
2006	11	1472	1589	6099	1728	5685	142126
2007	8	1660	1728	6068	1743	5850	146248
2008	9	2141	1965	7097	2221	6020	150489
2009	15	2782	2145	7331	2666	6234	155853
2010	9	2717	2007	6718	2717	6454	161341
2011	15	2935	1996	5084	3002	6641	166020
2012	9	2944	1706	5854	3107	6833	170835
2013	5	2961	1465	5272	2943	7032	175789
2014	7	3037	1367	4774	3039	7235	180887
2015	4	3019	1334	5523	3003	7445	186133
2016	9	2611	1394	7773	2671	7661	191530
2017	5	2822	1378	7167	2765	7883	197084
2018	8	3006	1234	5702	3008	8112	202799

(Source: St. Francis Xavier Hospital Biostatistics Unit)

KNUST

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Table 1 above shows the raw figures of the number of maternal deaths, antenatal care registrants, postnatal care registrants, institutional deliveries, expected pregnancies and the total estimated population over the study period (1997 - 2018) obtained from the biostatistical unit of St. Francis Xavier Hospital.

The number of pregnancy-related maternal deaths shows a decreasing trend while live births in the hospital increases. Antenatal care registrants on the other hand shows a decreasing trend, postnatal care registrants and institutional deliveries show an increasing trend over the study period.

Table 2 Staff Distribution from 1997 to 2018

Year	Doctors	Midwives	Registered General Nurses	Total Staff
1997	4	14	28	103
1998	5	14	28	104
1999	5	14	28	104
2000	4	14	28	112
2001	4	14	28	123
2002	4	13	27	135
2003	7	13	27	128
2004	7	13	22	123
2005	7	17	22	163
2006	6	17	22	168
2007	7	17	30	173
2008	7	17	41	185
2009	7	21	39	212
2010	7	21	45	219
2011	7	21	64	244
2012	8	11	64	224
2013	8	11	49	248
2014	9	14	61	286
2015	10	17	71	281
2016	13	27	96	323
2017	16	28	112	346
2018	11	30	105	351

Table

Table 2 above shows a yearly distribution of staff for the study period 1997 – 2018 from the hospital Human Resource Unit. The table indicates an increasing number of skilled health care professionals (Doctors, Midwives and Registered General Nurses) from 1997 until 2018. The highest number of skilled health care professionals; Doctors – 16, Midwives – 30 and Registered General Nurses – 112 distributed to the hospital were recorded in 2017, 2018 and 2017 respectively.



3 Coverage of ANC, PNC, Institutional Deliveries and Institutional Maternal Mortality Ratio from 1997 to 2018.

Year	% Antenatal Coverage	% Postnatal Care Institutional	% Mortality	Institutional Deliveries	Maternal Care coverage Ratio/100000LB
1997	194.7	16.3	27.5	1099.8308	
1998	199.5	23.4	31.7	1663.89351	
1999	200.8	30.2	36.6	2353.78031	
2000	165.2	82.6	33.1	1438.30431	
2001	160.6	80.3	32.1	1432.88084	
2002	153	28.4	23.5	1264.59144	
2003	127	26.3	24.8	1004.63679	
2004	41.4	39.4	38	562.659847	
2005	35.3	154.8	39.8	409.649522	
2006	28	107.3	30.4	747.282609	
2007	29.5	103.7	29.8	481.927711	
2008	32.6	119.9	36.9	420.364316	
2009	34.4	117.6	42.8	539.180446	
2010	31.1	104.1	42.1	331.2477	
2011	30.1	76.6	45.2	511.073254	
2012	25	85.6	45.5	305.706522	
2013	20.9	75	41.9	168.861871	
2014	18.9	66	42	230.490616	
2015	17.9	74.2	40.3	132.494203	
2016	18.2	101.5	34.9	344.695519	
2017	17.5	91	35.1	177.179305	
2018	15.2	70.3	37.1	266.134398	

Table 3 above shows a percentage coverage of antenatal care, postnatal care and institutional maternal mortality ratio for the entire study period (1997 - 2018).

Table**4 Pre policy coverage of ANC, PNC, Institutional Deliveries and Institutional Maternal Mortality Ratio from 1997 to 2007**

Year	% Antenatal Care	% Postnatal Care	% Institutional Maternal coverage	Institutional Mortality Ratio/100000LB Coverage Deliveries
1997	194.7	16.3	27.5	1099.8308
1998	199.5	23.4	31.7	1663.89351
1999	200.8	30.2	36.6	2353.78031
2000	165.2	82.6	33.1	1438.30431
2001	160.6	80.3	32.1	1432.88084
2002	153	28.4	23.5	1264.59144
2003	127	26.3	24.8	1004.63679
2004	41.4	39.4	38	562.659847
2005	35.3	154.8	39.8	409.649522
2006	28	107.3	30.4	747.282609
2007	29.5	103.7	29.8	481.927711

Table 4 above shows the highest institutional maternal mortality ratio of 2353.78 / 100000LB recorded in 1999 and a lowest of 481.93 / 100000LB in 2007, a year to the implementation of the free maternal care policy. The institutional maternal mortality ratio saw a significant decline from 2003 to 2005, a period when the free maternal care policy was being piloted in the Central and Volta regions.

Institutional deliveries showed a highest coverage of 39.8% in 2005 and a lowest of 23.5% in 2002 showing no clear direction in trend during the pre-policy period. Antenatal care and postal care however show a decreasing and increasing trends respectively, with antenatal care recording a highest coverage of 200.8% in 1999 and a lowest of 28% in 2006. Postnatal care on the other hand recorded a lowest coverage of 16.3% in 1997 and a highest coverage of 154.8% in 2005.

Table**5 Post policy coverage of ANC, PNC, Institutional Deliveries and Institutional Maternal Mortality Ratio from 2008 to 2018**

Year	% Antenatal Care coverage	% Postnatal Care Coverage	% Institutional Deliveries	Institutional Maternal Mortality Ratio/100000LB
2008	32.6	119.9	36.9	420.3643
2009	34.4	117.6	42.8	539.1804
2010	31.1	104.1	42.1	331.2477
2011	30.1	76.6	45.2	511.0733
2012	25	85.6	45.5	305.7065
2013	20.9	75	41.9	168.8619
2014	18.9	66	42	230.4906
2015	17.9	74.2	40.3	132.4942
2016	18.2	101.5	34.9	344.6955
2017	17.5	91	35.1	177.1793
2018	15.2	70.3	37.1	266.1344

Table 5 above table shows a generally fairly decreasing trend of institutional maternal mortality ratio with the highest ratio of 539.18 / 100000 LB recorded in 2009 a year after the implementation of the free maternal care policy and the lowest of 132.49 / 100000LB in 2015.

With a highest coverage of 45.5% in 2012 and a lowest of 34.9% in 2016, institutional deliveries during the post policy implementation period (2008 - 2018) did not show any significant change in trend but remained fairly stable. Postnatal care coverage however showed a random walk not showing a clear direction of either increasing or decreasing trend. Antenatal care coverage on the other hand shows a clear direction of decreasing trend from a high of 34.4% in 2009 as the highest coverage to 15.2% in 2018 as the lowest coverage in the post policy implementation period.

Table**6 Summary of Pre-Policy Descriptive Statistics from 1997 – 2007 Variable
Observation Mean Std. Minimum Maximum**

		Coverage	Deviation	Coverage	Coverage
Antenatal Care	11	121.3636	72.9686	28	200.8
Postnatal Care	11	62.9727	45.4484	16.3	154.8
Institutional Delivery	11	31.5727	5.1869	23.5	39.8
Inst. MMR	11	1132.676	584.0703	409.6495	2353.78
Doctors	11	5.4545	1.3685	4	7
Midwives	11	14.5455	1.6348	13	17
Registered Gen. Nurses	11	26.3636	2.9077	22	30
Total Staff	11	130.5455	26.2883	103	173

The table above shows the descriptive statistics of the variables used in the study. The summary of the descriptive statistics includes mean coverage, standard deviation, minimum and maximum coverages in all study variables. The mean coverage of antenatal care (ANC), postnatal care (PNC), institutional delivery (ID) and staff distribution (doctors, midwives and registered general nurses) are 121.36, 62.97, 31.57, 5.45, 14.55 and 26.36 respectively. The mean institutional maternal mortality ratio over the pre policy period of the study was 1132.68 / 100000LB. This indicates that on the average, out of every 100000 live births in the hospital, 1133 pregnancy related deaths will occur. For the observed period (1997 - 2007), the maximum coverage for ANC, PNC, ID and staff distribution (doctors, midwives and registered general nurses) are 200.8, 154.8, 39.8, 7, 17 and 30 respectively. The minimum coverage for the same variables as mentioned above are 28, 16.3, 23.5, 4 and 22 respectively. The maximum institutional maternal mortality ratio recorded over the period is 2353.78 / 100000LB and the minimum being 409.65 / 100000LB with a standard deviation of 584.07.

