

THE IMPACTS OF FREE MATERNAL DELIVERY POLICY ON MATERNAL MORTALITY IN GHANA; A CASE STUDY OF KUMASI METROPOLIS.

By

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DECLARATION

I hereby declare that this submission is my own work towards the MA and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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ABSTRACT

Maternal mortality is a prevalent problem particularly in developing countries including Ghana and as a result, the United Nations has set a goal on maternal health to be achieved by all member countries by 2015 known as Millennium Development Goal 5 which aims to achieve a seventy-five per cent reduction in maternal mortality between 1990 and 2015 levels and also increase access to reproductive health.

It is therefore imperative in this research to find the impacts of the Free Maternal Healthcare Policy implemented by the Government of Ghana in 2008 that provides free antenatal care, delivery services and postnatal care to expectant mothers aimed at curtailing the high maternal mortality in the country and achieve the United Nation's Millennium Development Goal 5 by the year 2015.

Kumasi Metropolis is used as the case study area with secondary data collected from records of health facilities in the metropolis and running regression models for key variables that were studied including antenatal and postnatal care in the pre-policy and post-policy periods. The results are presented and analysis made.

The study revealed that antenatal care related negatively with maternal mortality whiles postnatal care related positively to maternal mortality in the pre-policy period however, the two variables are not statistically significant on impacting on maternal mortality in the pre-policy period. In the post-policy period, both variables relate positively with maternal mortality, however only antenatal attendance has a statistically significant impact on maternal mortality. The study revealed that there are inherent challenges in the operation of the Free Maternal Healthcare Policy to cause a statistically

significant impact to curtail maternal mortality thus recommendations are made to concerned agencies to be implemented to enable the country achieve it Millennium development Goal 5 by 2015.

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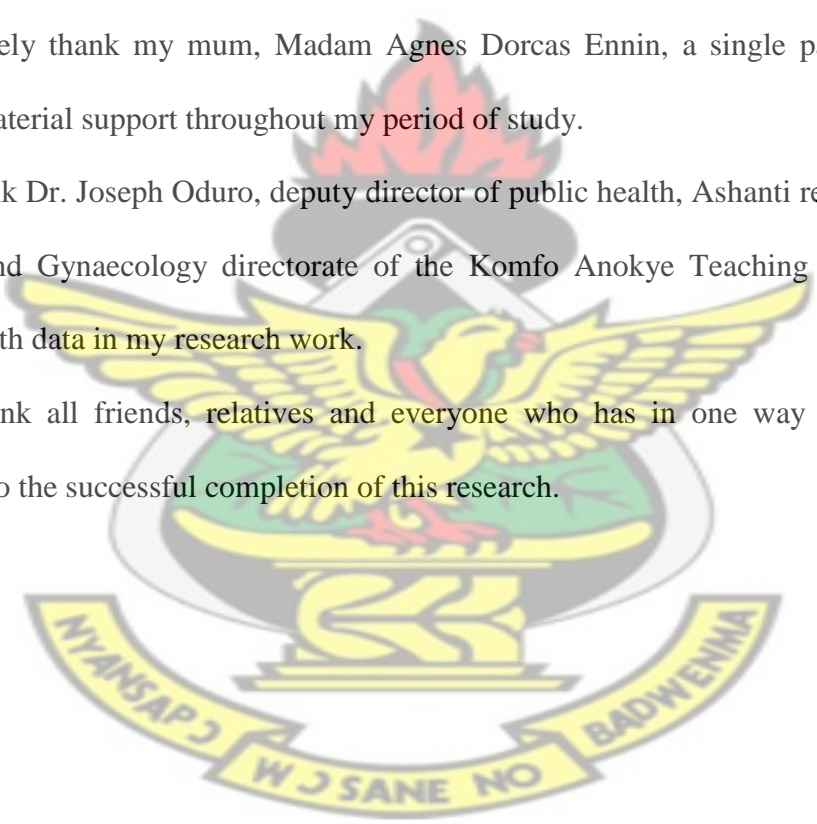


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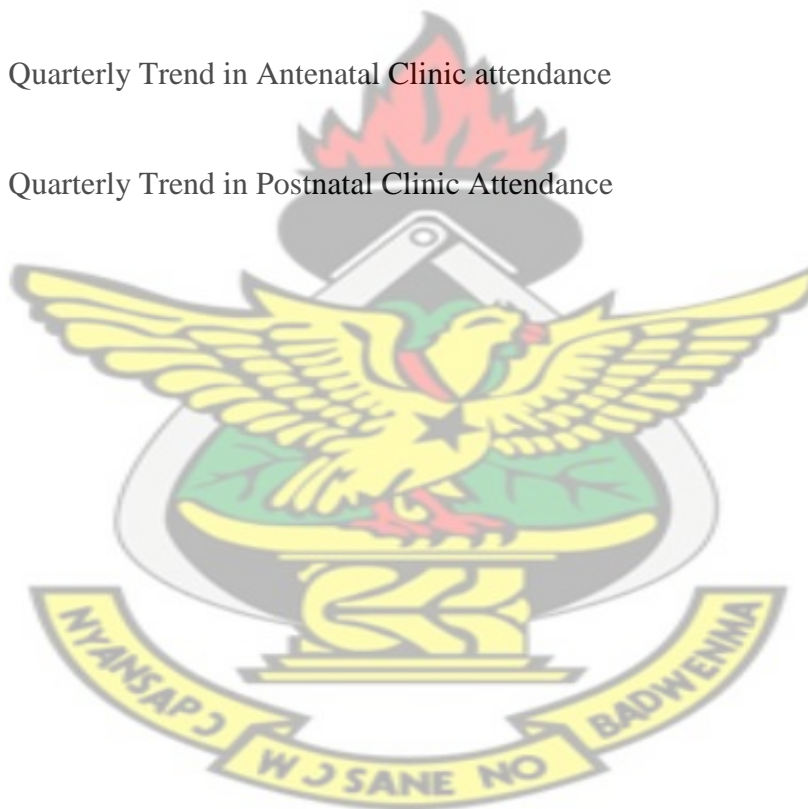


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GLOSSARY

| | |
|------|--|
| AIDS | -Acquired Immune Deficiency Syndrome |
| ANC | -Antenatal Care |
| BMC | - Budget Management Centre |
| CHC | -Community Health Compound |
| CHOs | - Community Health Officers |
| CHPS | - Community-based Health Planning and Services |
| CIA | -Central Intelligence Agency |
| DHS | -Demographic and Health Survey |
| FP | - Family Planning |
| FMDP | - Free Maternal Delivery Policy |
| GDP | -Gross Domestic Product |
| GDHS | -Ghana Demographic and Health Survey |
| GHS | -Ghana Health Services |
| GoG | - Government of Ghana |

| | |
|------|--|
| HIPC | - Highly Indebted Poor Countries |
| HIV | -Human Immune Virus |
| HIRD | -High Impact Rapid Delivery |
| ICD | - International statistical classification of diseases |
| ICPD | - International Conference on Population and Development |
| KATH | -Komfo Anokye Teaching Hospital |
| MDG | - Millenium Development Goals |
| MICS | -Multiple Indicator Cluster Survey |
| MoH | -Ministry of Health |
| MM | -Maternal Mortality |
| MMR | - Maternal Mortality Ratio |
| NHIS | - National Health Insurance Scheme |
| NGOs | -Non Governmental Organisations |
| NHIL | -National Health Insurance Levy |
| OECD | -Organisation for Economic Cooperation and Development |
| PNC | -Postnatal Care |

| | |
|--------|---|
| RLNP | -Regenerative Lifestyle and Nutrition Program |
| SD | -Supervised Delivery |
| SM | -Safe Motherhood Initiative |
| SM | -Safe Motherhood Strategy |
| SSNIT | - Social Security and National Insurance Trust |
| STIs | -Sexually Transmitted Infections |
| SWAp | -Sector Wide Approach |
| TBAs | -Traditional Birth Attendants |
| UN | - United Nations |
| UNICEF | - United Nations Childrens Fund |
| UNFPA | -United Nations Population Fund |
| UK | -United Kingdom |
| USAID | -United States of America International Development |
| WB | -World Bank |
| WHO | - World Health Orgarnisation |

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

In the International statistical classification of diseases and related health problems, 10th revision (ICD-10), World Health Organization (WHO) defines maternal death as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes. (<http://www.who.int.org/>)

Maternal mortality is a prevalent problem particularly in developing countries including Ghana. This has given rise to the United Nations agency for health, World Health Organization setting a millennium development goal on achieving maternal health by 2015. The two targets for assessing this Millennium Development Goal (MDG) 5 are reducing the maternal mortality ratio (MMR) by three quarters between 1990 and 2015 levels and achieving universal access to reproductive health by 2015.

Ghana is a member of the World Health Organization and thus some policy interventions aimed at curtailing this menace and achieving the goal on maternal health has been implemented and hence in Ghana the target is to reduce institutional maternal mortality rates from 214 per 100,000 live births in 1990 to 54 per 100,000 live births by 2015. Ghana has been ranked 41st on world maternal mortality rate index, according to CIA World Fact book.

The World Health Organization and the United Nations Children's Fund (UNICEF) estimated Ghana's maternal mortality ratio in 1995 at 586 per 100,000 and 740 per 100,000 live births respectively. Other surveys by World Health Organization, United Nations Children's Fund and the United Nations Populations Fund in the year 2000 put the figure at 540 per 100,000 live births while a nationwide maternal health survey of 2007 in Ghana put the rate at 580 per 100,000 live births. (Source: Ghana maternal health survey, 2007)

Available information also indicates that the problem of maternal mortality is high in poor rural areas because health facilities in poor rural areas often are beyond the reach of the formal health system. The most common clinical causes of maternal death during conception and delivery globally includes; hemorrhage, obstructed labour, anaemia, abortion, hypertensive disorders and others. Globally according to World Health Organization (WHO), about 80 per cent of maternal deaths are due to these direct causes. Among the indirect causes of maternal death (20 per cent) are diseases that complicate or are aggravated by pregnancy, such as malaria, anaemia and HIV. Women also die because of poor health at conception and a lack of adequate care needed for the healthy outcome of the pregnancy for themselves and their babies. Evidence also shows that the inaccessibility to skilled care delivery, inadequate health infrastructure and personnel and social phenomenon such as diet, social behaviour among others are also causes of maternal deaths. (Source: <http://www.who.int/>)

There have been greater political commitments towards reducing maternal deaths in Ghana. In 1998, the government of Ghana launched the Safe Motherhood Programme,

the intervention areas of which included free antenatal care for all pregnant women, emergency obstetric care for all pregnant women among others.

The Government of Ghana again in 2003 implemented a Free Maternal Delivery Policy specifically to curtail the high maternal mortality rates in Ghana. The aim of the Free Maternal Delivery Policy is to eliminate all financial barriers to pregnant women using maternity services from accredited private, faith based health facilities and all public health facilities in the country thus improving uptake of maternity services and quality as well as geographic access to delivery care in health facilities and therefore helping to reduce the high maternal deaths recorded in the country as a result of financial and geographic barriers.

The Government of Ghana absorbed the cost of each delivery service including normal deliveries and assisted deliveries (caesarean sections and surgical complications). The policy was initially implemented in the four most deprived regions including the three Northern regions and the Central region and in the year 2005 was extended to all the regions in the country.

The Free Maternal Delivery Policy implemented was funded by International partners including funds from the Highly Indebted Poor Countries (HIPC) lower debt repayment funds. The implementation of the policy did not apply a system of standardized charging and failure of prompt and adequate reimbursement to the clinical facilities led to near failure of the policy. Many facilities at one point reverted to collection of user fees. Other barriers to the success of the policy included; costs of transportation to the health facility, medicines and other supplies, long distances to health facilities, cultural and social barriers and preference for traditional birth attendants. An effective monitoring system

was not put in place and therefore many of the deficiencies in financial flows, quality of care and issues related to poverty were not documented to ensure a successful implementation of the programme. (Source:<http://www.immpact-international>)

In 2007, the programme was superseded by the National Health Insurance Programme as a result of problems of inadequate financial flows from donor partners. Pregnant women were therefore encouraged to enroll onto the National Health Insurance Scheme by paying a premium and receiving the same maternity services as in the Free Maternal Delivery Policy.

In 2008 the government of Ghana again implemented a maternal delivery exemption policy under the National Health Insurance Scheme for all pregnant women by exempting them from paying a premium but accessing free delivery services including Antenatal, Postnatal and Caesarean and Emergency Obstetric conditions.

1.2 PROBLEM IDENTIFICATION

Maternal mortality remains prevalent in Ghana and other developing countries thus concerns have been raised about many developing countries including Ghana meeting the millennium Development Goal 5 on maternal health, by 2015.

Ghana has implemented a Free Maternal Healthcare Policy since 2008 which enables all pregnant women to have free access to maternity care services before, during and after childbirth from both accredited private and all public hospitals in the country.

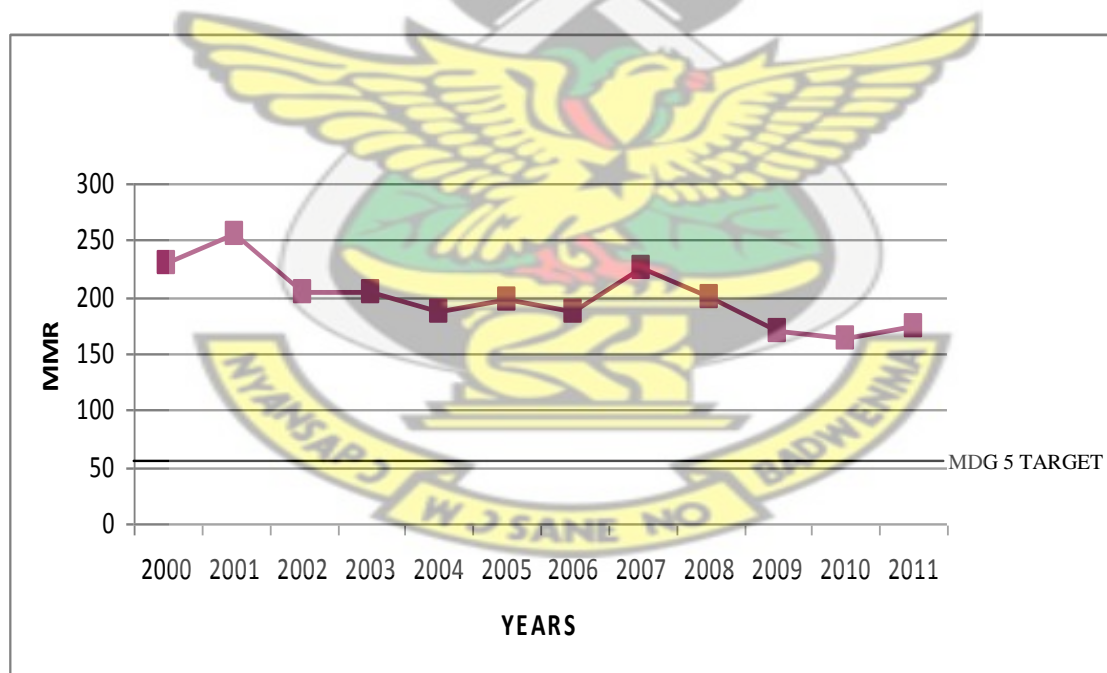
This policy is to enable the country achieve its Millennium Development Goal 5 on maternal health as it will enable pregnant women access maternity healthcare services from skilled healthcare providers without paying fees at the point of service utilization.

Thus this policy is expected to solve most of the notable causes of maternal mortality in Ghana which includes inaccess to health services from skilled healthcare providers as a result of user fees charged by health facilities, abortion related deaths notably out of medical facilities, and post partum related causes due to inaccess to postnatal services among others.

However official statistics from the Ministry of Health, Ghana indicates the country still records high maternal mortality figures even after the Free Maternal Healthcare Policy was implemented in the year 2008. The country is only making a slow progress towards achieving the Millennium Development Goal 5 by 2015.

This is illustrated in the time graph in figure 1.

Figure 1: Annual Trend in Maternal Mortality in Ghana (2000-2011).



From Figure 1, the country's Millennium Development Goal 5 on Maternal Health aims to achieve a maternal mortality rate of 54 per 100,000 live births by the year 2015

which is indicated by the horizontal line whereas the actual maternal mortality rate recorded in the country are indicated by the trend line graph.

It can be inferred from the graph above that the maternal mortality rate in the country prior to implementation of the Free Maternal Delivery Policy in 2008 was very high and peaked at a rate of 224.2 per 100,000 live births in 2007 but after the implementation of the policy, the maternal mortality rate in the country is declining and a slow progress being made towards the Millennium Development Goal 5 of 54 per 100,000 live births by 2015 but the maternal mortality rate is still very high as indicated in the time graph thus concerns are been raised about the country been able to achieve the target of 54 per 100, 000 live births by the year 2015 which is only three years away and hence achieving the Millennium Development Goal 5 on Maternal Health.

1.3 OBJECTIVES OF THE STUDY

The main objective of this study is to find out the impacts of the Free Maternal Care Policy implemented in 2008 on maternal mortality in Ghana with Kumasi metropolis as a case study area thus this research will seek to find the impacts of variables in the Free Maternal Care Policy namely antenatal and postnatal clinic attendance on maternal mortality in the Pre and Post policy implementation period in the Kumasi metropolis.

The research seeks to also ascertain the stability of the variables as a result of implementation of the Free Maternal Healthcare policy in 2008.

This research enables us to know the trend of the maternal mortality rates in the country and how achievable the Millennium Development Goal 5 of reducing maternal mortality rates by 75 per cent is thus reducing the maternal mortality rate in the country

from 214 per 100,000 live births in the year 2000 to 54 per 100,000 live births by the year 2015.

The research also seeks to find the effectiveness of the Free Maternal Care Policy in addressing this menace as maternal mortality figures are still very high in the country.

The research also make recommendations to all stakeholders of maternal health in Ghana including the Ministry of Health in Ghana, the Government of Ghana, allied International health partners such as World Health Organization, United Nations Children's Fund among others.

Lastly, this research contributes to existing body of knowledge on maternal health Particularly in sub-Sahara Africa where maternal mortality is prevalent and help in achieving the Millennium Development Goal 5 on maternal health by 2015.

1.4 JUSTIFICATION OF STUDY

Ghana is a signatory to the World Health Organization Convention on Millennium Development Goal 5 which aims to achieve a 75 percent reduction on maternal mortality rates globally by the year 2015 and improve maternal and child health.

Ghana has since the year 2008, implemented a Free Maternal Healthcare Policy which enables all pregnant women to have free access to maternal healthcare services from skilled healthcare providers in accredited private, mission clinics and all public hospitals including deliveries, antenatal and postnatal services.

However, maternal mortality rates in the country still remains high in Ghana in spite of the Free Maternal Care Policy, it is thus of relevance to undertake this research to enable us uncover the identifiable problems in the policy reducing maternal mortality and

the country achieving its Millennium Development Goal 5 on maternal health by the year 2015 which are only two years away.

Concerns have also been raised by the country's international partners in the health sector including World Health Organization on the country achieving the Millennium Development Goal 5 by 2015 as official statistics in the country indicate the country is far from achieving this target by 2015 thus this gives rise to the relevance of this research.

The research seeks to bring to the fore possible problems or the lapses accounting for the inability of the Free Maternal Delivery Policy in curbing the high maternal mortality rate in the country and make appropriate recommendations based on the findings to all the stakeholders of the policy in helping to achieve the Millennium Development Goal 5 by 2015.

The outcome of this research must inform decision makers in the country and international partners in their new policies that will be formulated and implemented to help the country in achieving its Millennium Development Goal 5 by 2015 which is only two years away and also other policies aimed at health interventions in the country. The recommendations will also enable us to find out the stages of implementation of international conventions that the country has ratified particularly on the Millennium Development Goal 5 and the needed interventions to achieving it.

1.5 ORGANISATION OF THE STUDY

The study has been organized into six main chapters namely; Introduction, Literature Review, Health Service Delivery in Ghana, Methodology, Results presentation and Analysis and lastly Summary, Recommendations and Conclusion.

Chapter one is Introduction which gives an overview of the entire thesis by presenting a background on the subject- matter that is on maternal mortality. It then states a problem identification which explains why maternal mortality figures are still very high in spite of implementation of a Free Maternal Healthcare Policy since 2008.

It then states the Objectives and Justification of the research. The methodology of the study is briefly explained by presenting a model for the study variables and data collection method and lastly Organization of the research is also presented in chapter one.

Chapter two of this research is on Literature Review. This examines the theoretical literatures related to Maternal Health particularly maternal mortality and policies to address it and secondly examines empirical literature to aid my further research of the subject-matter.

Chapter three examines health service delivery particularly maternal health services in Ghana.

Chapter four explains the methodology used in this research and explain sources of data, data collection method, states a model for the study and explain the variables and also states a hypothesis to be tested in the research. A time series analysis using the ordinary least square method is used to run a regression of the variables in the model. Chapter five present results of the Ordinary Least Square Time Series regression and analysis are made including economic and statistical significance which includes hypothesis testing and parameter stability test.

Chapter six makes summary of findings, recommendations and conclusions of the research.

CHAPTER TWO

LITERATURE REVIEW

2.1 THEORETICAL REVIEW

2.1.1 THE TRANSITION THEORY OF POPULATION

The transition theory of population states that countries pass through three stages of population growth as they advance from an under-developed country to a more developed state. These stages are (i) high birth rates and high death rates, (ii) high birth rates and declining death rates and (ii) low birth rates and low death rates.

The implication of this theory is that at the initial stages of development of a country, couples give birth to large numbers of children. They do not deliberately take steps to control births but give birth to as many children as nature gives them in their reproductive years. Out of these numbers, a lot die in their infancy because the death rate is high and life expectancy is also low. At a more advanced stage, while the birth rate is still high, the death rate begins to decline due to improved medical care, access to more nutritious food, people leading more hygienic lifestyles etc. Finally when countries become even more advanced, death rates fall to their barest minimum. And couples consciously give birth to fewer children that is birth rates fall.

Ghana as a lower middle income developing country can be described as in stage two of this theory with high birth rate and declining death rates. The high birth rates has been noted to be as a result of the following reasons; cultural practices of early and

polygamous marriages as well as children seen as source of pride and farm hands. Further, low acceptor rate of family planning services and high infant mortality rates in Ghana are notable reasons for the high birth rates. However poor nutrition of pregnant women and inaccess to skilled medical care during the period of pregnancy, delivery and after causes high maternal mortality in Ghana.

2.1.2 BECKER'S CONCEPT OF ECONOMIC CHOICE OF FAMILY SIZE

Gary Becker (pioneer of the new household economics, 1960), in his "An Economic Model of Choice of Family Size" assumes that children are as a kind of consumer durable that yields benefits over time. It assumes that having children is a rational choice and analyzes costs and benefits of having children.

The benefits of having children includes ; children can be thought of as a consumer good, children may supplement household income by working and in poorer societies, without elaborate social security measures, people cannot save towards old age thus they have children as a way to support them in future(insurance).

The costs of having children on the other hand includes: direct financial costs of raising children which varies with living standards entailing cash outlays for food, clothing, shelter etc. Further costs include forgone income during childbearing and child rearing and lastly possible psychic costs such as anxiety and loss of leisure time activities.

The number of children a family has decreases as society becomes more modernized and industrialized and as more production is done outside the household because the benefits of having children decrease and the costs of having more children increase. The

benefits of additional children decrease because of the following reasons; there are now fewer ways children can contribute to household income, the insurance effect of an additional child decreases because the existing children have a higher chance of surviving to adulthood and taking care of their parents in old age and also public and private insurance (social security) become more available as a country's average income increases.

The costs of having additional children increases because the expected standard of living rises as a country's average income increases and as incomes rise there is greater incentive to choose between "child quantity" and "child quality" As incomes rise parents would choose "child quality" by having fewer children and invest in children's education thus their children will have greater human capital, better health and well-being and greater productive potential than the several children the parents could have had otherwise if they choose "child quantity".

The implication of this choice-theoretic approach includes the following; viewing childbearing as an economic decision has the following implications including ;fertility should be higher when children can earn incomes or contribute to household enterprise at a young age than when they cannot, reducing infant mortality should lower fertility because fewer births will then be needed to produce a given number of surviving children, the introduction of an institutionalized social security system should lower fertility because then the need for parents to depend on their children in their old age is reduced.

Further fertility should fall when there is an opportunity for women to work in jobs that are relatively incompatible with childbearing essentially outside the home. Lastly

fertility should be higher when income is higher because the explicit costs are more easily borne by parents.

The first four theoretical predictions have been well verified empirically, however the fifth is in conflict with observed reality as in the real world, fertility is usually negatively related to income and not positively related as simple theory predicts. Becker explains the fall in fertility as income rises overtime by saying that the cost of the parents time tends to rise especially because the opportunity cost of the parent's time goes up. Becker has been criticized for exaggerating the extent to which couples consciously select their family sizes using a cost – benefit calculus. (Source: Boateng, K. (2008) 'Development Economics'.)

2.1.3 CALDWELL'S CONCEPT OF NET-INTERGENERATIONAL WEALTH TRANSFER.

The demographer John Caldwell in his Net Intergenerational Wealth Transfer concept (1982) explains demographic transition in somewhat different terms. He argues that the main reasons why large families are rational in traditional societies is that extended family relationship cause net intergenerational wealth transfers to flow from younger to older generations. According to Caldwell, as nuclear families become more common and emotional ties between generations weaken in the course of modernization, the direction of intergenerational flow of wealth reverses. Since parents must now transfer net wealth to their children rather than receiving net wealth from them hence they opt to have fewer children. (Source: Boateng, K. (2008) 'Development Economics'.)

2.2 EMPIRICAL REVIEW

2.2.1 THE GHANA DEMOGRAPHIC AND HEALTH SURVEY (2003)

(Ghana Demographic and Health Survey, 2003) carried out a nationwide sample survey to provide information on population, family planning, maternal and child health, nutrition, childhood mortality, and AIDS and sexually transmitted infections (STIs).

The sample for the 2003 GDHS covered the population residing in private households in the country. A representative probability sample of about 6,600 households was selected nationwide.

All women age 15-49 and all men age 15-59 that were either usual residents of the households in the GDHS sample or visitors present in the household the night before the survey were eligible to be interviewed in the survey. Information was collected on the characteristics of each person listed, including the age, sex, education, and relationship to the head of household.

The Women's Questionnaire was used to collect information including use of family planning methods, antenatal and delivery care, breastfeeding and infant and child feeding practices, childhood mortality and awareness and behaviour regarding AIDS and other STIs. Interviews were completed with 5,691 of these women, yielding a response rate of 96 percent. The response rates are slightly lower for the urban than rural sample and among men than women.

The findings of the survey included the following; A comparison of the 2003 GDHS data with data from the three earlier DHS surveys show that there has been an

improvement in the utilization of antenatal services in the last fifteen years from 82 percent of mothers receiving care for their most recent birth in the five-year period preceding the survey in 1988, to 92 percent in 2003.

Ninety-eight percent of urban residents and 89 percent of rural residents got antenatal care from a trained health professional. Regional variations in antenatal care from a health professional are marked. Care from a doctor, for example, ranges from a high of 45 percent in Greater Accra to a low of 3 percent in the Upper East. In fact, less than 10 percent of women living in the three northern regions received antenatal care from a doctor, and one in six mothers in the Northern Region and one in seven mothers in the Upper East did not receive any antenatal care.

Women's education is strongly associated with receipt of antenatal care from a health professional. As a woman's education increases, the likelihood that she will receive antenatal care from a health professional increases from 86 percent among women with no education to 100 percent among women with at least some secondary.

Government hospitals and clinics are by far the most common source providing antenatal care to 62 percent of women, followed by health centres, 25 percent. Twelve percent of women received antenatal care from a private facility, with most of them receiving care from private hospitals or clinics (9 percent).

Nationally, 46 percent of births in the last five years are delivered in health facilities, with 36 percent in public health facilities and 9 percent in private health facilities. About half of births (53 percent) occur at home.

. A child born in an urban area is two and a half times more likely to have been delivered at a health facility than a rural-born child. Four in five births in Greater Accra are delivered in a health facility compared with one in six births in the Northern region.

As expected, a woman's education and wealth are strong determinants of institutional deliveries. For example, 89 percent of births to women with at least secondary education occurred in a health facility compared with 28 percent of births to women with no education.

Criticisms

This research uses a survey data of 5 years preceding 2003 but in the presentation of its results it does not indicate the yearly or quarterly statistics of the research variables in the 5 year preceding the research in 2003 thus one is not able to make a yearly or quarterly analysis or review of maternal health indicators in Ghana in the 5 years preceding the survey.

2.2.2 INITIATIVE FOR MATERNAL MORTALITY PROGRAMME ASSESSMENT RESEARCH (2005).

Initiative for Maternal Mortality Programme Assessment (IMMPACT) (2005) assessed the effectiveness of the free delivery policy and, in particular, investigated the extent to which it can be judged to have affected utilization, quality of services and health outcomes.

They conducted interviews with key personnel involved in implementing the policy in the Central and Volta Regions in early October 2005. Fifty-five key informants were interviewed including representatives of regional and district health authorities,

representatives of the District Assemblies through which the funds had been channelled, and a sample of heads of facilities.

The key findings included the free delivery policy is seen as an effective approach to an important problem by the key informants as it is believed to have substantially increased utilization of skilled care for delivery.

However, the key informants also noted cash flow problems as a result of shortfalls and unpredictability of funding. For example, in the Central Region, the first funds were received from the District Assemblies in early 2004. Interviewees were not clear about how long the funds were supposed to last and when the next allocation would come.