Table**7 Summary of Post Policy Descriptive statistics from 2008 - 2018**

Variable	Observation	Mean Coverage	Std. Deviation	Minimum Coverage	Maximum Coverage
Antenatal Care	11	23.8	7.0460	15.2	34.4
Postnatal Care	11	89.2546	19.0246	66	119.9
Institutional Delivery	11	40.3455	3.7943	34.9	45.5
Inst. MMR	11	311.5844	135.682	132.4942	539.1804
Doctors	11	9.3636	2.9419	7	16
Midwives	11	19.8182	6.5699	11	30
Registered Gen. Nurses	11	67.9091	25.7661	39	112
Total Staff	11	265.3636	56.3494	185	351

From the post policy summary descriptive statistics table above, the mean coverage of antenatal care (ANC), postnatal care (PNC), institutional deliveries (ID) and staff distribution are 23.8, 89.25, 40.35, 9.36, 19.82 and 67.91 respectively. The mean institutional maternal mortality ratio is also recorded as 311.58 / 100000LB. An indication of 312 pregnancy or child birth related deaths on the average out of every 100000 live births in the hospital. The minimum and maximum coverage for ANC, PNC and ID are 15.2, 34.4; 66, 119.9; 34, 45.5 respectively. The study results however shows a minimum and maximum institutional maternal mortality as 132.49 and 539.18. **8**

Descriptive statistics table

Table

Variable	Obs	Mean	Std. Dev.	Min	Max
antenatalc~v	22	72.58182	71.07787	15.2	200.8
postnatalc~e	22	76.11364	36.56304	16.3	154.8
instdel	22	35.95909	6.310585	23.5	45.5
mmr	22	722.1303	589.7349	132.4942	2353.78
totalstaff	22	197.9545	81.24946	103	351
doctors	22	7.409091	3.002524	4	16
regisgenn	22	47.13636	27.78882	22	112

The table above gives an illustration of the descriptive statistics of the variables used in the study from which key inferences can be made. The summary of descriptive statistics include mean, standard deviation, minimum and maximum of all the study variables. The average of antenatal care coverage, postnatal care coverage, staff distribution and institutional delivery are 72.58, 76.11, 197.95 and 35.96 respectively. The mean maternal mortality ratio over the study period is 722.13 / 100000 LB. This indicates that on the average, out of every 100,000 live births in the hospital, 722 pregnancy related deaths will occur. For the observed period, that is from 1997 to 2018, the maximum or the highest coverage for antenatal care, postnatal care and institutional delivery are 200.8, 154.8, and 45.5 percent respectively. The minimum or lowest level antenatal care, postnatal care and institutional delivery recorded are 15.2, 16.3 and 23.5 percent respectively. The maximum or the highest maternal mortality ratio recorded over the study period is 2353.78 / 100000 LB and the lowest or the minimum maternal mortality ratio recorded is 132.49 / 100000 LB.

4.2 Yearly Trend Analysis of Antenatal Care, Postnatal Care, Institutional Maternal Mortality Ratio and Institutional Delivery Coverage

Trend analysis were performed on these variables to know the characteristics or the behavior of the variables over the study period (1997 -2018).

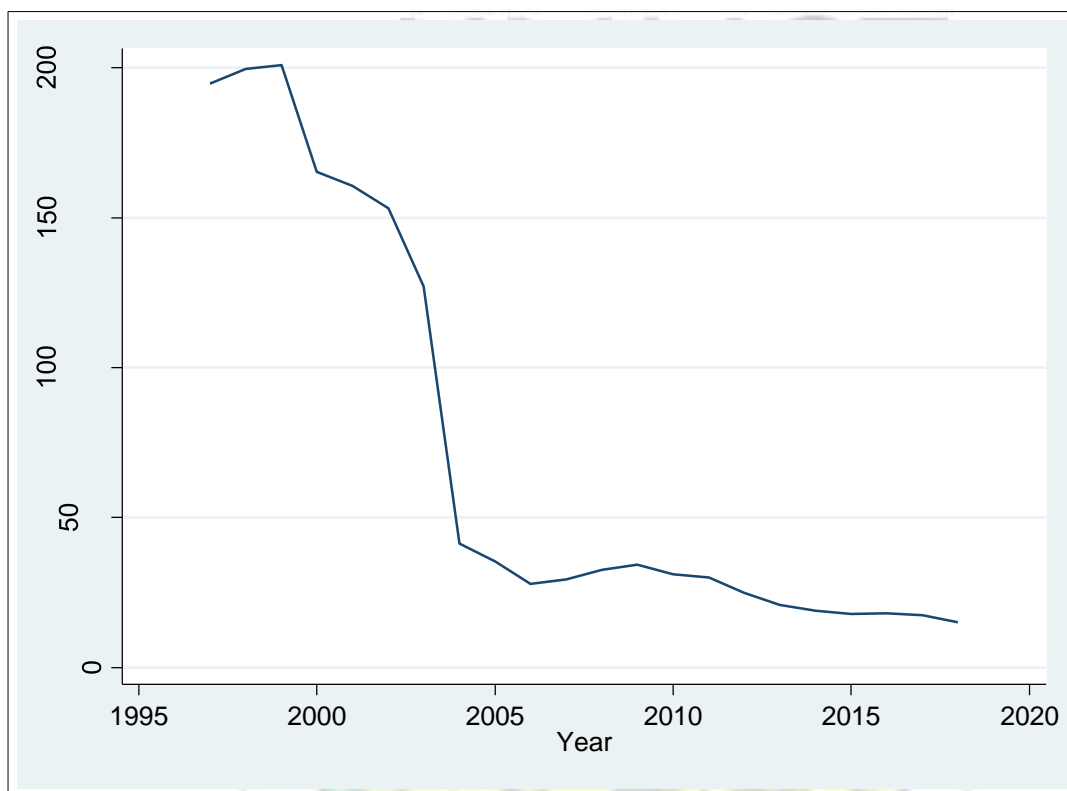


Figure 4.1 Yearly Trend in Antenatal Care Coverage from 1997 - 2018

Coverage for pregnant women attending antenatal care in the hospital increased from 194.7 percent in 1997 to 200.8 percent in 1999, the highest in the pre-policy (1997 - 2007) period and saw a steady decline over the years to 28 percent in 2006, the lowest in the pre-policy period and later increased marginally to 29.5 percent in 2007. During the post policy (2008 - 2018) period, antenatal care coverage remains relatively stable with the highest coverage (34.4 percent) recorded in 2009 and the lowest (15.2 percent) in 2018. Contrary to expectation, the mean antenatal care coverage was 23.8 percent in the post policy period as compared to 121.36 percent in the pre-policy period.

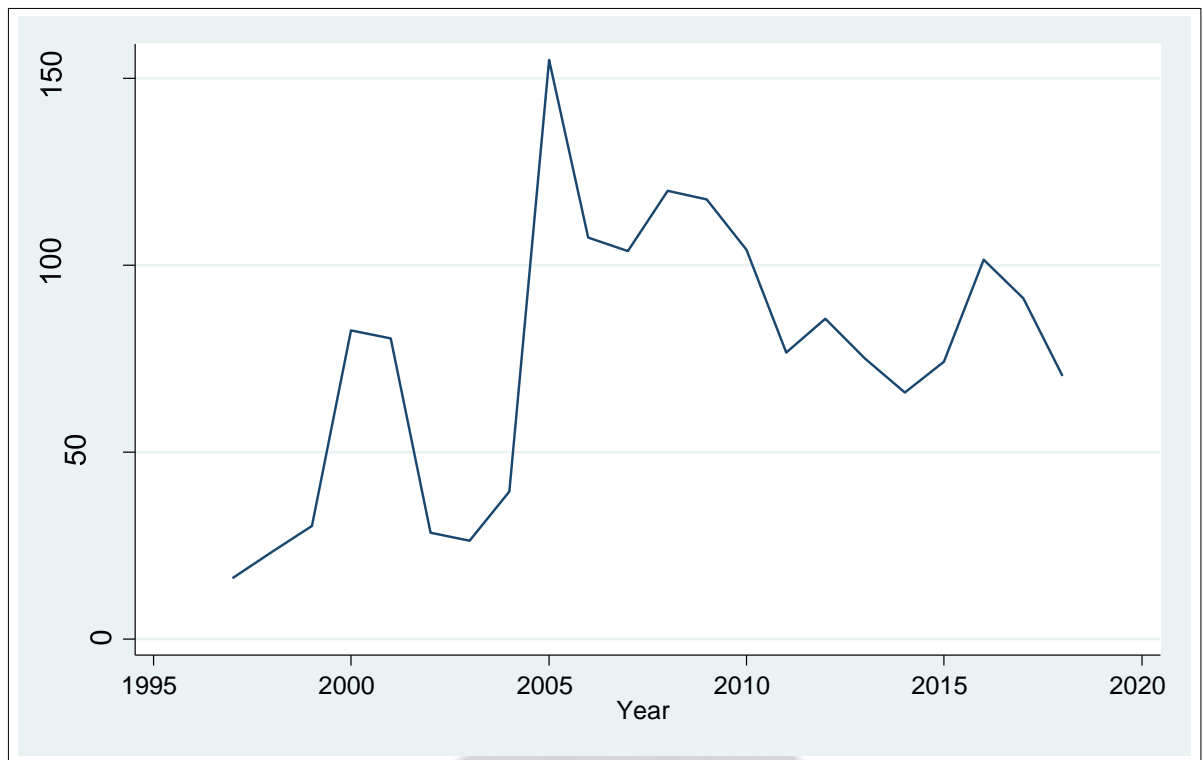


Figure 4.2 Yearly Trend in Post-natal Care Coverage from 1997 - 2018

The figure above shows a time series graph of the postnatal care coverages of the hospital for the study period (1997 - 2018). It indicates a rise in postnatal care coverage from 16.3 percent in 1997, its lowest in the pre-policy period (1997 - 2007) to its highest (154.8 percent) in 2005 and later declined in the last two years of the pre-policy period to 103.7 percent in 2007. During the post policy (2008 - 2018) period as shown above, postnatal care coverage saw a relatively consistent decline from 119.9 percent in 2008 to 66 percent in 2014, the lowest within the period and later to 70.3 percent after rising to a little above 100 percent in 2016. On the average, the post policy postnatal care coverage increased by 26.28 percent. This result is consistent with the expectation of an increase in postnatal care coverage after the implementation of the free maternal care policy due to the removal of the cost associated with the postnatal care services.

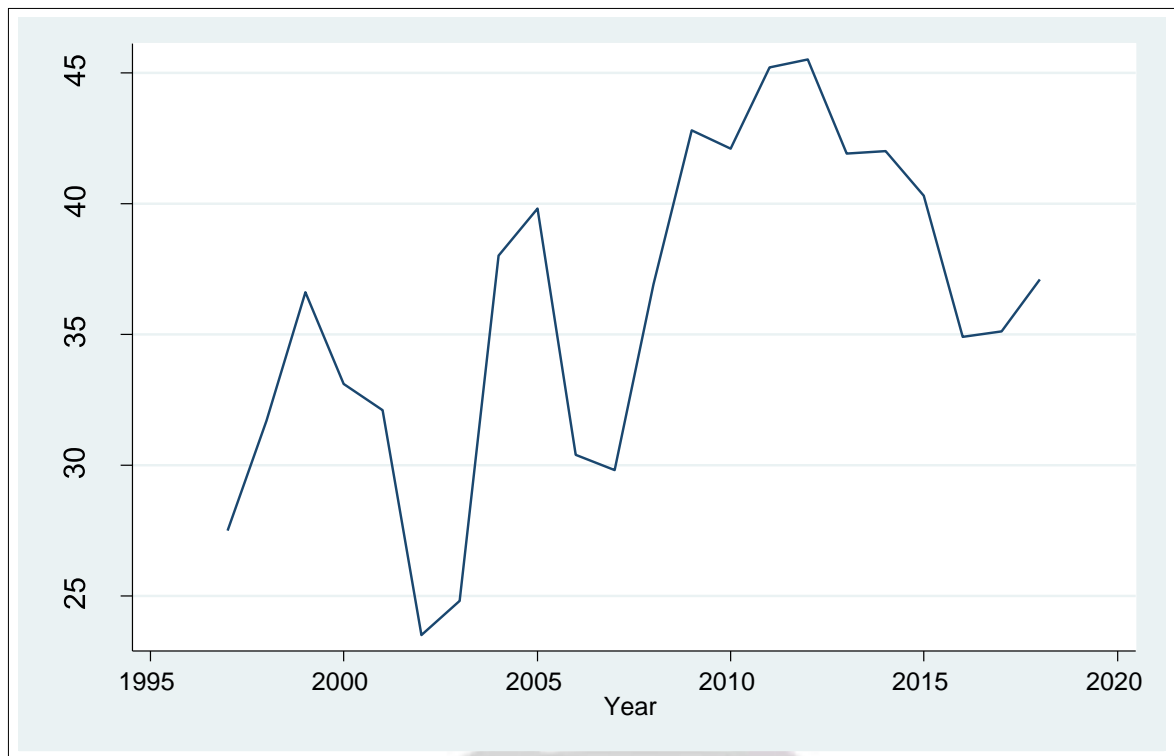


Figure 4.3 Yearly Institutional Delivery from 1997 - 2018

The time series analysis of institutional delivery coverage (skilled delivery) showed that the likelihood that pregnant women would give birth at a health facility significantly increased after the implementation of the free maternal care policy (user fees elimination). The mean skilled delivery coverage after the implementation of the policy (2008 - 2018) was 40.35 percent as against 31.35 percent before the policy (1997 – 2007). This upward trend of institutional delivery in the hospital is as a result of the implementation of the free maternal care policy which eliminated the user fees on delivery making hospital delivery free for all mothers attending health facilities for child birth services.

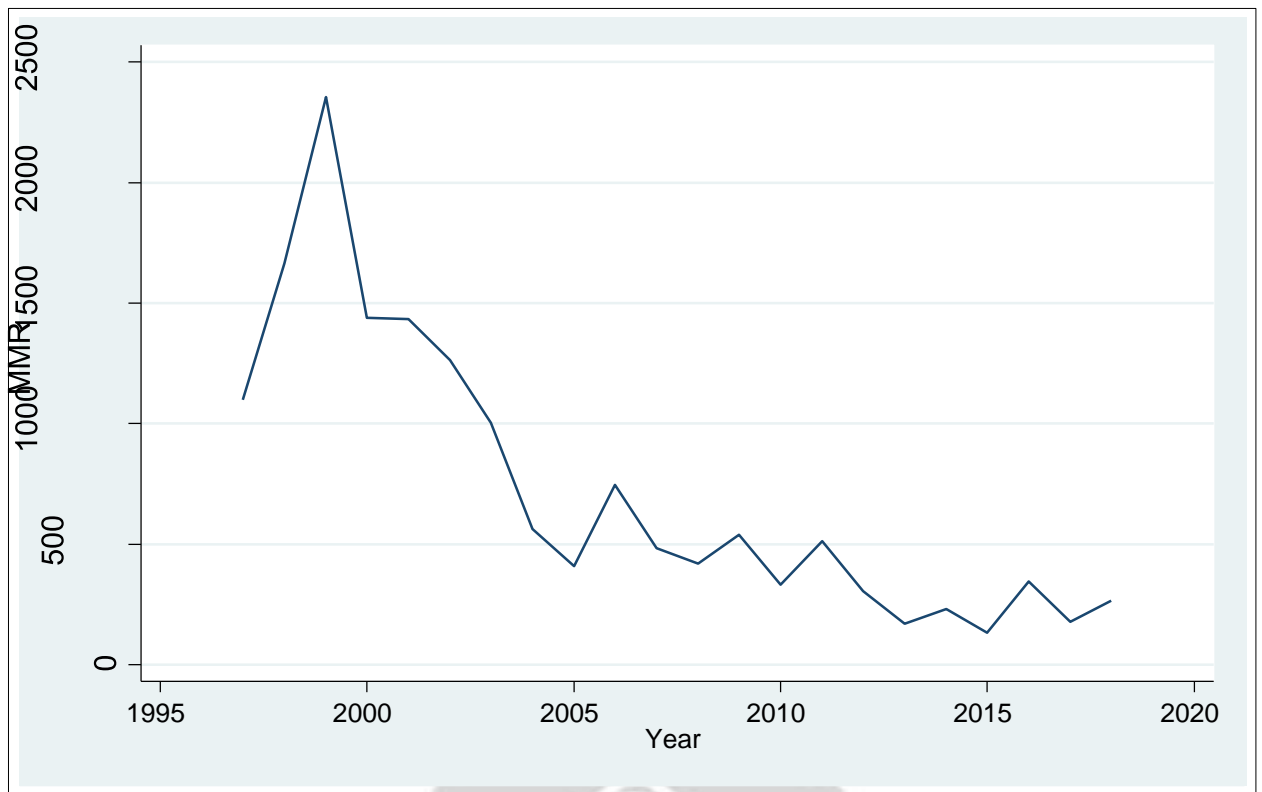


Figure 4.4 Yearly Trend of Institutional Maternal Mortality Ratio from 1997 - 2018