In general, there seemed to be a lack of confidence amongst those staff interviewed about the policy. They expressed concern that the lack of financial stability may lead to mistrust by clients towards providers as some districts that had exhausted their funds had been forced to begin charging clients again. The inability to reimburse adequately and promptly could, therefore, have negative effects at all levels of the system. In addition, managers and staff referred to insufficient clarity about reimbursement rates, which some believed to be different across the two regions.

Criticisms of this Research

The criticisms from this research on assessment of the fee exemption policy on Maternal Health services in Ghana in 2005 can be considered too early since introduction or implementation of a new policy will initially be fraught with challenges of implementation and gradually overcome some of the challenges overtime thus will take some adequate time to be effective hence their criticisms based on their assessment can be considered to be too early.

Secondly, the research only conducted their survey in two out of ten regions in Ghana thus was not nationally representative and with a sample size of 55 interviewees which is too small to assess the impacts of this policy thus the survey could have been extended to cover about five or six out of the ten regions in Ghana and the sample size of interviewees increased to cover the numerous stakeholders concerned in this research in order to assess this policy effectively

The research also only reports challenges in the operations of the Free Maternal Delivery Policy and increased utilization of skilled care for delivery but fails to report its findings on the impacts of the policy on maternal deaths, antenatal and postnatal records since in its surveyed sample regions and lastly it only reported increased utilization of services but did not report on quality of services and health outcome as was stated in its objectives.

2.2.3 EFUA A. OPOKU (2007) STUDY

Efua A. Opoku (2007) researched on Utilization of maternal care services in Ghana by region.

The findings were based primarily on data analyzed from the 2006 Annual Statistics data from the Multiple Indicator Cluster Survey Ghana (2006) and the GHS (Ghana Health Services) half-year 2006, 2007 & 2008 reports. These data sets provided information on what has happened on the regional level. Percentages were calculated from the original data sets in order to compare the various situations occurring in the regions.

The key findings of that study included the following. About half the births occurring in the 2 years prior to the Multiple Indicator Cluster Survey (MICS) were delivered by skilled personnel. This percentage was highest in the Greater Accra Region (83 %) and Ashanti Region (60%) with seven of the regions below 50 % (Western, Central, Volta, Eastern, Northern, Upper East and Upper West). The Upper West shows the lowest percentage of any skilled attendance (29.1%).

The Greater Accra Region showed the highest percentage of deliveries in a health facility at 83.1 percent followed in second at 59.6 percent by the Ashanti Region. The Upper West Region showed the lowest percentage at 28.4 percent followed by the Northern Regions at 34.4 percent. The Greater Accra and Ashanti region dominate with high percentages of deliveries in Government facilities, private hospitals and have a high total percentage of deliveries in a facility. The Upper West and Upper East have the lowest percentage of deliveries in Government facilities, private hospitals and a low percentage of deliveries in a facility.

There is a clear separation between the two regions with high urban areas and the two regions with high rural areas. The concentration in the high urban areas with the highest population shows that care is centralized in the more urban areas and in the rural areas there are not as many facility options.

Most pregnant women receive ANC services at GHS facilities and the teaching hospitals. Ghana Health Service and the Teaching Hospitals accounted for 69.6% of ANC registrants in 2006, an increase over that of 2005 (64.9%). The Teaching Hospitals alone accounted for 2%. The CHAG (Faith-Based health institutions) and quasi-government institutions registered a slight decrease in their contribution (14.8%) as compared to that

of 2005 (15.5%). There was also a decrease in the contribution from Private hospitals and maternity homes for the year 2006 (10.9%) as compared to 2005 (11.7%).

Contribution by trained TBAs continued to decline. In 2006 TBA contribution was 4.4%, a slight decline from that of the previous year (4.9%).

The data shows that some of the issues with maternal care have an urban & rural trend. The Greater Accra and Ashanti Region exhibit the highest coverage for assistance during delivery during the year 2006-2008. Both regions hold a greater amount of facilities, which is evident in their higher rate of total facility deliveries based on the 2006 annual statistics. The more rural regions of Northern and Upper West region show low percentages of sites available for delivery, total facility delivery and assistance during delivery.

The Efua Opoku's (2007) study, however, also failed to report some components of maternal care utilization, particularly postnatal care utilization by expectant mothers in the regions.

2.2.4 SUNDARAM ET AL (2007) STUDY

This study researched on abortion seeking behaviour among Ghanaian women. The research explored the characteristics of women who resorted to unsafe abortion (that is abortion from a non medical professional), and examined how different they were from women who went to trained professional providers when seeking an abortion. Various socio-economic and demographic characteristics were considered such as education, class, union status and age.

The analysis used data from the 2007 Ghana Maternal Health Survey. This is a special survey administered by ICF Macro (formerly Macro International) in collaboration with Ghana Statistical Services and is an addition to the Ghana Demographic and Health Surveys. It is a nationally representative survey that interviewed 10,370 women of reproductive ages.

Of special interest to this paper was the abortion module which is a part of the survey and the dataset produced from it. This module was administered to all women who had an abortion in the 5 years preceding the survey, and asked those questions on their decision to terminate the pregnancy, about the level of involvement of the partner, what sort of provider they used, and the methods used for terminating a pregnancy. Since this module was administered to a sub-sample of the women, the number of cases for this module is 564.

Preliminary results indicate that 14% of the sample has ever attempted to terminate a pregnancy, and similar percentage was successful in the termination process. The average age at first abortion is 22 years, and 85% of the first abortions are pre-marital.

A bulk of the repeat abortions is also pre-marital. Sixty percent of those who ever had an abortion were living in an urban area, and 20% have primary education or less. About 40% of the women who took any action to end a pregnancy in the 5 years preceding the survey, used the D&C method, and about 21% used an ineffective method to terminate their pregnancy.

Despite, the above, that study had a shortcoming. The research in its objective sought to differentiate between the characteristics of women who looked for professional medical abortion and those who did not and yet it failed to report this in the findings,

Further, in the presentation of the results of the research, it states that about 40% of the women who took any action preceding 5 years of the survey used the D&C method but it does not explain what this method is.

2.2.5 KAREN GREPIN'S (2009) STUDY

Karen Grepin (2009) a PhD candidate in Health Policy (Economics) researched into the effect of a fee exemption policy on the utilization of maternal health services in Ghana.

Data from the 2003 Demographic and Health Survey (DHS) as well as the 2006 Multiple Indicator Cluster Survey (MICS) data were used in that study.

The GDHS 2003 collects detailed maternity service utilization data on the last 6 births to eligible women; however, MICS 2006 only collects maternity service utilization data on the last birth of surveyed women.

The time period of interest in this evaluation is a period of 20 months prior to the introduction of the Delivery Fee Exemption Policy (DFEP) as well as the 20 months following the initial rollout of the policy.

The research revealed that coverage of supervised deliveries was much lower in the early intervention regions than in the other regions prior to the introduction of the DFEP. The overall trends in the two groups of regions appeared to be similar outside of the policy intervention time period. Also, a large jump appeared to have occurred in the early intervention regions during the time period that roughly corresponds to the introduction of the Delivery Fee Exemption Policy.

The Delivery Fee Exemption Policy appeared to have had a positive and significant impact on the proportion of births supervised by trained medical professionals (increased

by roughly 14-17%), the proportion of births delivered in any institution (increased by 16%), the proportion delivered in a public institution (increased by 19%), and the proportion of births delivered in a hospital (increased by 14%). Among targeted health services, there was not any major differential effect of this policy on wealthier patients, which suggests that the policy was able to achieve its pro-poor objective. The policy did not appear to have had any significant effect on maternal health services not directly targeted by the policy, strengthening the argument that it was the Delivery Fee Exemption Policy that increased coverage of targeted health services. Therefore the policy appears to have increased both the level of professionalization and institutionalization of deliveries in the targeted regions, both of which are believed to play an important role in reducing maternal mortality.

Grepin's study entailed two shortcomings. First the research used a time series data size of 20 months pre and posts implementation of the Free Maternal Delivery Policy, and this is considered too small a sample size for such an important research. Secondly, the research only indicated increased utilization of maternal health services including supervised delivery but failed to report on other maternal health indicators such as maternal mortalities, antenatal and postnatal utilization as a result of the Delivery Fee Exemption Policy implementation.

2.2.6 GHANA'S HEALTH SECTOR REVIEW SURVEY(2010)

The independent health sector review (2010) was actually carried out from March 9th to March 31st 2011. It is part of a broader annual review including Budget Management Centre (BMC) reviews and performance hearings (involving districts, regions and health

related agencies); the inter-agency review; the health partner's review; and the in-depth review of some agreed key areas of the health sector of Ghana.

The Ministry of Health (MoH) and its agencies briefed the Parliamentary Select Committee on Health on the sector performance, progress and challenges.

The ministry of health with local consultants and international experts collaborated with different stakeholders at district, regional and central level. The team specified the following key areas for review: a) reducing inequity in health outcomes, taking supervised deliveries as a proxy; b) maternal / reproductive health; c) prevention and control of communicable and non-communicable diseases; d) governance and administration; and e) financial management.

The findings included; The institutional MMR declined by 3.5% to 164, which is below the target of 185.

The number of women attending the ANC at least four times during pregnancy continues to rise, the coverage of pregnant women who received at least one antenatal care visit dropped by 7% since 2008 to 90.6%. Volta Region has the lowest coverage at 70.9%, which is almost 20 percentage points under the national average removal.

Supervised delivery remains low in Ghana; There is a modest increase from 45.6% in 2009 to 48.2% in 2010. Poor staff attitude and unsatisfactory facilities were identified as key factors affecting delivery in facilities, next to cultural and other barriers.

Criticism

This research reviews the health sector report for 2010 thus it does not engage in a primary research itself but only reviews a report.

Findings from my empirical literature review indicates that maternity healthcare services such as delivery at health facilities(skilled delivery), antenatal care and postnatal care utilization is growing increasingly after the implementation of the free Maternal Delivery Policy initially in 2003 and subsequently in the National Health Insurance Scheme in 2008 but there are variations in the increasing utilization among the ten regions particularly between the urban and rural areas in Ghana and some socio-economic factors like education level of women and wealth also affecting the rates of utilization of these services.

2.2.7 ASAMOAH ETAL (2011) STUDY

Asamoah et al(2011) in their study of causes of maternal mortality among 605 women who died from pregnancy related causes in Ghana between 2000 and 2005 indicated the causes of maternal deaths in Ghana shown in the table a.

Table a: Causes of Maternal Mortality among 605 women who died from pregnancy - related causes in Ghana between 2000-2005.

| Variable | Number | Valid percentage |
|--|--------|------------------|
| Haemorrhage | 138 | 22.8 |
| Abortion(medical, attempted, failed, others) | 83 | 13.7 |
| Hypertensive disorders(including eclampsia) | 54 | 8.9 |
| Sepsis | 42 | 6.9 |
| Obstructed labour | 27 | 4.5 |
| Miscarriage | 20 | 3.3 |
| Other infectious diseases | 84 | 13.9 |

| | | |
|-------------------------------|----|------|
| Other non-infectious diseases | 75 | 12.4 |
| Miscellaneous | 82 | 13.6 |

(Source: Asamoah et al BMC Public Health 2011.

The major infectious diseases were malaria 53.6%, viral hepatitis 13.1%, unspecified infections &.1% and tuberculosis 2.4%.

The major cause of death in the category of non-infectious diseases was anaemia 41.3% followed by diseases of blood and blood forming organs 17.3%, respiratory diseases 14.6% and circulatory diseases 12.0%.

Miscellaneous causes comprised mainly obstetric deaths of unspecified causes 26.8%, rupture of uterus 17.1%, complications of obstetric surgery 14.6%, embolism 9.8%, complications of anaesthesia 4.8% and other complications of pregnancy. (Source: <http://www.biomedcentral.com>)

2.3 HISTORICAL REVIEW OF GLOBAL HEALTHCARE

2.3.1 INSTITUTIONAL GLOBAL COMMITMENT

Maternal Mortality has received increased attention from the international community following the inclusion of Millennium Development Goal 5 on maternal health which aims at a seventy –five per cent reduction in maternal mortality between 1990 and 2015 and also achieve universal access to reproductive health. The general set of strategies advocated by the World Health Organization(WHO) and other International health organizations to improve health outcomes during pregnancy is known as the Safe Motherhood (SM) Initiative, which grew out of a major international conference on

maternal health organized by the World Bank, the WHO and the United Nations Population Fund (UNFPA) during the late 1980s. The four main components of the Safe Motherhood (SM) strategy are family planning, antenatal care, skilled assistance at delivery, and access to emergency obstetric care. The Safe Motherhood strategy has been adopted and implemented to a various degree by most countries in the developing world over the past 20 years.

In September 2010, the UN Secretary-General launched the Global strategy for women's and children's health, to mobilize commitments by governments, civil society organizations and development partners to accelerate progress towards MDG 5.

The strategy identifies the following elements as key pillars to achieve MDG 5:

(I) country-led health plans, (ii) a comprehensive, integrated package of essential interventions and services, (iii) integrated care, (iv) health-systems strengthening, (v) health workforce capacity building and (vi) coordinated research and innovation.

Following the launch of the global strategy, a high-level Commission on Information and Accountability for Women's and Children's Health was established to “determine the most effective international institutional arrangements for global reporting, oversight and accountability on women's and children's health”. The commission launched its report in May 2011 and included, among its 10 recommendations one that is specific to improving measurement of maternal (and child) deaths. This recommendation requires that “by 2015, all countries have taken significant steps to establish a system for registration of births, deaths and causes of death, and have well-functioning health information systems that combine data from facilities, administrative sources and surveys” Considering that only a third of countries are characterized as having complete civil registration system

with good attribution of cause of death , it is imperative that countries with deficient civil registration data take steps to strengthen them. This will tremendously improve the estimation of maternal mortality and monitoring of MDG 5. (Source: <http://www.who.int>)

2.3.2 HEALTHCARE GLOBAL DELIVERY

The delivery of modern health care depends on groups of trained professionals and paraprofessionals coming together as interdisciplinary teams. This includes professionals in medicine, nursing, dentistry and allied health, plus many others such as public health practitioners, community health workers and assistive personnel, who systematically provide personal and population-based preventive, curative and rehabilitative care services. (Source: Wikipedia, the free encyclopedia)

While the definitions of the various types of health care vary depending on the different cultural, political, organizational and disciplinary perspectives, there appears to be some consensus that primary care constitutes the first element of a continuing health care process.

Primary care refers to the work of health care professionals who act as a first point of consultation for all patients within the health care system. Primary care involves the widest scope of health care, including all ages of patients, patients of all socioeconomic and geographic origins, patients seeking to maintain optimal health, and patients with all manner of acute and chronic physical, mental and social health issues, including multiple chronic diseases. Consequently, a primary care practitioner must possess a wide breadth of knowledge in many areas.

Common chronic illnesses usually treated in primary care may include, for example: hypertension, diabetes, asthma, depression and anxiety, back pain, arthritis or thyroid dysfunction. Primary care also includes many basic maternal and child health care services such as family planning services and vaccinations.