Fig 4-4 shows a time series analysis of institutional maternal mortality ratio. As shown above, maternal mortality ratio of the hospital increased from 1099.83 / 100000LB in 1997 to 2353.78 / 100000LB in 1999, the highest ratio in the study period and declined to 132.49 / 100000LB in 2015 being the lowest in the study period. The mean maternal mortality ratio recorded after the implementation of the free maternal care policy is 311.58 / 100000LB (2008 - 2018) as compared to 1132.68 / 100000LB before the policy (1997 - 2007). The decrease in maternal mortality in the hospital may be attributed to the effect or influence of improved Postnatal coverage and skilled delivery occasioned under the free maternal care policy as well as an increased trained health staff distribution in the hospital.

Correlation matrix was performed to find the relationship between the study variables.

Table 9 Correlation Matrix

	antena~v	postna~e	instdel	mmr	totals~f	doctors	midwives
antenatalc~v	1.0000						
postnatalc~e	-0.6589	1.0000					
instdel	-0.5975	0.4479	1.0000				
mmr	0.9277	-0.5481	-0.5038	1.0000			
totalstaff	-0.7637	0.3719	0.4893	-0.7586	1.0000		
doctors	-0.6777	0.3045	0.3186	-0.6704	0.8898	1.0000	
midwives	-0.4614	0.3819	0.1614	-0.4092	0.7208	0.7124	1.0000
regisgenn	-0.5396	0.1717	0.3616	-0.5624	0.9304	0.8908	0.7545
	regisg~n						
regisgenn	1.0000						

From the correlation matrix table above, there is a strong positive correlation of 0.9277 between Antenatal care coverage and the Institutional maternal mortality ratio but this is inconsistent with this study. There is however a moderately negative correlation between postnatal care coverage and institutional delivery (- 0.5481 and - 0.5038) respectively and institutional maternal mortality ratio indicating a decrease in maternal mortality as the two variables increase. The correlation between staff distribution over the years and maternal mortality ratio shows a negative moderately strong association (- 0.6704 and -0.5624) between doctors and registered nurses' distribution and maternal mortality respectively. The correlation between Midwife distribution and maternal mortality ratio is a negative association but weak (-0.4092).

Table 10 Regression Result Using Maternal Mortality as Dependent Variable.

Source	SS	df	MS	Number of obs = 21		
Model	11.9978022	5	2.39956045	F(5, 15) = 29.41		
Residual	1.22383398	15	.081588932	Prob > F = 0.0000		
				R-squared = 0.9074		
				Adj R-squared = 0.8766		
Total	13.2216362	20	.661081811	Root MSE = .28564		

lnmmr	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
dinstdel	-.0019048	.0127335	-0.15	0.883	-.0290456	.0252359
lnpostnatalcare	-.0279648	.1712962	-0.16	0.872	-.393074	.3371444
lnantenatalcarecov	.7564799	.1256845	6.02	0.000	.4885898	1.02437
lnregisgenn	-.4241861	.1975189	-2.15	0.048	-.8451876	-.0031846
lnmidwives	.6881882	.2979287	2.31	0.036	.0531683	1.323208
_cons	3.159457	1.4842	2.13	0.050	-.00404	6.322954

From the regression result above, maternal mortality ratio was used as dependent variable and institutional delivery, antenatal care coverage, postnatal care coverage, registered nurses and midwife's distribution were used as independent variables. Institutional delivery was not statistically significant at all level (0.883) predicting maternal mortality, but institutional delivery has a negative influence on maternal mortality ratio. The dependent variable was log and institutional delivery was in the 1st difference level. The result indicates that 1 percent increase in institutional delivery is associated by $(0.019048 \times 100\%) = 1.9048\%$ decrease in the maternal mortality ratio. This means that as more pregnant women give birth in the hospital it helps reduce maternal mortality ratio in the country. Postnatal care coverage was not found to be statistically significant ($p=0.872$) but it has a negative influence on maternal mortality ratio in the country. The result shows that an increase in postnatal care is associated by $(0.0279648 \times 100\%) = 2.796\%$ decrease in maternal mortality ratio in the country. Antenatal care coverage was statistically significant ($p=0.000$) in predicting maternal mortality ratio in Ghana over the study period but the operational sign was not consistent with the study. The result indicates that 1 percent increase in antenatal care is associated by 0.7564199% increase in maternal mortality ratio in the country. This means that as

more and more pregnant women attend hospital during pregnancy increases maternal mortality. The antenatal care coverage was statistically significant but the sign was not in line with the researcher expectation. The number of registered nurses was also found to be statistically significant in influencing maternal mortality ratio. An increase in registered nurses in the country is associated by -0.4241861% decrease in maternal mortality ratio. The result tells that for maternal mortality to reduce by 0.424 the Government must employ more registered nurses in the country. Midwives was also reported a significant level in predicting maternal mortality in the country but it has a positive influence on maternal mortality ratio. This means that as the number of midwives increases in the various hospitals maternal mortality also increases as well. This finding is not consistent with the researcher expectation.

The R- Square also known as coefficient of determination was very strong. R – square determines the variations in the dependent variable (maternal mortality ratio) which is explain by all the independent variables such as institutional delivery, postnatal care coverage, antenatal care coverage, registered nurses and midwives. From the result the R- square was $(0.9074 \times 100) = 90.74\%$, this means that all the independent variables put together influencing maternal mortality ratio by 90.74%. All the independent variables jointly are statistically significant at 5% ($p=0.0001$) in predicting the maternal mortality ratio. It means the coefficient of determination is significant in influencing maternal mortality ratio.

CHAPTER FIVE

GENERAL DISCUSSION

5.1 Introduction

The chapter discusses the key findings of the study, consistency of the key findings with existing literature, explanations of the findings and its implications for policy and further research. The chapter concludes with a brief summary, discussion of limitations of the study and areas for future research.

The purpose of this study was to determine the impact of Ghana's free maternal care policy launched in July 2008, on maternal mortality in St. Francis Xavier Hospital in the Assin Fosu Municipality. Three research questions were explored in this study:

1. What is the trend of the coverage of antenatal care, postnatal care and births attended by skilled health care providers?
2. Has the implementation of the free maternal care policy influenced the trend of institutional maternal mortality?
3. What is the relationship between: Antenatal care coverage; Skilled attendant at birth; Postnatal care coverage; and institutional maternal mortality ratio pre and post policy implementation?

5.2 Key Findings of the Study

The findings of this study suggest that the free maternal care policy plays a significant role in maternal mortality reduction (mean pre and post policy institutional maternal mortality ratio 1132.68/100000LB and 311.58/100000LB respectively). Variables of the policy identified to have statistically significant impact on institutional maternal mortality, adjusting for other factors include Antenatal care (ANC) coverage ($p = 0.0001$) and distribution of registered general nurses ($p = 0.048$) and midwives ($p = 0.036$). Variables including institutional delivery coverage ($p = 0.883$) and postnatal care coverage ($p = 0.872$) after adjusting for other variables become statistically not significant.

These findings notwithstanding, it was realized that as more pregnant women give birth in the hospital attended to by skilled health care providers, it helps reduce institutional maternal mortality ratio in the country. As mothers attend the hospital for postnatal care services after delivery, there is a decrease in institutional maternal mortality in the Country. However, as more and more pregnant women attend antenatal care in the hospital during pregnancy, institutional maternal mortality turn to also increase. The antenatal care coverage was statistically significant but the sign was not in line with the researcher's expectation. The result tells that for maternal mortality to reduce by 0.424 the Government must employ more registered nurses in the country. Midwives also reported a significant level ($p = 0.036$) in predicting maternal mortality in the country.

5.3 Consistency with previous studies

5.3.1 Trends of antenatal / postnatal and skilled delivery coverage within the period of the study

All women need access to antenatal care services in pregnancy, skilled care in a health facility during childbirth and support in the early weeks after birth. The study findings show an unexpected decline (97.56 percent) in the post policy implementation antenatal care mean coverage compared to that of the pre policy mean coverage (mean coverage before policy 121.36 percent and mean coverage after policy implementation 23.80 percent). This finding is inconsistent with the prior expectation of the researcher as it was his believe that more pregnant women will attend hospital for antenatal care services after the implementation of the free maternal care policy which will eliminate the financial barriers to accessing antenatal care services. This results is not consistent with previous studies (Ameyaw, 2011; Lang, Mwanri and Temmerman, 2019) on the effect of free maternal care policy on maternal service utilization which found significant increase in antenatal care coverage after the free maternal care policy. However, Dalinjong, (2018)

in his study to explore factors affecting access in the form of affordability, availability, acceptability and quality of care under the NHIS policy, concluded that despite the policy, findings showed that out of pocket payments still existed and many women were significantly disadvantaged by the payments which could still be a barrier to accessing maternal care services in the hospital. Moreover, many health facilities including polyclinics, CHPS centres and private hospitals came into operation within the district in the period the free maternal care policy was implemented. These health facilities among other factors might have contributed to the huge decrease in the antenatal care coverage in the hospital after the policy as these health facilities were established to help in bringing health care to the door step of the clients and also ease the work pressure on St. Francis Xavier hospital which served as the only hospital for the three Assin districts for a long period of time.

Poor support during delivery leading to maternal deaths has become the blame game for most maternal deaths by families who have lost a member through childbearing. It is particularly important that all births are attended to in health facilities by skilled health professionals who are able to identify complications and act appropriately when need be (WHO, 2014). According to results from this study, skilled attendant at birth in St. Francis Xavier hospital increased by 8.78 percent after the free maternal care policy was implemented, an indication that more women now deliver at the hospital when the cost to childbirth was eliminated in the free maternal care policy (mean pre policy skilled delivery coverage = 31.57 percent; mean post policy skilled delivery coverage = 40.35 percent). This results is corroborated by Njuguna, Kamau and Muruka, (2017) who found a 26.8 percent increase in institutional deliveries after the inception of free delivery policy in County referral hospitals in Kenya. The findings is also in line with the 24-percentage increase in skilled delivery in Ghana after the free maternal care policy as recorded in the 2017 Ghana

Maternal Health Survey. Since the inception of the policy in 2008, there has been a steady increase in the number of facility based deliveries (Awuah *et al.*, 2013) which also confirmed the national trend of increasing use of health facilities for deliveries (GMHS, 2017). This is however inconsistent with the findings of Issah, (2017) who in her study to assess the effect of Ghana's free maternal care policy on maternal mortality at the Nsawam Government Hospital, found that, there was a decrease in the number of deliveries after the policy.

True to the expectation of the researcher and in line with the objective of the free maternal care policy, postnatal care coverage after the implementation of the policy increased by 26.28 percent with a mean coverage before and after the policy being 62.97 percent and 89.25 percent respectively. This increase in postnatal care coverage might be attributed to the free maternal care policy which eliminated all financial barriers to accessing postnatal care services in the hospital. This study finding was corroborated by a study conducted in the Nsawam Government hospital in 2017 to assess the effect of free maternal care policy on maternal mortality and found the policy contributing to an increase in postnatal care coverage (Issah, 2017). This study however was inconsistent with Twum *et al.*, (2018) in their study to evaluate if women covered under the free maternal care policy had a better chance of accessing maternal health care services in two districts in Ghana, where it found majority of the mothers covered under the policy not going for Postnatal care services after delivery.

Yearly Trend of Institutional Maternal Mortality Ratio within the period of the study

The study demonstrated a statistically significant decline in institutional maternal mortality ratio in the study site following the implementation of the free maternal care policy. While it is not possible to attribute causality, this finding appears to refute the assumption that the free delivery care would lead to increased institutional maternal mortality ratio as many mothers will likely want to take advantage of the free policy to

deliver more without thinking of the complications associated with pregnancy and childbirth. Secondly, the quality of delivery-related care could have suffered as a result of increased workload or reduced staff morale, particularly as the implementation of the exemption policy was not accompanied by a commensurate increase in human, material and financial resources (Lang'at and Mwanri, 2015; Tama *et al.*, 2018).

The findings in this study confirms the institutional maternal mortality ratio, report by the Ghana Health Service declined from 230/100000LB in 2007 to 170/100000LB in 2011. Similar study to assess the effect of Ghana's Free Maternal Health Care Policy on Maternal Mortality in Nsawam Government hospital (Issah, 2017) support the findings of this study. Her report showed a reduction in maternal mortality though there was an insignificant difference in the means of maternal mortality before and after the policy.

5.4 Estimation of the Relationship between the policy and institutional Maternal Mortality Ratio (IMMR)

This study highlights the extent to which the Free Maternal care Policy in Ghana is associated with institutional maternal mortality in St. Francis Xavier hospital. Similar studies have been conducted in Kumasi Metropolis (Quansah, 2013) and Nsawam Government hospital (Issah, 2017) with both studies demonstrating non-statistically significant impact of the policy on reducing maternal mortality. Other writers have identified an increase in antenatal care (ANC) coverage to be positively associated with increase in use of skilled care during birth (McDonagh, 1996) where use of skilled care during birth has been linked with reduction in the risk of maternal and perinatal morbidity and mortality (Jacobs *et al.*, 2012; Chou *et al.*, 2015) and improved perinatal survival (McDonagh, 1996). This study assessed the following Variables; antenatal care coverage, coverage of skilled deliveries attended to in the hospital, postnatal care coverage including the distribution of nurses and midwives in the hospital over the study period (from 1997 to 2018). The results presented in the study shows

that the Free Maternal care Policy is associated with an increase in number of health facility deliveries as well as women who were attended to by a skilled care provider in the hospital at least once after delivery. The policy however was associated with a decline in antenatal care coverage.

The study demonstrated that institutional delivery was statistically insignificant at all level (0.883) predicting maternal mortality, but it however had a negative influence on maternal mortality ratio. This result indicates that a 1 percent increase in institutional delivery is associated with 1.90 percent decrease in institutional maternal mortality ratio. This means that as more pregnant women give birth in the hospital attended to by skilled health care providers, it helps reduce maternal mortality ratio in the country. This result corroborates the findings of Steele *et al.*, (2018) in a retrospective review of charts on deliveries before and after removal of user fees at St. Joseph's hospital in Roma, Lesotho in which they found a 49 percent increase in skilled delivery and a subsequent decrease in maternal mortality. This is also consistent with WHO and UNICEF (2015) which found over three folds increase in the proportion of deliveries attended to by skilled health care provider resulting in a 78-percentage decline in maternal mortality in Rwanda after access to institutional deliveries was expanded between 1990 and 2015. A previous study (Gabrysch *et al.*, 2019), however emphasized that increasing health facility births dose not necessarily translate into less mortality unless quality of care is assured and the gap between contact and content (Aguirre, Ziqi and Zaka, 2017) is closed.

Postnatal care helps prevent complications after childbirth. More than 4 in 5 women (84 percent) age 15-49 with a live birth or stillbirth in Ghana received a postnatal check within two days of delivery. Women who delivered in a health facility are twice as likely

to have received a postnatal check within two days of delivery than women who delivered elsewhere (95% versus 45%) (GSS, 2017).

From this study result, Postnatal care coverage was found to be statistically insignificant (0.872) but was found to have a negative association or influence on maternal mortality ratio as a percentage increase in postnatal care coverage is associated by 0.028 percent decrease in maternal mortality ratio. This study finding is consistent with previous studies that found more than 60 percent of maternal deaths occurring in the postnatal period (Li *et al.*, 1996) and a survey of women delivering in rural homes identified a 43 percent rate of postpartum morbidity (Bang *et al.*, 2004). Most postpartum deaths occur the first day after birth and their management falls within the skilled attendance or emergency care strategies. Postpartum home visits have been suggested (Bang *et al.*, 2004 but said to be a subject that needs further research by others (Li *et al.*, 1996).

Lack of antenatal care and failure to give birth in health facility are likely to delay early detection of pregnancy related complications during pregnancy and delivery, which in turn are likely to increase the risk of maternal mortality (Berhan and Berhan, 2014).