The World Health Organization attributes the provision of essential primary care as an integral component of an inclusive primary health care strategy. Depending on the nature of the health condition, patients may then be referred for secondary or tertiary care.

Secondary care is the health care services provided by medical specialists and other health professionals who generally do not have first contact with patients, for example, cardiologists, urologists and dermatologists.

It includes acute care which is necessary treatment for a short period of time for a brief but serious illness, injury or other health condition, such as in a hospital emergency department. It also includes skilled attendance during childbirth, intensive care, and medical imaging services.

The "secondary care" is sometimes used synonymously with "hospital care". However many secondary care providers do not necessarily work in hospitals, such as psychiatrists, clinical psychologists, occupational therapists or physiotherapists, and some primary care services are delivered within hospitals. Depending on the organization and policies of the national health system, patients may be required to see a primary care provider for a referral before they can access secondary care.

Allied health professionals, such as physical therapists, respiratory therapists, occupational therapists, speech therapists, and dietitians, also generally work in secondary care, accessed through either patient self-referral or through physician referral.

Tertiary care is specialized consultative health care, usually for inpatients and on referral from a primary or secondary health professional, in a facility that has personnel and facilities for advanced medical investigation and treatment, such as a tertiary referral hospital.

Examples of tertiary care services are cancer management, neurosurgery, cardiac surgery, plastic surgery, treatment for severe burns, advanced neonatology services, palliative, and other complex medical and surgical interventions

The term **quaternary care** is also used sometimes as an extension of tertiary care in reference to medicine of advanced levels which are highly specialized and not widely accessed. Experimental medicine and some types of uncommon diagnostic or surgical procedures are considered quaternary care. These services are usually only offered in a limited number of regional or national health care centres.

Aside the primary, secondary and tertiary cares; there are other types of health care interventions delivered outside of health facilities. They include many interventions of public health interest, such as food safety surveillance, distribution of condoms and needle-exchange programmes for the prevention of transmissible diseases.

They also include the services of professionals in residential and community settings in support of self care, home care, long-term care, assisted living, treatment for substance use disorders and other types of health and social care services. (Source: Wikipedia, the free encyclopedia. <http://www.health-policy-systems.com/content/8/1/24>)

In almost every jurisdiction with a government-funded health care system, a parallel private, and usually for-profit, system is allowed to operate. This is sometimes referred to as two-tier health care or universal health care.

The management and administration of health care is another area vital to the delivery of health care services. In particular, the practice of health professionals and operation of healthcare institutions is typically regulated by national or state/provincial authorities through appropriate regulatory bodies for purposes of quality assurance.

(Source: Wikipedia, the free encyclopedia.)

2.3.3: GLOBAL TRENDS IN MATERNAL MORTALITY RATES

Table b below provides figures for maternal mortality rates as well as maternal deaths for the world in various global regions.

Table b: Global Trends in Maternal Mortality Rates / Maternal deaths

| Region | MMR per Hundred Thousand (1990) | Maternal deaths in Numbers (1990) | MMR per Hundred Thousand (2010) | Maternal deaths in Numbers (2010) |
|--------------------|---------------------------------|-----------------------------------|---------------------------------|-----------------------------------|
| World | 400 | 543000 | 210 | 287000 |
| Developed regions | 26 | 4000 | 16 | 2200 |
| Developing regions | 440 | 539000 | 240 | 284000 |
| Northern Africa | 230 | 8500 | 78 | 2800 |
| Sub-Saharan Africa | 850 | 192000 | 500 | 162000 |
| Eastern Asia | 120 | 30000 | 37 | 6400 |
| Southern Asia | 590 | 233000 | 220 | 83000 |
| Western Asia | 170 | 7000 | 71 | 3500 |
| Latin America | 130 | 14000 | 72 | 7400 |

| | | | | |
|---------------------------------|-----|-------|------|-------|
| Caribbean | 280 | 2300 | 1400 | 1400 |
| Oceania | 320 | 620 | 200 | 510 |
| South-Eastern Asia | 410 | 50000 | 150 | 17000 |
| Eastern Asia excluding China | 53 | 610 | 45 | 400 |
| SouthernAsia excluding India | 590 | 70000 | 240 | 28000 |

(Source: Global estimates of maternal deaths, UNFPA)

Globally, an estimated 287 000 maternal deaths occurred in 2010, a decline of 47% from levels in 1990. The global maternal mortality rate (MMR) in 2010 was 210 maternal deaths per hundred thousand live births, down from 400 maternal deaths per hundred thousand live births in 1990.

The MMR in developing regions (240) was 15 times higher than in developed regions. Sub-Saharan Africa had the highest MMR at 500 maternal deaths per 100 000 live births, while Eastern Asia had the lowest among MDG developing regions, at 37 maternal deaths per 100 000 live births.

A total of 40 countries had high MMR (defined as MMR \geq 300 maternal deaths per 100 000 live births) in 2010. Of these countries, Chad and Somalia had extremely high MMRs of 1100 and 1000, respectively. Comparatively, only four countries outside the Sub-Saharan African region had high MMRs.

The percentage reductions for the 10 countries that have already achieved MDG 5 by 2010 are: Estonia (95%), Maldives (93%), Belarus (88%), Romania (84%), Bhutan

(82%), Equatorial Guinea (81%), Islamic Republic of Iran (81%), Lithuania (78%), Nepal (78%) and Viet Nam (76%).

For the remaining countries, one way to gauge progress is to examine whether they have had the expected average annual decline of 5.5% in the MMR from 1990 to 2010.

A country is considered to be “on track” if the average annual percentage decline between 1990 and 2010 is 5.5% or more. If the annual decline in MMR is between 2% and 5.5%, the country is considered to be “making progress”. Countries with an annual decline of less than 2% are considered to have made “insufficient progress” and countries with rising MMR have been categorized as making “no progress”. Worldwide, an average annual decline of 3.1% was observed, which indicates “making progress”.

All MDG regions experienced a decline in MMR between 1990 and 2010, with the highest reduction in the 20-year period in Eastern Asia (69%) followed by Northern Africa (66%).

Several factors account for global, regional and country decline in maternal mortality between 1990 and 2010. In addition to improvement in health systems, other factors outside the health sector such as increased female education and increased physical accessibility to health facilities are contributory factors

The Millennium Development Goals report of 2011 indicates that the other MDG 5 indicators have also shown some improvement in the past two decades.

The proportion of deliveries attended by skilled health personnel in developing regions rose from 55% in 1990 to 65% in 2009. Similarly, the proportion of women who were attended to by skilled healthcare personnel at least once during pregnancy increased from 64% to 81%, while the WHO, UNICEF, UNFPA and The World Bank estimates

proportion of women aged 15–49 years who use any method of contraception also increased from 52% to 61%.

Improvement in the coverage of these healthcare interventions over the past two decades may have contributed to improved outcomes. However, disparities exist, within and across regions. For example, Eastern Asia, which experienced the greatest MMR decline, has a contraceptive prevalence rate of 84% as opposed to only 22% in sub-Saharan Africa, the region with one of the lowest MMR declines. (Source:<http://www.unfpa.org>)

2.3.4 GLOBAL CAUSES OF MATERNAL DEATHS.

The high number of maternal deaths in some areas of the world reflects inequities in access to health services, and highlights the gap between rich and poor. There are also large disparities within countries, between people with high and low income and between people living in rural and urban areas.

The risk of maternal mortality is highest for adolescent girls under 15 years old. Complications in pregnancy and childbirth are the leading cause of death among adolescent girls in most developing countries.

Women in developing countries have on average many more pregnancies than women in developed countries, and their lifetime risk of death due to pregnancy is higher. Women die as a result of complications during and following pregnancy and childbirth. Most of these complications develop during pregnancy. Other complications may exist before pregnancy but are worsened during pregnancy.

The most common clinical causes of maternal death during conception and delivery globally includes; hemorrhage, obstructed labour, anaemia, abortion, hypertensive disorders and others as shown in Figure 2.

Hemorrhage is bleeding during pregnancy and may indicate several conditions. In early pregnancy it indicates threatened abortion. In later pregnancy, it suggests problems in placentation. Postpartum hemorrhage is one of the most common reasons for blood transfusion, an intervention that has become dangerous with the advent of HIV/AIDS. Hemorrhage remains the leading cause of maternal mortality, accounting for approximately one third of deaths

Anaemia can contribute to maternal mortality by impairing a pregnant woman's ability to resist infection or severe hemorrhage.

Obstructed labour is a complication in which the process of labour does not function normally due to mechanical blockage of the birth canal. In very severe cases, it may lead to fistulation in which urine and faecal matter gain entry into the reproductive system. Obstructed labour may be due to early pregnancy, inadequate nutrition during childhood, foeto-pelvic disproportion, multiparity and abnormal foetal presentation.

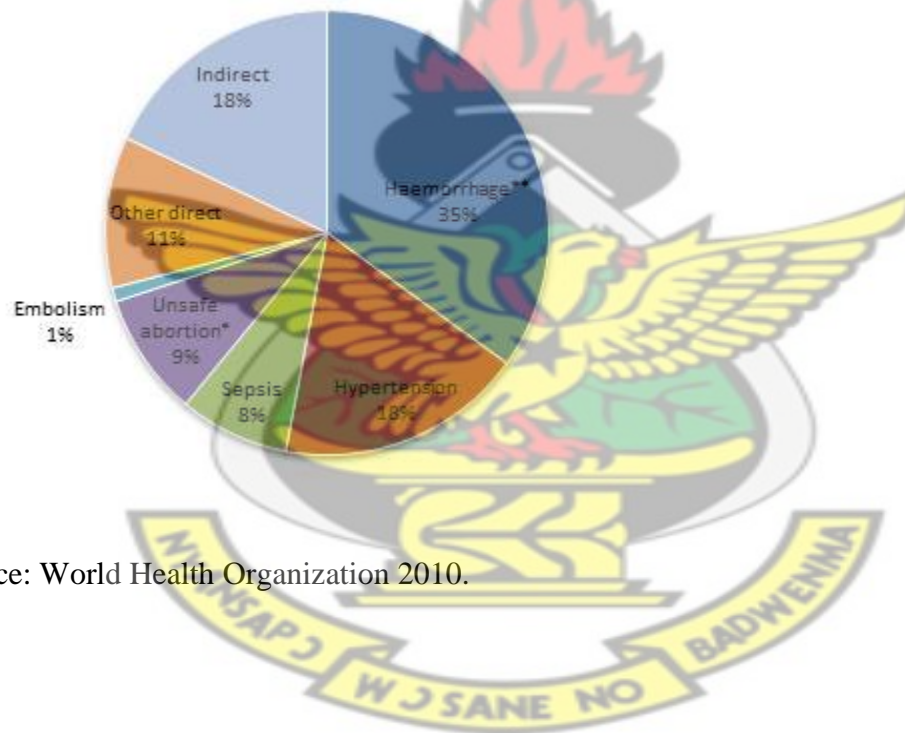
Abortion is voluntary or involuntary termination of pregnancy before 20 weeks of gestation. It is characterized by bleeding, lower abdominal pains, and passage of foetal and placental tissue.

Hypertensive Disorders are associated with protein in urine. They are the most difficult of the obstetric emergencies to prevent and manage. If untreated, they may progress to eclampsia characterized by convulsion, brain damage, renal failure and death.

Other conditions that cause maternal morbidity or mortality include ectopic pregnancy, renal failure and cardiac disorders.

Globally according to World Health Organization, about 82 per cent of maternal deaths are due to these direct causes. Among the indirect causes of maternal death (18 per cent) are diseases that complicate or are aggravated by pregnancy, such as malaria and HIV. Women also die because of poor health at conception and a lack of adequate care needed for the healthy outcome of the pregnancy for themselves and their babies.

Figure 2: Global estimates of the causes of maternal deaths, 1997-2007



Source: World Health Organization 2010.

CHAPTER THREE

HEALTH SERVICE DELIVERY IN GHANA

3.1 INSTITUTIONAL DEVELOPMENT

The health system in Ghana has been undergoing significant reform since 1980's with the goal of making health service delivery better coordinated and more effective. These reforms were guided by five principles: integration, decentralization, partnerships, ownership, and common financing. The decentralization of health services has also been a guiding principle of recent health system reforms in Ghana.

In 1997, the Ghana Health Service (GHS) was established as the agency of the government responsible for implementing health service delivery. The Ministry of Health remained responsible for the stewardship of the health system, including policy formulation, resource mobilization, and overall monitoring and evaluation of the system. Under this newly reformed model, health priorities are identified at the national level, and then it is up to the regional and district level implementing units to develop operational plans and deliver health services. Capacity constraints present at lower implementation units mean that actual implementation does not always follow national goals. Although fully integrated into the overall health system, separate units are responsible for ensuring the delivery of reproductive health and family planning services.

In 1997, Ghana adopted a sector-wide approach (SWAp) to delivery of health services. This approach provides a vehicle to coordinate the activities of all partners in the health sector. Under the Sector Wide Approach (SWAp), the government and all partners (including donors, faith-based health service providers, and NGOs) agreed to a common program of work, and finances from all sources were pooled through the Ministry of Health. The work programs run for five years, and Ghana has currently completed its third round (2007-2011). Some donors, including United State of America International Development (USAID) and United Nations Population Fund (UNFPA), continue to disburse their funds through separate channels.

In 1983 the Government of Ghana (GoG) introduced user fees into the public health system. As applied to maternal health services, the policy instituted user fees for all services except tetanus toxoid immunization for pregnant women. To reduce the financial barriers to services, while maintaining the user fee financing scheme, a series of exemptions was later instituted along with the user fees. Antenatal care, delivery services, family planning, and immunizations were among the services receiving fee exemptions starting in 1997, free antenatal services were offered throughout the country.

Fee exemptions for delivery services began in 2003 in four regions and expanded to the remaining six regions by 2005. The Delivery Fee Exemption Policy (DFEP) was funded through the Highly Indebted Poor Country (HIPC) debt relief funds. Under DFEP, facilities were reimbursed on a per-delivery basis. Different fixed rates were established for normal and caesarean deliveries. Private and public facilities had different reimbursement rates.

In 2004, Ghana launched the National Health Insurance Scheme (NHIS). The NHIS supersedes the user fee and exemption system of health service financing. Individuals must enroll in the NHIS and pay a premium to participate. Maternity services covered under the NHIS include antenatal care, delivery, caesarean section, management of emergency obstetric conditions, and postnatal care.

(source:<http://www.ghanahealthservice.org/>)

3.2 GHANA'S HEALTHCARE DELIVERY SYSTEM

The National Health Insurance Act, Act 650 was promulgated in 2003 and a National Health Insurance Scheme (NHIS) in 2004 under a National Health Insurance Authority with a governing council. The National Health Insurance Act, established three types of health insurance schemes in the country consisting of the District Mutual Health Insurance Schemes (DMHIS), Private Mutual Health Insurance Schemes (PMHIS), and Private Commercial Health Insurance Schemes (PMHIS). The National Health Insurance Authority (NHIA) as established by Act 650 is the regulator of all forms of health insurance business in Ghana, as well as the implementer of the National Health Insurance Scheme in the country.

Funding for healthcare financing under the National Health Insurance Scheme as established by Act 650, comes from a fund created by the Act, with income from two main sources also created by the Act. These are the National Health Insurance Levy (NHIL), a 2.5 percentage top up of the Value Added Tax (VAT), and a 2.5 percentage transfer from the existing Social Security and National Insurance Trust (SSNIT). The National Health Insurance Scheme has since 2004 come to be accepted by Ghanaians as one of the best social intervention programmes to be introduced in this country. More so

because it was not one of those programmes that were sponsored by donor community or the World Bank and the International Monetary Fund.

From table c, as at 2010, a total of 14,282,626 Ghanaians were registered with the 145 District Mutual Health Insurance schemes operating the country's healthcare system. All across the country, registered card bearing members of the scheme are getting treated without paying anything at the point of use, for conditions that would have caused them millions of Ghana cedis under the former 'cash and carry' system.

Women now receive free maternal and child care under the Free Maternal programme.

Detailed statistics about the scheme are given below in Tables c, d and e.

Table c: Category and Number of Participation of NHIS, 2010.

| <u>Category</u> | <u>Number of persons</u> | <u>% OF NHIS</u> |
|--------------------|--------------------------|------------------|
| INFORMAL ADULTS | 4,132,783 | 28.94 |
| AGED ABOVE 70YEARS | 960,549 | 6.73% |
| UNDER 18YEARS | 7,071,270 | 49.51% |
| SSNIT CONTRIBUTORS | 876,034 | 6.13% |
| SSNIT PENSIONERS | 75,444 | 0.53% |
| INDIGENTS | 444,597 | 3.11% |
| PREGNANT WOMEN | 721,943 | 5.05% |
| TOTAL | 14,282,626 | 100% |

(Source: Directorate of corporate affairs & strategic direction, NHIS)

Table d: Facility Type and Provider Participation of NHIS-Public(Formal), 2010.

| <u>Facility Type</u> | <u>Number of Facilities</u> |
|----------------------|-----------------------------|
| SECONDARY HOSPITALS | 4 |
| PRIMARY FACILITIES | 62 |

| | |
|--------------------|-----|
| CLINICS | 94 |
| HEALTH CENTRES | 74 |
| MATERNITY HOMES | 130 |
| CHPS ZONES | 74 |
| PHARMACY SHOPS | 80 |
| CHEMICAL SHOPS | 55 |
| DIAGNOSTIC CENTRES | 45 |
| TOTAL | 498 |

(Source: Directorate of corporate affairs & strategic direction, NHIS)

Table e: Facility Type and Provider participation of NHIS-Private(Provisional),2010

| <u>Type of facility</u> | <u>Number of Facility</u> |
|----------------------------|---------------------------|
| HOSPITALS AND CLINICS | 395 |
| DENTAL CLINICS | 5 |
| MATERNITY HOMES | 237 |
| PHARMACIES | 451 |
| CHEMICAL SHOPS | 329 |
| DIAGNOSTIC CENTRES/IMAGING | 128 |
| TOTAL | 1545 |

(Source: Directorate of corporate affairs & strategic direction, NHIS)

As in Tables d and e, the total number of facilities provided under NHIS for the formal(public) and the private sectors stood at 498 and 1545 respectively.

While Act 650 passed by parliament created schemes which are almost autonomous it made it mandatory for the National Health Insurance Authority to make financial resources available to them from the Health Insurance Fund on a continuous basis.

Another source of funding is the premiums which are collected from the informal sector subscribers on the schemes.

While the law does not make it mandatory for the schemes to render accounts on their financial dealings to the Authority even with funds made available to them from public money, the Authority regularly funnels huge sums of money to them without the Schemes being accountable for anything. This has opened the flood gates for the huge corrupt practices that have engulfed the schemes country-wide. (Source: <http://www.nhis.gov.gh>)

3.3 CAUSES OF MATERNAL DEATHS IN GHANA.

The causes of maternal mortality in Ghana are not that different from that of other African countries.

One of the causes of maternal deaths in Ghana is lack of sufficient medical care. Many areas still lack hospitals and where there are even clinics, they are ill-equipped with facilities. This, lack of health centres, forces many of the women to turn to traditional birth attendants, some of whom are not skillful enough, and result in maternal mortality. The distance that those who decide to go to health centres have to travel and the bad road conditions also lead to many deaths in times of emergency.

Poverty is also another cause of maternal mortality in Ghana. Although many of the women in Ghana now seek prenatal care during pregnancy, poverty makes it difficult for them to purchase the food they need and live in conditions better for their health and nurturing of the foetuses. Poverty, again, prevent most of the women from getting education that will let them understand their medications, nutrition and proper care of

themselves during pregnancy. Until the User Fee Exemption Policy was implemented for pregnant women in 2003, the cash-and-carry system operated by the Ghana health sector also prevented many of the women from accessing professional prenatal care and services during labour.

Shortage of health workers in the country's health centres; and this is mainly due to the migration of Ghanaian health staff. Within the country, most of the health workers refuse to be posted to the rural areas. All the health professionals prefer staying in the urban areas. Even those from the rural areas refuse to go back after their training. This makes health delivery in the rural areas very poor.

In the rural areas of Ghana, some traditional practices make some parents not see the need to send their daughters to school. Men are seen in many societies in Ghana as the heads of their families. Women's jobs are in the kitchen and taking care of children. Although education and campaigns by both governments and non-governmental organizations have improved this, they are still practiced by some few in the rural areas; and this lead to illiteracy which affects how the women take care of themselves later in life during pregnancies.

(Source: Robert T. Mensah (2010); 'How is Ghana Dealing with Maternal Mortality?'' Feature Article on Ghana web)

3.4 STRATEGIES AND PROGRAMS ON MATERNAL HEALTH IN GHANA.

Several initiatives within the health sector are utilized to provide health care services and other assistance to pregnant women. These include the Regenerative Lifestyle and

Nutrition Program (RLNP), High Impact Rapid Delivery (HIRD), and Community-based Health Planning and Services (CHPS).

RLNP focuses on non-communicable diseases such as obesity and hypertension, and maternal and child health. It identifies, trains and supports change agents at the community level to communicate healthy lifestyle messages to promote services and health-seeking behavior.

The HIRD program promotes high-priority, cost-effective interventions to improve maternal and child health at the district level. This program provides specific funding for service delivery with an aim to increase focus on and funding for reproductive and child health services by DHMTs.

CHPS is a strategy that aims to increase access to maternal and child health services. CHPS refers to a specific process for moving health services into underserved areas through community mobilization. Community leaders and volunteers cooperate to mobilize resources and labor to construct a simple health facility known as a Community Health Compound (CHC), consisting of space for a clinic and living quarters for a health care provider. CHCs are staffed by Community Health Officers (CHOs), who are nurses trained specifically for this role.

Abortion Policy.

Since 1985, Ghanaian law has permitted abortion for pregnancies that result from rape, incest, or “defilement of the female idiot,” where there is high risk that the child would suffer from a serious deformity, or if the pregnancy threatens the woman’s physical or mental health. From a policy perspective, however, Ghana did not integrate safe abortion into national reproductive health policy until 2003.

In 2006, the Ghana Health Service released new standards and protocols for safe abortion services that include direction for interpreting Ghana's abortion law. These standards were developed in collaboration with World Health Organization and other stakeholders. Ghana's liberal law on abortion notwithstanding, as of 2007 a mere 3% of pregnant women and only 6% of those seeking an abortion were aware of the legal status of abortion. Almost half (45%) of abortions in Ghana remain unsafe.

There are significant differences in abortion safety according to women's social and economic status. Compared with poorer women, who have less access to financial resources and healthcare facilities, wealthier women have three times the odds of having a safe abortion. Young women may be less likely to know where to get an abortion, have less access to financial resources and be more influenced by stigma, compared with older women.

It is thus recommended to promote access to safe, legal abortion services for all women, to the full extent of the law including publicizing the availability of these services in public-sector facilities and ensure that services are affordable for poor and rural women. Increase the role of trained midwives in providing abortion services particularly in remote and rural areas where there are relatively few health care providers. (Source:<http://uaps2011.princeton.edu/>)

Safe Motherhood and Reproductive Health Policy

The Ghana Reproductive Health Strategic Plan (2007-2011) includes six high-level objectives under its Safe Motherhood Policy, the first of which is to “reduce maternal morbidity and mortality”. Included under this high-level objective are five intermediate objectives:(i) Improve access to comprehensive and basic essential obstetric care

- (ii) Improve the capacity of family and community members in home-based, life-saving skills, (iii) Increase the proportion of deliveries conducted by skilled attendants,
- (iv) Increase antenatal care and postnatal care coverage, content, and quality of services,
- (v) Ensure the availability of comprehensive abortion care services as permitted by law

The specific activities included in the GHS 5-year strategic plan can be grouped into activities to reduce the three delays: (i) community initiatives to expand knowledge of danger signs and promote delivery with a skilled attendant, (ii) initiatives to expand availability of and access to maternal health care services and (iii) initiatives to improve quality of care and effective management of complications at health facilities.

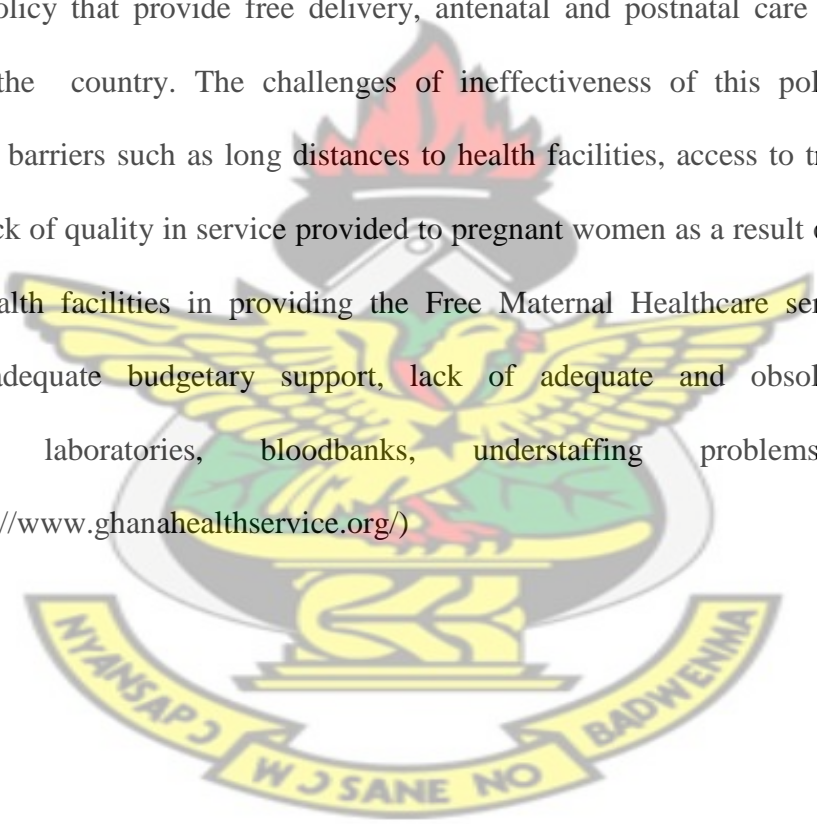
A major barrier to access to care is the cost of services and availability of health care services. Lack of equipment in health facilities has been a barrier to quality of care. In 2007, the MOH completed a mapping of essential equipment requirements in facilities nationwide and submitted a proposal for procurement.

The introduction of the safe motherhood and reproductive health policy in 1995 introduced a range of interventions which included antenatal care, labour and delivery care, postnatal care, family planning, prevention and management of unsafe abortions and health education but still maternal mortality rate has not been encouraging in the country over the years and improvements are so slow.

Maternal Morbidity and Mortality Reduction Program.

The objectives of this program is to provide the commitment and financial and technical resources to assist the Government of Ghana to: (i) increase its contraceptive prevalence rate (CPR) by making both contraceptive methods and comprehensive abortion care more available and more utilized at all levels of the public and private

sectors of the health care system, and (ii) reduce morbidity and mortality due to unsafe abortion in three regions, to support progress towards MDG-5. Areas covered by the program include Greater Accra, Ashanti, and Eastern region. There has been an increasing prevalence rate in contraceptive use in Ghana according to the Ghana Demographic and Health Survey in 2007. However, contraceptive prevalence rate is still low in Ghana. Maternal morbidity and mortality rates still remain high in Ghana with institutional maternal mortality about 200 per 100,000 live births despite a free Maternal healthcare policy that provide free delivery, antenatal and postnatal care to expectant mothers in the country. The challenges of ineffectiveness of this policy includes geographical barriers such as long distances to health facilities, access to transportation problems, lack of quality in service provided to pregnant women as a result of challenges faced by health facilities in providing the Free Maternal Healthcare services which includes inadequate budgetary support, lack of adequate and obsolete medical equipments, laboratories, bloodbanks, understaffing problems etcetera. (Source:<http://www.ghanahealthservice.org/>)



CHAPTER FOUR

METHODOLOGY OF THE STUDY

4.0 INTRODUCTION

The methodology employed is concerned with collection of quarterly recorded data on maternal deliveries at health facilities, ante-natal attendance by expectant mothers and post-natal attendance by delivered mothers in health facilities within the Kumasi Metropolis and make a presentation of these data as well as analysis and conclusions made.

Further descriptive and inferential statistics are used in this research. Under descriptive, line graphs, pie chart and tables are used to present data for easy reference and pictorial view. This research employs both quantitative and qualitative methods in descriptive and analytical analysis. Inferential statistics on the other hand uses Gretl software to run a Time series regression analysis for the variables under study using the Ordinary Least Square (OLS) method. Further, hypothesis testing using the significance level approach and Chow test are used to make analysis of the regression results.

The set of data used in running the regression is divided into three parts namely the Pre Free Maternal Healthcare Policy period, Post Free Maternal Healthcare Policy period and the Pooled data of the two periods.

4.1 SOURCES AND METHOD OF SAMPLE DATA COLLECTION

This research uses secondary data. The secondary data are generated from various sources including domestically and externally. Secondary data generated from domestic sources includes yearly national institutional maternal mortality data between the years 2000 to 2011 which is depicted in the line graph in problem statement in chapter one. Again secondary data on quarterly recorded maternal deliveries at health facilities, antenatal attendance and postnatal attendance from hospitals in the Kumasi metropolis to ascertain the impacts of the Free Maternal Delivery Policy on Maternal Mortality in Ghana with Kumasi as a case study area.

This research reviews literature on Maternal Health from the Ghana Health Service, Ghana Ministry of Health, International partners in the health sector including World Health Organization (WHO), United Nations Children's Fund (UNICEF), United Nations Population Fund (UNPF), Internet Websites, Journals, Publications, Articles, Newspaper features among other sources.

Literature on Maternal Health from the Ghana Health Service and Ghana Ministry of Health gives descriptive overview of the Maternal Health situation in Ghana particularly in the last decade to the present year whiles literature from International partners gives the global descriptive overview of maternal health.