The implication is that the generally low antenatal care coverage in the study might have contributed to the high maternal mortality as previous reports showed (Hogan *et al.*, 2010) . Other studies have also shown about 10-to 17-fold increased maternal mortality among women with no antenatal care (Garenne *et al.*, 1997; Igberase and Ebeigbe, 2007). Antenatal care coverage was found to be statistically significant (0.000) in predicting maternal mortality ratio in Ghana over the study period but the operational sign was not consistent with the study. The result indicates that 1 percent increase in antenatal care coverage is associated by 0.756 percent increase in maternal mortality. This means that as more and more pregnant women attend antenatal care in the hospital

during pregnancy, maternal mortality also increases. The antenatal care coverage was statistically significant but the sign was not in line with the researcher expectation.

Health facility staffing have a significant impact on maternal outcomes (Gerein, Green and Pearson, 2006). Health worker factors are part of the major contributors to maternal death (Thorsen *et al.*, 2014) and significant contributors to poor outcomes for labouring women. Lack of sufficient skilled health care personnel plays a dual role in the phases of delay. Firstly, delays in receiving timely and appropriate care on reaching a health facility can be directly caused by having too few skilled health personnel available to carry out adequate care (Knight, Self and Kennedy, 2013). Shortages of health professionals reduce the number of facilities equipped to offer emergency obstetric care, and are significantly related to quality of care and maternal mortality rates. The results of this study indicate that for maternal mortality to reduce by 0.424 the Government must employ more registered nurses in the country. Midwives was also reported a significant level ($p = 0.036$) in predicting maternal mortality in the country but it has a positive influence on maternal mortality ratio. This means that as the number of midwives increases in the various hospitals maternal mortality also increases as well. This finding is not consistent with the prior expectation of the researcher because midwives are specially trained to attend to pregnant women, assist pregnant women at term to deliver safely and attend to the mother and the newborn after birth. In all of the stages, the midwife is equipped with the knowledge and skills to identify and avert or refer any complications arising appropriately. So, it is expected that as the numbers of midwives increase in the hospitals, the number of maternal mortalities will subsequently reduce. The coefficient of determination (R-Square) was very strong

(90.74 percent). All the independent variables jointly are statistically significant at 5% (0.000) in predicting the maternal mortality ratio. This means the coefficient of determination is significant in influencing maternal mortality ratio.

KNUST



CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter presents the study findings, conclusion and recommendation, study contribution to knowledge and areas for further studies.

6.2 Findings

6.3 1 Summary of pre- and post- descriptive statistics

- From the findings, institutional deliveries and postnatal care saw significant improvement with the implementation of the free maternal care policy.
- Antenatal care however showed a decline with the implementation of the free maternal care policy. This finding however could be as a result of the establishment of many other facilities including CHPS compounds during the post policy implementation period to help ease the work pressure on the hospital.

6.3.2 Trend of institutional maternal mortality pre and post policy implementation

Institutional maternal mortality saw a reduction with the implementation of the free maternal care policy. This finding may be attributed to the impact of the free maternal care policy because, though the institutional maternal mortality was decrease before the policy, the level of reduction became more significant during the post policy implementation period.

6.3.3 The relationship between ante- and post-natal care coverage, institutional delivery and institutional maternal mortality ratio

On the relationship between the study variables, it was found that an increase in institutional deliveries is likely to reduce institutional maternal mortality ratio by 1.9%.

Whereas an increase in postnatal care coverage is likely to result in a reduction in institutional maternal mortality ratio by 0.03%, antenatal care coverage is associated with a 0.76% increase in institutional maternal mortality. Increase in the number of registered general nurses was also found to be associated by 0.42% decrease in institutional maternal mortality.

63 Conclusion

- From the study, institutional maternal mortality ratio has generally seen a decline after the implementation of the free maternal care policy. The study also realized that the decrease in institutional maternal mortality was also associated with an increase in institutional deliveries and postnatal care coverage after the free maternal care policy was implemented.
- This study associates itself with other studies which found that skilled attendance at delivery and postnatal care services to mothers after birth are crucial in reducing pregnancy and child birth related deaths and so any barriers (especially financial) should be removed to allow for mothers to access maternal care services during and after child birth.

6.4 Recommendations

The free maternal care policy has many prospects for the individual, the health system and the Nation as a whole and should be maintained. However, the researcher has the following recommendations to make with regards to findings of this study:

6.4.1 Ghana Health Service

1. The free maternal care policy should be strengthened and extended to include post-partum family planning services.

2. More skilled health care professionals (Doctors, Midwives and Registered general Nurses) should be employed and health facilities equipped to be able to stand up to the growing demands brought about by the free maternal care policy initiative.

6.4.2 Recommendation for health facility

1. A plan should be implemented in the hospital to improve medical record system to be inline with the Ghana Health Service reporting system.

6.4.3 Recommendations for future research

1. Further studies could be conducted on the impact of the free maternal care policy initiative using mix method. Also, a study on possible barriers to accessing antenatal care services in St. Francis Xavier Hospital could be conducted to find reasons to the declining antenatal care coverage recorded by this study.

REFERENCES

- Aguirre, L. C., Ziqi, M. and Zaka, N. (2017) „Gap between contact and content in maternal and newborn care : An analysis of data from 20 countries in sub – Saharan Africa“, 7(2), pp. 1–8. doi: 10.7189/jogh.07.020501.
- Alkema, L. *et al.* (2016) „Global , regional , and national levels and trends in maternal mortality between 1990 and 2015 , with scenario-based projections to 2030 : a systematic analysis by the UN Maternal Mortality Estimation Inter-Agency Group“, *The Lancet*. World Health Organization. Published by Elsevier Ltd/Inc/BV. All rights reserved., 387(10017), pp. 462–474. doi: 10.1016/S01406736(15)00838-7.
- Ameh, C. *et al.* (2012) „Status of Emergency Obstetric Care in Six Developing Countries Five Years before the MDG Targets for Maternal and Newborn Health“, *PLoS ONE*, 7(12), pp. 9–15. doi: 10.1371/journal.pone.0049938.
- Ameyaw, E. A. (2011) „an Assessment of the Effect of the Free Maternal Care Policy on the Utilisation of Maternal Care Services in the New Juaben Municipality“, pp. 1–105. Available at: [dspace.knust.edu.gh/bitstream/123456789/.../ Emmanuel Asante Ameyaw.pdf](https://dspace.knust.edu.gh/bitstream/123456789/.../EmmanuelAsanteAmeyaw.pdf).
- Anafi, P. *et al.* (2018) „Implementation of Fee-Free Maternal Health-Care Policy in Ghana: Perspectives of Users of Antenatal and Delivery Care Services From Public Health-Care Facilities in Accra“, *International Quarterly of Community Health Education*, 38(4), pp. 259–267. doi: 10.1177/0272684X18763378.
- Anthony, Q. (2013) *The Impacts Of Free Maternal Delivery Policy On Maternal Mortality In Ghana; A Case Study Of Kumasi Metropolis*.
- Appiah-Denkyira, Ebenezer; Herbst, H. Christopher; Soucat, Agnes; Lemiere, Christophe; Saleh, K. (2013) *Toward Interventions in Human Resources for Health in Ghana; Evidence for Health Workforce Planning and Results*. Washington DC: The World Bank.
- Berhan, Y. and Berhan, A. (2014) „Antenatal care as a means of increasing birth in the health facility and reducing maternal mortality: a systematic review“, *Ethiopian journal of health sciences*, 24(6), pp. 93–104. doi: 10.4314/ejhs.v24i0.9S.
- Calhoun, L. M. *et al.* (2018) „The Effect of the Removal of User Fees for Delivery at Public Health Facilities on Institutional Delivery in Urban Kenya“, *Maternal and Child Health Journal*. Springer US, 22(3), pp. 409–418. doi:

10.1007/s10995-017-2408-7.