The collection of data used for the research, the researcher presented introductory and protocol letters from the Department of Economics, Kwame Nkrumah University of Science and Technology to the Kumasi Metropolitan Assembly indicating the data variables of interest to the researcher and period relevant to accessing the data which was a two week period and was able to access the data request within the specified period from the directorate concerned.

Sample Size and Sampling Method

The research studies the Impact of Free Maternal Delivery Policy on Maternal mortality thus it uses data from the period prior to the implementation of the policy and the period after the implementation of the policy. Therefore, the data samples are into three parts; the first quarter of 2003 to the fourth quarter of 2007 for the Pre Free Maternal Healthcare Policy period and the first quarter of 2008 to the fourth quarter of 2012 for the Post Free Maternal Healthcare Policy period and the first quarter of 2003 to the fourth quarter of 2012 for the pooled data.

The sample size for the Pre policy data is nineteen quarterly data while the sample size for the post policy period is also nineteen and sample size for the pooled data is thirty nine quarterly data.

The research uses convenience sampling method to select the Kumasi Metropolis and access recorded quarterly data on maternal mortalities, maternal deliveries, ante-natal attendance and post-natal attendance between the first quarters of 2003 to the fourth quarter of 2012. The Kumasi Metropolis comprises six sub-metros namely Asokwa, Tafo, Bantama, Subin, North Manhyia and South Manhyia. . The hospitals in the six sub metros within the Kumasi metropolis includes Government hospitals, quasi –government health

facilities, faith based health facilities, one teaching hospital and some accredited private health facilities.

4.2 THE OLS REGRESSION MODEL

The research estimated a regression model for the period before the implementation of the policy and after by using the regression in its general form as $Y_t = Y_t(X_{1t-1}, X_{2t})$ Where, Y_t = maternal mortalities recorded in health facilities in current quarter.

X_{1t-1} = Ante-natal clinic attendance by expectant mothers in a previous quarter $t-1$.

Antenatal clinic attendance is lagged by one because antenatal clinic attendance in a quarter of the year does not have an instantaneous impact on maternal mortality in the current quarter of the year but rather it has an impact on the next quarter of the same year hence this variable is lagged.

X_{2t} = Post-natal care attendance by delivered mothers in the current quarter t .

The priori expectations of this research includes each of the independent variable should have a negative relationship with the dependant variable such that an increase in each of the independent variables (X_{1t-1} , X_{2t}) should lead to a fall in the dependant variable (Y_t). In other words, as ante-natal attendance (X_{1t-1}) and post-natal (X_{2t}) attendance by pregnant women and delivered mothers respectively increases, it is expected that maternal mortality (Y_t) should decrease. It is also expected that particularly in the Post-policy implementation period, each of the independent variable will rise and as a result of the negative relationship with the dependent variables will increase to cause a decline in the maternal mortality.

However, the variable X_{1t-1} is expected to have the greatest impact on reducing maternal mortality (Y_t) as access to Ante-natal care during the period of pregnancy by pregnant women is expected to reduce the tendency of maternal mortalities since most maternal mortalities occur as a result of lack of adequate medical attention during the period of pregnancy. Post-natal clinic attendance (X_{2t}) is expected to have the least impact on reducing maternal mortality (Y_t) since maternal mortality occurs least in the period after delivery if adequate pre natal or antenatal care is received by pregnant women prior to delivery.

4.3 HYPOTHESIS STATEMENTS

There are many variables that impacts on maternal mortality but this research aims to find two key variables and their impacts on maternal mortality thus ante-natal attendance by pregnant women and post-natal attendance by delivered women are selected for hypotheses testing. Below are a set of hypothesis statements that were tested empirically;

(1) H_0 : Ante-natal attendance by pregnant women in a previous quarter of the year has no impact on maternal mortality in the current quarter of the year

H_1 : Ante-natal attendance by pregnant women in a previous quarter of the year has positive impacts on maternal mortality in the current quarter of the year.

(2) H_0 : Post-natal attendance by delivered women in a current quarter of the year has no impacts on maternal mortality

H_1 : Post-natal attendance by delivered women in a current quarter of the year has positive impacts on maternal mortality

(3) H_0 : There is no stability between the independent variables in the pre and post period of the Free Maternal Healthcare policy

H_1 : There is stability between the independent variables in the pre and post periods of the Free Maternal Healthcare policy.

4.4 DEFINITION AND MEASUREMENT OF REGRESSION VARIABLES

This research uses both descriptive and analytical analysis in both quantitative and qualitative methods in assessing the impact of the Free Maternal Delivery Policy on Maternal Mortality. Pie charts, tables and line graphs are used in the descriptive part of this research for presentation and analysis of the data whereas inferential statistics using Time series regression analysis uses the OLS method and hypothesis testing using the significance level approach through Gretl software.

The time series regression analysis is used to determine the statistical relationship between maternal mortality (dependent variable) and the two independent variables (ante-natal and post-natal attendance).

The main variables used in the research analysis are; maternal mortality, ante-natal attendance and post-natal attendance.

Maternal Mortality

In the International statistical classification of diseases and related health problems, 10th revision (ICD-10), World Health Organization (WHO) defines maternal mortality as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or

aggravated by the pregnancy or its management but not from accidental or incidental causes. (<http://www.who.int.org/>)

In this research, recorded deaths of expectant mothers during the period of pregnancy, period of conception and post-partum period recorded in a quarter of a year in health facilities in the six sub metros of the Kumasi metropolis are used to measure maternal mortality.

Ante-natal attendance

This refers to expectant mothers seeking antenatal care from a health facility during the pregnancy period. ANC services includes The antenatal clinic provided to expectant mothers includes blood pressure check, vaccinations, insecticide treated net distribution, counseling, information about signs of pregnancy complications, blood pressure measurement, the testing of urine and blood samples, and the provision of iron supplements and anti-malarial prophylaxis tablets among others. The World health Organization recommends at least four antenatal clinic attendance during the period of pregnancy whiles Obstetricians generally recommends monthly antenatal visits up to the seventh month and every two weeks to the eight month and every week after the eight month. ANC visits is recommended in the first trimester of pregnancy.

Thus in this research, the number of pregnant women who attend ante-natal clinic for the first time recorded in a quarter of the year in health facilities in the six sub metros within the kumasi metropolis are used to measure ante-natal attendance. Complications during pregnancy are an important cause of maternal and child morbidity and mortality.

Post-natal attendance

This refers to delivered mothers seeking postnatal care from a health facility in the post-partum period after delivery. Post-natal care provided to delivered mothers includes post-partum family planning services, post-partum vitamin A for the delivered mother among others.

Thus in this research, the number of delivered mothers who attend post-natal clinic at health facilities in the six sub metros within the Kumasi metropolis in a quarter of a year are used to measure post-natal attendance. Another crucial component of safe motherhood is postnatal care. Postnatal check-ups provide an opportunity to assess and treat delivery complications and to counsel new mothers on how to care for themselves and their children. The timing of postnatal care is important. Since most maternal and neonatal deaths occur within two days of delivery, postnatal care should be received immediately following the birth, during this critical period

It is important to analyze the impact of the Free Maternal Healthcare Policy implemented by the Government of Ghana in 2008 on Maternal Mortality. The policy was implemented specifically to curtail the high maternal mortality rates in Ghana. The policy aims to eliminate all financial barriers to pregnant women using maternity services including antenatal, postnatal and deliveries (caesarean and emergency obstetric) from accredited private, faith based health facilities, private midwives, public health facilities, teaching hospitals, government health centres and healthpost and quasi-government institutions in the country thus improving uptake of maternity services and quality as well as geographic access to delivery care in health facilities and therefore helping to reduce the high maternal deaths recorded in the country as a result of financial

and geographic barriers. The success of the policy has been explained further in chapter five.

Two separate regressions were run. The first was based on data for the pre-policy period and the second regression was valid for the period after the policy implementation. Next the two periods were also pooled together in a separate regression. Finally, the policy factor was introduced as a dummy variable set to zero and one for the pre and post policy periods was introduced into the pooled regression to account for the possibility of policy shift or otherwise in that single regression.

Both the linear and the log-linear specifications of the model were estimated in the OLS regression using the Gretl statistical software package.

The logo of Kenya National University of Science and Technology (KNUST) is centered in the background. It features a yellow eagle with spread wings perched on a green shield. Above the eagle is a red torch. The entire emblem is encircled by a yellow banner with black text in Swahili. The word 'KNUST' is printed in large, light grey letters across the middle of the page, partially overlapping the logo.

CHAPTER FIVE

PRESENTATION AND ANALYSIS OF RESULTS.

5.0 INTRODUCTION

This chapter presents results and analysis of the research. The chapter consists of two main sections. The first section presents the trend analysis of the three main variables of interest, namely, maternal mortality and ante and postnatal attendances. The second section deals with the presentation and analysis of the regression model, first for the pre-policy period (2003-2007), followed by results and analysis of the regression for the period after the policy was instituted (2008-2012); and finally, the two periods were

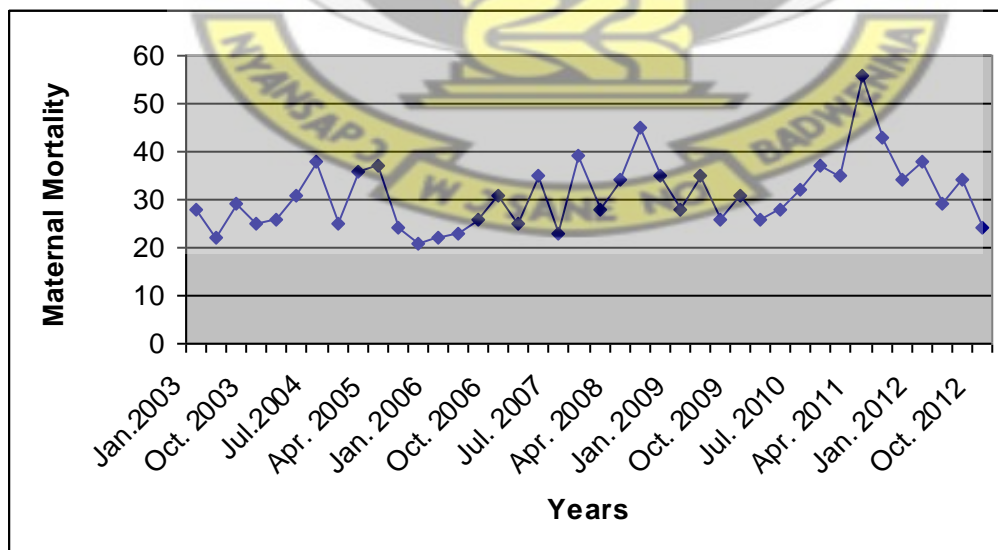
pooled together, and the results and analysis of the regression (2003-2012) are presented. The results of the hypothesis tests are also presented and evaluated.

5.1 Presentation and Analysis of Trend in Variables

From figure 5.1.1, the trend in the maternal mortality in the pre-policy period (2003-2007) is relatively stable.

The lowest maternal mortality was recorded in the last quarter of 2005(21 maternal mortalities) whiles the highest maternal mortality was recorded in the fourth quarter of 2007(39 maternal mortalities).

Figure 5.1.1: Quarterly Trend in Maternal Mortality

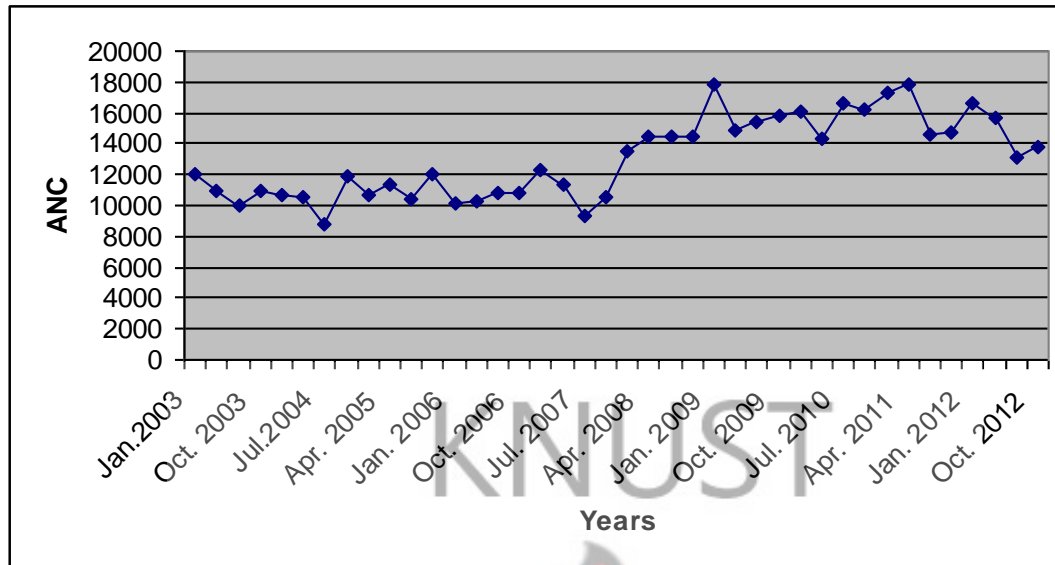


(Source: Author's Own Compilation)

The priori expectations in the pre-policy period is that the trend in maternal mortality should be declining because there are some factors that impacts to reduce maternal mortality such as accessing maternity services from traditional birth attendants (trained and untrained), clinics and hospitals, dieting, among others thus these factors are expected to impact to cause a decline in maternal mortality. However, the stability in the trend of maternal mortality from figure 5.1.1 may be explained by some other factors that impacts against reducing maternal mortality such as geographical barriers or long distances and transportation problems to health facilities, financial barriers including user fees charged by health facilities at point of service among others.

In the post-policy period, there is a general trend of decline in maternal mortality particularly between 2008 to 2010 and 2011 to 2012. The lowest maternal mortality in this period is recorded in the last quarter of 2012(24 maternal mortalities) while the highest maternal mortality is recorded in the second quarter of 2011(56 maternal mortalities). However, the priori expectations for the post-policy period is that, the implementation of the Free Maternal Healthcare policy in 2008 which makes the provision of free maternal health services at all public health facilities and accredited private health facilities in the country should impact to cause a decline in the trend of maternal mortality thus the trend from figure 5.1.1 is expected.

Figure 5.1.2: Quarterly Trend in Antenatal clinic attendance



(Source: Author's Own Compilation)

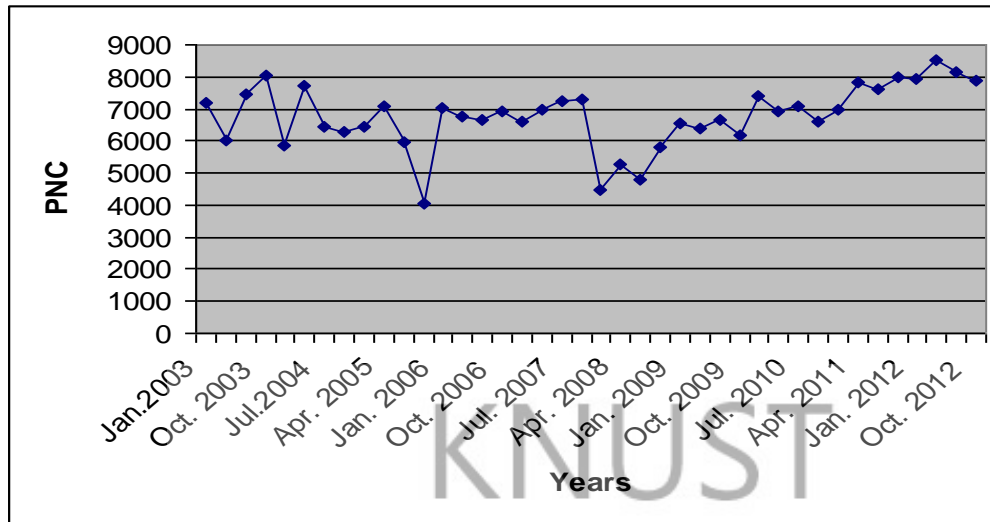
From figure 5.1.2, the trend in antenatal clinic attendance by pregnant women in the pre-policy period (2003-2007) is relatively stable. The lowest antenatal clinic attendance was recorded in the third quarter of 2004(8,848 registrants) while the highest antenatal clinic attendance was recorded in the first quarter of 2007(12,289 registrants). The prior expectations for the trend in antenatal clinic attendance is an increasing trend because expectant mothers are expected to attend antenatal clinic during the period of pregnancy to access medical care to reduce the risk of pregnancy and childbirth however, geographical factors such as long distances and transportation problems to health facilities and also financial barriers including user fees charged for antenatal services provided by health facilities are obstacles that impact against the prior expectations as depicted in figure 5.1.2

However, in the post policy period (2008-2012), there is a relatively increasing trend in antenatal clinic attendance. The lowest antenatal clinic attendance is recorded in the

third quarter of 2012(9,697 registrants) while the highest antenatal clinic attendance is recorded in second quarter of 2011(17,863 registrants). The prior expectations in the trend of antenatal clinic attendance in the post-policy period is an increasing trend because the implementation of the Free Maternal Healthcare Policy in 2008 making the provision of antenatal services during pregnancy free, it is expected to cause an increasing trend in utilization of antenatal services as depicted in figure 5.1.2.



Figure 5.1.3: Quarterly Trend in Post-natal clinic attendance



(Source: Author's Own Compilation)

From figure 5.1.3, the trend in post-natal clinic attendance by delivered women in the pre-policy period (2003-2007) is relatively stable particularly between 2003 to 2005 and 2006 to 2007. The lowest post-natal clinic attendance was recorded in the fourth quarter of 2005(4,038 registrants) while the highest post-natal clinic attendance was recorded in the fourth quarter of 2003(8,039 registrants). The priori expectations for the trend in post-natal clinic attendance is an increasing trend because delivered mothers are expected to attend post-natal clinic after child delivery to access medical care to reduce the risk of post-partum maternal mortality. However, geographical factors such as long distances and transportation problems to health facilities and also financial barriers including user fees charged for post-natal services provided by health facilities are obstacles that impacts against the priori expectations as depicted in figure 5.1.3

However, in the post policy period (2008-2012), there is a relatively increasing trend in post-natal clinic attendance by delivered women. The lowest post-natal clinic

attendance is recorded in the first quarter of 2008(4,473 registrants) while the highest post-natal clinic attendance is recorded in second quarter of 2012(8,525 registrants). The priori expectations in the trend of post-natal clinic attendance in the post-policy period is an increasing trend because the implementation of the Free Maternal Healthcare Policy in 2008 making the provision of post-natal services after delivery free, it is expected to cause an increasing trend in utilization of post-natal care as depicted in figure 5.1.3

5.2: RESULTS AND ANALYSIS: PRE-POLICY REGRESSION

Tables 5.2a and 5.2b show the regression results of the log-linear and linear functions for the pre-policy period, based on quarterly data for the 2003-2007 period.

The pre-policy regression results depicted in table 5.2a indicates that, the coefficient of the constant is negative 0.51 which means that maternal mortality is negatively related to the constant (other factors that impact on maternal mortality but excluded in this regression model) such that a one per cent increase in the constant, reduces maternal mortality by fifty one per cent (51 per cent) holding the parameters in the model constant.

Table 5.2.a: Log-Linear Regression of the Maternal Mortality Function: Pre-Policy Period.

| Variable | Coefficient | Standard error | t-ratio | p-value |
|----------------------|-------------|----------------|---------|---------|
| Constant | -0.505654 | 6.00999 | -0.0841 | 0.93399 |
| LnANC_{t-1} | -0.1001158 | 0.562708 | -0.1780 | 0.86096 |
| LnPNC_t | 0.540919 | 0.322928 | 1.6750 | 0.11336 |

| | |
|-------------------------|---------------------|
| R-squared | 0.1513 |
| Adjusted R-squared | 0.0453 |
| F-value | 1.4271 (p= 0.2689) |
| SER | 0.2012 |
| Log-likelihood Estimate | 5.1323 |
| DW | 2.0716 |
| Schwarz criterion | -1.4314 |
| Akaike criterion | -4.2647 |

(Source: Author's Regression Results)

This is consistent with the priori expectation of this research because there are some other factors excluded in this model that impact to reduce maternal mortality. Examples includes pregnant women accessing maternity services from traditional birth attendants(trained and untrained), private hospitals, public health facilities and also healthy lifestyle(dieting) of women during pregnancy, improved educational levels of women and improved income levels of women. The t-ratio(-0.0841) is greater than the t critical value(-2.093) therefore the t-ratio is statistically not significant at 93 per cent error level and this means that the constant(other factors that impact to reduce maternal

mortality but excluded in this regression model) is not statistically significant on impacting to reduce maternal mortality. The statistical insignificance may be explained by challenges in terms of the quality of the other variables also included in the constant such as user fees charged for maternity services provided by health facilities and quality of services provided, geographical barriers such as long distances and access to transportation to health facilities among other negative factors that affects the quality of variables included in the constant to cause a statistically significant impact on reducing maternal mortality.

The coefficient of LnANC_{t-1} (natural log of the lag of antenatal attendance by pregnant women in a quarter of the year) from table 5.2a is negative 0.1 which means that LnANC_{t-1} is negatively related to maternal mortality such that a one per cent increase in LnANC_{t-1} (previous quarter of the year antenatal clinic attendance by pregnant women) decreases maternal mortality by ten per cent (10 per cent) holding all the other parameters in the model constant. This relationship is consistent with the research's priori expectation because antenatal clinic attendance by pregnant women in a previous quarter of the year (LnANC_{t-1}) is expected to impact to reduce maternal mortality in the current quarter of the same year (LnMM_t). However the t-ratio (-0.1780) is greater than the t critical value (-2.093) thus the t-ratio is not statistically significant and this means that the variable LnANC_{t-1} is not statistically significant on impacting to reduce maternal mortality. This can be explained by challenges in the quality of antenatal services provided in the previous quarter of the year by health facilities such as inadequate and obsolete equipments such as x-ray machines, body scanners, laboratories, medical drugs among others used by health facilities and challenges of lack of qualified health

personnel such as doctors and nurses in some health facilities in the provision of antenatal services to pregnant women thus despite the negative relation between antenatal attendance by pregnant women in a previous quarter of the year, it is not statistically significant on impacting to reduce maternal mortality in the current quarter of the same year.

Ghana Maternal Health Survey (2010) research findings is consistent with this research findings as their findings indicated that despite increases in ANC in the Pre Free Maternal Delivery Policy period, institutional maternal mortality was also increasing. Their report indicates increased coverage of ANC with 98 per cent in urban areas compared to 94 per cent of rural women but lack of information on signs of pregnancy complications and access to basic laboratory services affect the quality of ANC provided thus ANC coverage might be increasing but lack of quality might fail to reduce maternal mortality significantly.

The coefficient of LnPNC_t (natural log of post-natal clinic attendance by delivered mothers in the current quarter of the year) is positive 0.54 which means that LnPNC_t is positively related to maternal mortality (LnMM_t) such that a one per cent increase in LnPNC_t (post-natal clinic attendance in the current quarter of the year) increases maternal mortality in the same quarter of the year (LnMM_t) by fifty-four per cent (54 per cent) holding all the other parameters in the model constant. This is not consistent with the priori expectations of this research since post-natal clinic attendance by delivered mothers in a current quarter of the year is expected to impact to reduce post-partum maternal mortalities thus a negative relationship is expected between the variables.

However, the t-ratio (1.6750) is less than the t critical value (2.093) thus the t-ratio is not statistically significant and this means that the variable LnPNC_t is not statistically significant on impacting to increase maternal mortality at eleven per cent (11 per cent) error level. This inconsistency with the priori expectations may be explained by lack of quality in the provision of post-natal services provided by health facilities such as health facilities lacking equipped facilities with modern equipments including theatres or operating rooms, laboratories, equipped maternity wards, lack of medical drugs, understaffing of qualified health professionals such as doctors and nurses at health facilities et cetera.

Ghana Maternal Health Survey (2010) research findings is consistent with this research findings as their findings indicates that despite increases in PNC in the Pre Free Maternal Healthcare Policy period, institutional maternal mortality was also increasing. It reports that institutional maternal mortality increased in 2004 from 187 per 100,000 live births to 197 per 100,000 live births and 201 per 100,000 live births in 2005 and 2006 respectively. Their report indicate problems such as transportation and distance to health facilities, lack of money for healthcare services, long waiting and non availability of female doctors and inconvenient service hours makes it difficult to reduce the maternal mortality rate hence the positive relationship such that as PNC increases, maternal mortality also increases.

R-squared for the pre-policy regression model is 0.15 and this means that the explanatory power of the explanatory variables (LnANC_{t-1} , LnPNC_t) on maternal mortality in the pre-policy period is fifteen per cent (15 per cent).

Table 5.2b provides the results of the linear function of the maternal mortality model for the pre-policy period.

Table 5.2.b: Linear Regression of the Maternal Mortality Function:Pre-Policy Period.

| Variable | Coefficient | Standard error | t-ratio | p-value |
|-------------------------|-----------------------|----------------|---------|---------|
| Constant | 14.56 | 20.8014 | 0.7000 | 0.4901 |
| LnANC_{t-1} | -0.00019091 | 0.00115824 | -0.1206 | 0.90548 |
| LnPNC_t | 0.00236919 | 0.00163569 | 1.4484 | 0.16681 |
| R-squared | 0.117727 | | | |
| Adjusted R-squared | 0.0077443 | | | |
| F-value | 1.067489 (p=0.367133) | | | |
| SER | 6.005723 | | | |
| Log-likelihood Estimate | -59.38880 | | | |
| DW | 2.031958 | | | |
| Schwarz criterion | 127.6109 | | | |
| Akaike criterion | 124.7776 | | | |

(Source: Author's Regression Results)

Using a linear model specification of the model, the pre-policy regression results depicted in table 5.2.b indicates that, the coefficient of the constant is positive 14.56 which means that maternal mortality is positively related to the constant (other factors

that impact on maternal mortality but excluded in this regression model) such that a one unit increase in the constant, increases maternal mortality by 14.56 units holding the parameters in the model constant. This is not consistent with the priori expectation of this research because there are some other factors excluded in this model that impact to reduce maternal mortality. Examples includes pregnant women accessing maternity services from traditional birth attendants(trained and untrained), private hospitals, public health facilities and also healthy lifestyle(dieting) of women during pregnancy, improved educational levels of women and improved income levels of women thus a negative relationship is expected. The t-ratio (0.7000) is less than the t critical value (2.093) therefore the t-ratio is statistically not significant at 49 per cent error level and this means that the constant (other factors that impact to reduce maternal mortality but excluded in this regression model) is not statistically significant on impacting to increase maternal mortality. The statistical insignificance may be explained by some other variables also included in the constant such as pregnant women accessing maternity services from traditional birth attendants(trained and untrained), private hospitals, public health facilities and also healthy lifestyle(dieting) of women during pregnancy, improved educational levels of women and improved income levels of women that impact to reduce maternal mortality hence the statistical insignificance of the constant on impacting to increase maternal mortality.

The coefficient of ANC_{t-1} (the lag of antenatal attendance by pregnant women in a quarter of the year) from table 5.2b is negative 0.0002 which means that ANC_{t-1} is negatively related to maternal mortality such that a unit increase in ANC_{t-1} (previous quarter of the year antenatal clinic attendance by pregnant women) decreases maternal

mortality by 0.0002 units holding all the other parameters in the model constant. This relationship is consistent with the research's priori expectation because antenatal clinic attendance by pregnant women in a previous quarter of the year (ANC_{t-1}) is expected to impact to reduce maternal mortality in the current quarter of the same year (MM_t). However the t-ratio (-0.1206) is greater than the t critical value (-2.093) thus the t-ratio is not statistically significant and this means that the variable ANC_{t-1} is not statistically significant on impacting to reduce maternal mortality at 91 per cent error level. This can be explained by challenges in the quality of antenatal services provided in the previous quarter of the year by health facilities such as inadequate and obsolete equipments such as x-ray machines, body scanners, laboratories, lack of medical drugs among others and challenges of lack of qualified health personnel such as doctors and nurses in some health facilities in the provision of antenatal services to pregnant women thus despite the negative relation between antenatal attendance by pregnant women in a previous quarter of the year and maternal mortality in the current quarter of the year, it is not statistically significant on impacting to reduce maternal mortality in the current quarter of the same year.

Ghana Maternal Health Survey (2010) research findings is consistent with this research findings as their findings indicates that despite increases in ANC in the Pre Free Maternal Delivery Policy period, institutional maternal mortality was also increasing. Their report indicates increased coverage of ANC with 98 per cent in urban areas compared to 94 per cent of rural women but lack of information on signs of pregnancy complications and access to basic laboratory services affect the quality of ANC provided

thus ANC coverage might be increasing but lack of quality might fail to reduce maternal mortality significantly.

The coefficient of PNC_t (post-natal clinic attendance by delivered mothers in the current quarter of the year) is positive 0.0024 which means that PNC_t is positively related to maternal mortality such that a one unit increase in PNC_t (post-natal clinic attendance in the current quarter of the year) increases maternal mortality in the same quarter of the year (MM_t) by 0.0024 units in the same quarter of the year holding all the other parameters in the model constant. This is not consistent with the priori expectations of this research since post-natal clinic attendance by delivered mothers in a current quarter of the year (PNC_t) is expected to impact to reduce post-partum maternal mortalities thus a negative relationship is expected between the variables. However, the t-ratio (1.4484) is less than the t critical value (2.093) thus the t-ratio is not statistically significant and this means that the variable PNC_t is not statistically significant on impacting to increase maternal mortality (MM_t) at seventeen per cent (17 per cent) error level. This statistical insignificance may be due to the impact of other external factors such as access to medical care including drugs from health facilities that impact to reduce post-partum maternal mortalities thus despite PNC_t increasing maternal mortality, it is not statistically significant on impacting to increase maternal mortality.