- Chou, D. *et al.* (2015) „Ending preventable maternal and newborn mortality and stillbirths“, *BMJ (Online)*. BMJ Publishing Group, 351, pp. 19–22. doi: 10.1136/bmj.h4255.
- Dalinjong, P. A. (2018) *Access to maternal health services under the free maternal health policy in the Kassena-Nankana municipality of Northern Ghana*.
- Dieleman, M. and Harnmeijer, J. W. (2006) „Improving health worker performance : in search of promising practices. KIT- Royal Tropical Institute The Netherlands“, (September).
- Dzakpasu, S., Powell-Jackson, T. and Campbell, O. M. R. (2014) „Impact of user fees on maternal health service utilization and related health outcomes: A systematic review“, *Health Policy and Planning*, 29(2), pp. 137–150. doi: 10.1093/heapol/czs142.
- Eric, Awuah; Josef, Decosas; Kenneth, Ofosu-Barko; Marc, Reveillon; Marta, M. (2013) „Evaluation of the Free Maternal Health Care Initiative in Ghana“, *HERA and Health Partners Ghana*, 1.
- Gabrysch, S. *et al.* (2019) „Articles Does facility birth reduce maternal and perinatal mortality in Brong Ahafo , Ghana ? A secondary analysis using data on 119 244 pregnancies from two cluster-randomised controlled trials“, *The Lancet Global Health*. The Author(s). Published by Elsevier Ltd. This is an Open Access article under the CC BY 4.0 license, 7(8), pp. e1074–e1087. doi: 10.1016/S2214-109X(19)30165-2.
- Garenne, M. *et al.* (1997) „Risk factors for maternal mortality: a case-control study in Dakar hospitals (Senegal).“, *African journal of reproductive health*, 1(1), pp. 14–24. doi: 10.2307/3583271.
- Gerein, N., Green, A. and Pearson, S. (2006) „The Implications of Shortages of Health Professionals for Maternal Health in Sub-Saharan Africa“, *Reproductive Health Matters*. Elsevier Ltd, pp. 40–50. doi: 10.1016/S0968-8080(06)27225-2.
- Grob, U. and Kerstin, W. (2014) *Maternal-Child Health Interdisciplinary Aspects within the perspective of Global Health*.
- GSS (2017) *2017 Maternal Health Survey Key Findings Ghana*. Available at: <https://dhsprogram.com/pubs/pdf/SR251/SR251.pdf> (Accessed: 26 June 2019).

- Gülmezoglu, A. M. *et al.* (2013) „Moving beyond essential interventions for reduction of maternal mortality (the WHO Multicountry Survey on Maternal and Newborn Health): a cross-sectional study“, *The Lancet*. doi: 10.1016/s01406736(13)60686-8.
- Henry Victor, Doctor; Emma, Radovich; Lenka, B. (2019) „Time trends in facilitybased and private-sector childbirth care : analysis of Demographic and Health Surveys from 25 sub-Saharan African countries from 2000 to 2016“, 9(2), pp. 1–12. doi: 10.7189/jogh.09.020406.
- Hunt, P. and Mesquita, J. B. D. E. (no date) „REDUCING MATERNAL“.
- Igberase, G. O. and Ebeigbe, P. N. (2007) „Maternal mortality in a rural referral hospital in the Niger Delta, Nigeria.“, *Journal of obstetrics and gynaecology : the journal of the Institute of Obstetrics and Gynaecology*, 27(3), pp. 275–8. doi: 10.1080/01443610701213687.
- Ir, P. and Bigdeli, M. (2009) „Removal of user fees and universal health-care coverage“, *The Lancet*. Elsevier Ltd, 374(9690), p. 608. doi: 10.1016/s01406736(09)61515-4.
- Jacobs, B. *et al.* (2012) „Addressing access barriers to health services: An analytical framework for selecting appropriate interventions in low-income Asian countries“, *Health Policy and Planning*, 27(4), pp. 288–300. doi: 10.1093/heapol/czr038.
- James, C. D. *et al.* (2006) „To Retain or Remove User Fees?“, *Applied Health Economics and Health Policy*. Springer International Publishing, 5(3), pp. 137– 153. doi: 10.2165/00148365-200605030-00001.
- Johri, M. *et al.* (2014) „Estimation of maternal and child mortality one year after userfee elimination: an impact evaluation and modelling study in Burkina Faso“, *Bulletin of the World Health Organization*, 92(10), pp. 706–715. doi: 10.2471/blt.13.130609.
- Kes, A. *et al.* (2015) *The economic burden of maternal mortality on households: evidence from three sub-counties in rural western Kenya*. doi: 10.1186/17424755-12-S1-S3.
- Knight, H. E., Self, A. and Kennedy, S. H. (2013) „Why Are Women Dying When They Reach Hospital on Time? A Systematic Review of the “Third Delay”“, *PLoS ONE*, 8(5). doi: 10.1371/journal.pone.0063846.

- Lagarde, M. and Palmer, N. (2011) „The impact of user fees on access to health services in low- and middle-income countries“, *Cochrane Database of Systematic Reviews*. John Wiley & Sons, Ltd, (4). doi: 10.1002/14651858.CD009094.
- Langat, E. and Mwanri, L. (2015) „Healthcare service providers“ and facility administrators“ perspectives of the free maternal healthcare services policy in Malindi District, Kenya: A qualitative study“, *Reproductive Health*. BioMed Central Ltd., 12(1). doi: 10.1186/s12978-015-0048-1.
- Lang, E., Mwanri, L. and Temmerman, M. (2019) „Effects of implementing free maternity service policy in Kenya : an interrupted time series analysis“. *BMC Health Services Research*, pp. 1–10.
- Leone, T. *et al.* (2016a) „Financial accessibility and user fee reforms for maternal healthcare in five sub-Saharan countries: a quasi-experimental analysis“, *BMJ Open*, 6(1), p. e009692. doi: 10.1136/bmjopen-2015-009692.
- Leone, T. *et al.* (2016b) „Financial accessibility and user fee reforms for maternal healthcare in five sub-Saharan countries: A quasi-experimental analysis“, *BMJ Open*, 6(1), pp. 1–8. doi: 10.1136/bmjopen-2015-009692.
- Mahmood, T. *et al.* (2010) „Models of care in maternity services“, *Models of Care in Maternity Services*, (Imci), pp. 1–224. doi: 10.1017/CBO9781107478336.
- McDonagh, M. (1996) „Is antenatal care effective in reducing maternal morbidity and mortality?“, *Health Policy and Planning*, pp. 1–15. doi: 10.1093/heapol/11.1.1.
- McPake, B. *et al.* (2013) *Removing financial barriers to access reproductive, maternal and newborn health services: the challenges and policy implications for human resources for health*. doi: 10.1186/1478-4491-11-46.
- McPake, B. *et al.* (2013) „Removing financial barriers to access reproductive, maternal and newborn health services: the challenges and policy implications for human resources for health“, *Human Resources for Health*. BioMed Central, 11(1), p. 46. doi: 10.1186/1478-4491-11-46.
- MoH (2016) „Acceleration Framework (MAF)“.
- MOH (2014) „2014-2017-Health-sector-medium-term-dev-plan.pdf“.
- Moran, A. C. *et al.* (2016) „A common monitoring framework for ending preventable maternal mortality, 2015–2030: phase I of a multi-step process“, *BMC Pregnancy and Childbirth*, 16(1), p. 250. doi: 10.1186/s12884-016-1035-4.

- Moyer, C. A., Adanu, R. M. and Engmann, C. M. (2013) „The relationship between facility-based delivery and maternal and neonatal mortality in Sub-Saharan Africa“, *International Journal of Gynecology and Obstetrics*, 122(3), pp. 263– 265. doi: 10.1016/j.ijgo.2013.04.010.
- Msc, H. *et al.* (2010) „Maternal mortality for 181 countries, 1980-2008: a systematic analysis of progress towards Millennium Development Goal 5“, *The Lancet*, 375, pp. 1609–1623. doi: 10.1016/S0140.
- Najman, J. *et al.* (1980) „THE CONCEPTUAL BASIS OF COMMUNITY HEALTH PROGRAMMES “:, (1), pp. 27–31.
- Njuguna, J., Kamau, N. and Muruka, C. (2017) „Impact of free delivery policy on utilization of maternal health services in county referral hospitals in Kenya“. *BMC Health Services Research*, pp. 1–6. doi: 10.1186/s12913-017-2376-z.
- Ramatu Issah (2017) *Effect of free maternal care policy on maternal mortality*.
- Robert, E. and Ridde, V. (2013) „Global health actors no longer in favor of user fees: a documentary study.“, *Globalization and health*. BioMed Central, 9, p. 29. doi: 10.1186/1744-8603-9-29.
- Saleh, K. and Bank, W. (2017) *The Health Sector in Ghana : A Comprehensive Assessment*. doi: 10.1596/978-0-8213-9599-8.
- Steele, S. J. *et al.* (2018) „Removal of user fees and system strengthening improves access to maternity care, reducing neonatal mortality in a district hospital in Lesotho“. doi: 10.1111/tmi.13175.
- Tama, E. *et al.* (2018) „Examining the implementation of the free maternity services policy in Kenya: A mixed methods process evaluation“, *International Journal of Health Policy and Management*. Kerman University of Medical Sciences, 7(7), pp. 603–613. doi: 10.15171/ijhpm.2017.135.
- Thorsen, V. C. *et al.* (2014) „Components of Maternal Healthcare Delivery System Contributing to Maternal Deaths in Malawi: A Descriptive Cross-Sectional Study“, 18(March), pp. 16–26.
- Twum, P. *et al.* (2018) „Effectiveness of a free maternal healthcare programme under the National Health Insurance Scheme on skilled care: evidence from a cross-sectional study in two districts in Ghana“, pp. 1–8. doi: 10.1136/bmjopen-2018022614.

- UN (2018) *High-level segment High-level political forum on sustainable development, convened under the auspices of the Economic and Social Council Economic and environmental questions: sustainable development Progress towards the Sustainable Development Goals*. Available at: <http://unstats.un.org/sdgs>. (Accessed: 16 December 2018).
- WHO, UNICEF, W. B. G. and the U. N. P. D. (2015) *Trends in Maternal Mortality: 1990 to 2015*. Geneva. Available at: https://apps.who.int/iris/bitstream/handle/10665/194254/9789241565141_eng.pdf;jsessionid=3B9EDCB327352EBE56F85308F19B5B0D?sequence=1 (Accessed: 26 January 2019).
- WHO (2013) „Postnatal care of the mother and newborn 2013“, *World Health Organization*, pp. 1–72. doi: 978 92 4 150664 9.
- WHO (2014) *Maternal mortality Progress towards achieving the fifth Millennium Development Goal*. Geneva. Available at: http://apps.who.int/iris/bitstream/handle/10665/112318/WHO_RHR_14.06_eng.pdf;jsessionid=E06BBF030B8B257867CBF032D5BEC59F?sequence=1 (Accessed: 21 December 2018).
- WHO (2015a) *Strategies toward ending preventable maternal mortality (EPMM)*. Geneva. Available at: www.who.int.
- WHO (2015b) *TRACKING UNIVERSAL HEALTH COVERAGE*. Geneva. Available at: https://apps.who.int/iris/bitstream/handle/10665/174536/9789241564977_eng.pdf?sequence=1 (Accessed: 2 February 2019).
- WHO (2016) „WHO recommendations on antenatal care for a positive pregnancy experience“, *World Health Organization*, p. 172. Available at: <http://www.who.int> (Accessed: 11 July 2019).
- WHO (2018a) „WHO | Skilled attendants at birth“, *WHO*. World Health Organization.
- WHO (2018b) *World health statistics 2018: monitoring health for the SDGs, sustainable development goals*. Geneva: WHO.
- WHO (2019) „WHO Maternal and reproductive health“, *WHO*. World Health Organization. Maternal mortality ratio (per 100 000 live births)“ (2014) *WHO*. World Health Organization. Available at: <https://www.who.int/healthinfo/statistics/indmaternalmortality/en/> (Accessed: 16 December 2018).
- Witter, S. (2010) *Mapping user fees for health care in high-mortality countries*:

evidence from a recent survey. Available at: www.pmnch.org (Accessed: 29 June 2019).

Ye, F. *et al.* (2012) „The immediate economic impact of maternal deaths on rural chinese households“, *PLoS ONE*, 7(6). doi: 10.1371/journal.pone.0038467.

APPENDIX 1

Raw figures of Ante- and Post- natal care registrants, Institutional deliveries, Live births, Maternal deaths and Expected pregnancies from 1997 to 2018.

Years	Number of births deaths	Live care registrants	Antenatal care registrants	Postnatal Delivery in the	Institutional Pregnancies the	Expected Population Municipality	Total of maternal Municipality
1997	13	1182	8542	716	1206	4388	109699
1998	20	1202	9017	1058	1432	4519	112975
1999	33	1402	9345	1406	1704	4654	116349
2000	19	1321	7913	3955	1583	4789	119723
2001	19	1326	7913	3955	1583	4928	123195
2002	13	1028	7760	1440	1190	5071	126768
2003	13	1294	6628	1372	1294	5218	130444
2004	11	1955	2222	2117	2039	5369	134227
2005	9	2197	1949	8553	2197	5525	138120
2006	11	1472	1589	6099	1728	5685	142126
2007	8	1660	1728	6068	1743	5850	146248
2008	9	2141	1965	7097	2221	6020	150489
2009	15	2782	2145	7331	2666	6234	155853
2010	9	2717	2007	6718	2717	6454	161341
2011	15	2935	1996	5084	3002	6641	166020
2012	9	2944	1706	5854	3107	6833	170835
2013	5	2961	1465	5272	2943	7032	175789
2014	7	3037	1367	4774	3039	7235	180887
2015	4	3019	1334	5523	3003	7445	186133
2016	9	2611	1394	7773	2671	7661	191530
2017	5	2822	1378	7167	2765	7883	197084
2018	8	3006	1234	5702	3008	8112	202799

(Source: St. Francis Xavier Hospital Biostatistics Unit)

APPENDIX 2

Staff Distribution from 1997 to 2018

Year	Doctors	Midwives	Registered General Nurses	Total Staff
1997	4	14	28	103
1998	5	14	28	104
1999	5	14	28	104
2000	4	14	28	112
2001	4	14	28	123
2002	4	13	27	135
2003	7	13	27	128
2004	7	13	22	123
2005	7	17	22	163
2006	6	17	22	168
2007	7	17	30	173
2008	7	17	41	185
2009	7	21	39	212
2010	7	21	45	219
2011	7	21	64	244
2012	8	11	64	224
2013	8	11	49	248
2014	9	14	61	286
2015	10	17	71	281
2016	13	27	96	323
2017	16	28	112	346
2018	11	30	105	351

(Source: St. Francis Xavier Hospital Biostatistics Unit)

INTRODUCTORY LETTER



NATIONAL CATHOLIC HEALTH SERVICES
(ARCHDIOCESE OF CAPE COAST)



Sisters
Hospitallers
ST FRANCIS XAVIER HOSPITAL

Our Ref:

Your Ref:

7th June, 2019

HEAD OF DEPARTMENT

DEPT. OF POPULATION, FAMILY & REPRODUCTIVE HEALTH

KNUST

Dear Sir,

RE: LETTER OF INTRODUCTION- FIDELIS Y. KON-ANGNA

I acknowledge receipt of your letter dated 6th May, 2019 referenced; KNUST-SPH/IRAR/13 on the above subject.

On behalf of Management of the institution, I assure you that he will be given the needed support to assist him complete his research work successfully.

Thank you.

Yours sincerely

DR. BERNARD BREWU

(MEDICAL DIRECTOR)

FOR: HOSPITAL MANAGEMENT

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APPROVAL LETTER



KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
COLLEGE OF HEALTH SCIENCES

SCHOOL OF MEDICAL SCIENCES / KOMFO ANOKYE TEACHING HOSPITAL
COMMITTEE ON HUMAN RESEARCH, PUBLICATION AND ETHICS



Our Ref: CHRPE/AP/392/19

17th June, 2019.

Mr. Fidelis Yelsong Kon-Angna
Department of Population, Family
and Reproductive Health
School of Public Health
KNUST-KUMASI

Dear Sir,

LETTER OF APPROVAL

Protocol Title: *"Assessing the Impact of Ghana's Free Maternal Care Policy on Maternal Mortality: A Retrospective Study in St. Francis Xavier Hospital."*

Proposed Site: *St. Francis Xavier Hospital, Assin Fosu, Assin Central Municipality.*

Sponsor: *Principal Investigator.*

Your submission to the Committee on Human Research, Publications and Ethics on the above-named protocol refers.

The Committee reviewed the following documents:

- A notification letter of 7th June, 2019 from the St. Francis Xavier Hospital (study site) indicating approval for the conduct of the study at the Hospital.
- A Completed CHRPE Application Form.
- Research Protocol.

The Committee has considered the ethical merit of your submission and approved the protocol. The approval is for a fixed period of one year, beginning 17th June, 2019 to 16th June, 2020 renewable thereafter. The Committee may however, suspend or withdraw ethical approval at any time if your study is found to contravene the approved protocol.

Data gathered for the study should be used for the approved purposes only. Permission should be sought from the Committee if any amendment to the protocol or use, other than submitted, is made of your research data.

The Committee should be notified of the actual start date of the project and would expect a report on your study, annually or at the close of the project, whichever one comes first. It should also be informed of any publication arising from the study.

Thank you, Sir, for your application.

Yours faithfully,

Osomfo Prof. Sir J. W. Acheampong MD, FWACP
Chairman