Ghana Maternal Health Survey (2010) research findings is consistent with this research findings as their findings indicates that despite increases in PNC in the Pre Free Maternal Healthcare Policy period, institutional maternal mortality was also increasing. It reports that institutional maternal mortality increased in 2004 from 187 per 100,000 live

births to 197 per 100,000 live births and 201 per 100,000 live births in 2005 and 2006 respectively. Their report indicate problems such as transportation and distance to health facilities, lack of money for healthcare services, long waiting and non availability of female doctors and inconvenient service hours makes it difficult to reduce the maternal mortality rate hence the positive relationship such that as PNC increases, maternal mortality also increases.

R-squared for the pre-policy regression model is 0.1177 and this means that the explanatory power of the explanatory variables (ANC_{t-1} , PNC_t) on maternal mortality in the pre-policy period is about twelve per cent (12 per cent).

5.3: RESULTS AND ANALYSIS: POST-POLICY REGRESSION

The results of the post-policy regression based on quarterly data from the 2008-2012 period, are shown in tables 5.3a and 5.3b for the log-linear and linear functional forms respectively.

From the post-policy regression results depicted in table 5.3a using log-log specification of the model, the coefficient of the constant is negative 4.18 which means that maternal mortality is negatively related to the constant (other factors that impact on maternal mortality but excluded in this regression model) such that a one per cent increase in the constant, reduces maternal mortality by four hundred and eighteen per cent (418 per cent) holding the parameters in the model constant.

Table 5.3.a: Log-Linear Regression of the Maternal Mortality Function: Post-Policy Period.

| Variable | Coefficient | Standard error | t-ratio | p-value |
|----------------------|-------------|----------------|---------|---------|
| Constant | -4.17587 | 5.10418 | -0.8181 | 0.42530 |
| LnANC_{t-1} | 1.15386 | 0.53926 | 2.1397 | 0.04814 |
| LnPNC_t | -0.389097 | 0.31015 | -1.2545 | 0.22766 |

| | |
|-------------------------|-----------------------|
| R-squared | 0.237924 |
| Adjusted R-squared | 0.142665 |
| F-value | 2.497645 (p=0.113759) |
| SER | 0.192565 |
| Log-likelihood Estimate | 5.971893 |
| DW | 1.223180 |
| Schwarz criterion | -3.110470 |
| Akaike criterion | -5.943787 |

(Source: Author's Regression Results)

This is consistent with the priori expectation of this research because in the post implementation period of the Free Maternal Healthcare policy, there have been improvement in some other factors excluded in this model that impacts to reduce maternal mortality. Examples include improved educational levels of women as a result of increased enrollment of women in higher institutions, improved incomes or wealth of women particularly increased access to micro-credit for small scale business women, increased accessibility to health facilities as a result of increased number of health facilities in the Kumasi metropolis and improved transportation network and among other

factors. The t-ratio(-0.8181) is greater than the t critical value(-2.093) therefore the t-ratio is statistically not significant at 42 per cent error level and this means that the constant(other factors that impact to reduce maternal mortality but excluded in this regression model) is not statistically significant on impacting to reduce maternal mortality. The statistical insignificance may be explained by challenges in terms of the quality of the variables included in the constant such as geographical barriers such as transportation cost to health facilities, delays at health facilities as a result of increased utilization of health facilities, health facilities lacking adequate and modern facilities such as laboratories, maternity wards, theatres or operating rooms, understaffed health facilities among other negative factors that affects the quality of variables included in the constant to cause a statistically insignificant impact to reduce maternal mortality.

The coefficient of LnANC_{t-1} (natural log of the lag of antenatal attendance by pregnant women in a quarter of the year) from table 5.3a is positive 1.15 which means that LnANC_{t-1} is positively related to maternal mortality such that a one per cent increase in LnANC_{t-1} (previous quarter of the year antenatal clinic attendance by pregnant women) increases maternal mortality in the current quarter of the year(LnMM_t) by one hundred and fifteen per cent (115 per cent) holding all the other parameters in the model constant. This relationship is not consistent with the research's priori expectation because implementation of the Free Maternal Healthcare Policy is expected to increase antenatal clinic attendance by pregnant women in a previous quarter of the year (LnANC_{t-1}) to impact to reduce maternal mortality in the current quarter of the same year (LnMM_t). This positive relationship may be explained that, the implementation of the Free Maternal Healthcare policy in 2008 has led to increased utilization of antenatal care

services from health facilities thus leading to overcrowding and overstretching of equipments and health facilities thus affecting the quality of antenatal care provided and also challenges of understaffing at health facilities particularly medical doctors and nurses and lack of adequate and modern equipments including laboratories, x rays, body scanners, blood banks et cetera all affect the quality of antenatal services provided by health facilities thus these factors impacting to cause the positive relationship. The t-ratio (2.1397) is greater than the t critical value (2.093) thus the t-ratio is statistically significant 5 per cent error level and this means that the variable LnANC_{t-1} is statistically significant on impacting to increase maternal mortality (MM_t). This may be due to the factors explained above.

Ghana Health Service Annual Report (2011) indicates that implementation of Free Maternal Care services in the National Health Insurance Scheme has resulted in an increase in access and utilization of health services with ANC coverage improving since 2008 with 92.1 per cent in 2009, 93.3 per cent in 2010 and 94.4 per cent in 2011. However, the marginal increases in ANC coverage is not yielding the necessary result and reports the following factors as compromising the quality of service provided in the Free Maternal Care which is not making the policy to yield the results of reducing maternal mortality. The impeding factors includes health facilities now earn more than 80 per cent of their Internally Generated funds from insured clients of the National Health Insurance Scheme and this is the main source of funding for health facilities with Government funding of health facilities decreasing over the years. Thus long delays in reimbursement of health facilities for services rendered to insured clients by the various district schemes is affecting the ability of health facilities particularly non governmental

health facilities to procure drugs and supplies. This is bound to have a large impact on the quality of care offered by the health facilities. Delays in reimbursement have resulted from a number of factors among which are increases in the client base of the various district schemes resulting in an increase in the number of forms that must be submitted each month by the health facilities, delays in submission of claims leads to delays in vetting of claims by the schemes and this coupled with lack of funds at the district impedes the settlement of claims.

Further, the National Health Insurance Authority inspection of health facilities indicated that most of the facilities obtained a grade C with only 3 per cent being awarded a grade A. The accreditation rating is a proxy of the quality of care being offered in a particular facility. This is an indication for an urgent need to support the majority of health facilities to improve their infrastructure, equipment and staffing in order to improve their ratings. Other factors impeding the success of the policy in reducing maternal mortality includes inadequate staffing and inequitable distribution of available staff to health facilities, lack of in-service training, overcrowding of health facilities as a result of the Free Maternal Care policy with inadequate expansion of health facilities and equipments, lack of adequate budgetary support from government and lack of effective supervision are factors identified to compromising the quality of maternal care services provided in the Free Maternal Care Policy thus despite the marginal increases in Antenatal care in the Free Maternal Care policy, maternal mortality has been increasing.

The coefficient of LnPNC_t (natural log of post-natal clinic attendance by delivered mothers in the current quarter of the year) is negative 0.39 which means that LnPNC_t is

negatively related to maternal mortality such that a one per cent increase in LnPNC_t (post-natal clinic attendance in the current quarter of the year) decreases maternal mortality in the same quarter of the year by thirty nine per cent (39 per cent) holding all the other parameters in the model constant. This is consistent with the priori expectations of this research since post-natal clinic attendance by delivered mothers in a current quarter of the year is expected to impact to reduce post-partum maternal mortalities thus a negative relationship is expected between the variables. However, the t-ratio (-1.2545) is greater than the t critical value(-2.093) thus the t-ratio is not statistically significant and this means that the variable LnPNC_t is not statistically significant on impacting to decrease maternal mortality at twenty three per cent(23 per cent) error level. This statistical insignificance may be explained by lack of quality in the provision of post-natal services provided by health facilities such as health facilities lacking modern equipments including theatres or operating rooms, laboratories, equipped maternity wards, lack of medical drugs, inadequate blood banks, understaffing of qualified health professionals such as doctors and nurse et cetera.

Ghana Health Service Annual Report (2011) indicates that implementation of Free Maternal Care services in the National Health Insurance Scheme resulting in an increase in access and utilization of health services. The report indicates that PNC coverage has also been improving since 2008 from 53 pr cent in 2008, 56 per cent in 2009, 62 per cent in 2010 and 65 per cent in 2011.However, the marginal increases in since the implementation of the policy in 2008 is not yielding the necessary result and reports the following factors as compromising the quality of service provided in the Free Maternal Care which is not making the policy to yield the results of reducing maternal mortality.

The impeding factors includes health facilities now earn more than 80 per cent of their Internally Generated funds from insured clients of the National Health Insurance Scheme and this is the main source of funding for health facilities with Government funding of health facilities decreasing over the years. Thus long delays in reimbursement of health facilities for services rendered to insured clients by the various district schemes is affecting the ability of health facilities particularly non governmental health facilities to procure drugs and supplies. This is bound to have a large impact on the quality of care offered by the health facilities. Delays in reimbursement have resulted from a number of factors among which are increases in the client base of the various district schemes resulting in an increase in the number of forms that must be submitted each month by the health facilities, delays in submission of claims leads to delays in vetting of claims by the schemes and this coupled with lack of funds at the district impedes the settlement of claims.

Further, the National Health Insurance Authority inspection of health facilities indicated that most of the facilities obtained a grade C with only 3 per cent being awarded a grade A. The accreditation rating is a proxy of the quality of care being offered in a particular facility. This is an indication for an urgent need to support the majority of health facilities to improve their infrastructure, equipment and staffing in order to improve their ratings. Other factors impeding the success of the policy in reducing maternal mortality includes inadequate staffing and inequitable distribution of available staff to health facilities, lack of in-service training, overcrowding of health facilities as a result of the Free Maternal Care policy with inadequate expansion of health facilities and equipments, lack of adequate budgetary support from government and lack of effective supervision are

factors identified to compromising the quality of maternal care services provided in the Free Maternal Care Policy thus despite the marginal increases in Postnatal care in the Free Maternal Care policy, maternal mortality has been increasing despite the marginal increases in Postnatal care services in the post-policy period.

R-squared for the post-policy regression model is 0.24 and this means that the explanatory power of the explanatory variables (LnANC_{t-1} , LnPNC_t) on maternal mortality in the post-policy period is twenty four per cent (24 per cent).

From the post-policy regression results depicted in table 5.3b, the coefficient of the constant is positive 4.379 which means that maternal mortality is positively related to the constant (other factors that impact on maternal mortality but excluded in this regression model) such that a one unit increase in the constant, increases maternal mortality by 4.379 units holding the parameters in the model constant

Table 5.3.b: Linear Regression of the Maternal Mortality function: Post-Policy Period.

| Variable | Coefficient | Standard error | t-ratio | p-value |
|----------|-------------|----------------|---------|---------|
| Constant | 4.73932 | 20.3737 | 0.2326 | 0.81901 |

| | | | | |
|----------------------|-------------|------------|---------|---------|
| LnANC_{t-1} | 0.00261356 | 0.00129235 | 2.0223 | 0.06019 |
| LnPNC_t | -0.00157046 | 0.0017522 | -0.8963 | 0.38339 |

| | |
|-------------------------|-----------------------|
| R-squared | 0.208271 |
| Adjusted R-squared | 0.109305 |
| F-value | 2.104464 (p=0.154388) |
| SER | 7.212110 |
| Log-likelihood Estimate | -62.86672 |
| DW | 1.351275 |
| Schwarz criterion | 134.5668 |
| Akaike criterion | 131.7334 |

(Source: Author's Regression Results)

This is not consistent with the priori expectation of this research because in the post implementation period of the Free Maternal Healthcare policy there have been improvement in some other factors excluded in this model that impacts to reduce maternal mortality. Examples include improved educational levels of women as a result of increased enrollment of women in higher institutions, improved incomes or wealth of women particularly increased access to micro-credit for small scale business women, increased accessibility to health facilities as a result of increased number of health facilities in the kumasi metropolis and improved transportation network and among other factors thus these factors are expected to impact to reduce maternal mortality hence a negative relationship is expected. The t-ratio (0.2326) is less than the t critical value (2.086) therefore the t-ratio is statistically not significant at 82 per cent error level and

this means that the constant (other factors that impact to reduce maternal mortality but excluded in this regression model) is not statistically significant on impacting to increase maternal mortality. The statistical insignificance may be explained by some other variables included in the constant such as pregnant women accessing maternity services from traditional birth attendants(trained and untrained), private hospitals, public health facilities and also healthy lifestyle(dieting) of women during pregnancy, improved educational levels of women and improved income levels of women in the post-policy period that impact to reduce maternal mortality hence the statistical insignificance of the constant on impacting to increase maternal mortality.

The coefficient of ANC_{t-1} (the lag of antenatal attendance by pregnant women in a quarter of the year) from table 5.3b is positive 0.0026 which means that ANC_{t-1} is positively related to maternal mortality such that a one unit increase in ANC_{t-1} (previous quarter of the year antenatal clinic attendance by pregnant women) increases maternal mortality by 0.003 units holding all the other parameters in the model constant. This relationship is not consistent with the research's priori expectation because in the post Free Maternal Healthcare period, antenatal clinic attendance by pregnant women in a previous quarter of the year (ANC_{t-1}) is expected to impact to reduce maternal mortality in the next quarter of the same year (MM_t). This positive relationship may be explained that, the implementation of the Free Maternal Healthcare policy in 2008 has led to increased utilization of antenatal care services from health facilities thus leading to overcrowding and overstretching of equipments and health facilities thus affecting the quality of antenatal care provided and also challenges of understaffing at health facilities particularly medical doctors and nurses and lack of adequate and modern equipments

including laboratories, x rays, body scanners et cetera all affect the quality of antenatal services provided by health facilities thus these factors impacting to cause the positive relationship. The t-ratio (2.0223) is less than the t critical value (2.086) thus the t-ratio is not statistically significant at 6 per cent error level and this means that the variable ANC_{t-1} is not statistically significant on impacting to increase maternal mortality. This statistical insignificance may be due to the impact of other external factors such as increased access to medical care including drugs from health facilities as a result of implementation of the policy that impact to reduce risk during pregnancy period and childbirth thus despite ANC_{t-1} increasing maternal mortality, it is not statistically significant on impacting to increase maternal mortality.

Ghana Health Service Annual Report (2011) indicates that implementation of Free Maternal Care services in the National Health Insurance Scheme has resulted in an increase in access and utilization of health services with ANC coverage improving since 2008 with 92.1 per cent in 2009, 93.3 per cent in 2010 and 94.4 per cent in 2011. However, the marginal increases in ANC coverage is not yielding the necessary result and reports the following factors as compromising the quality of service provided in the Free Maternal Care which is not making the policy to yield the results of reducing maternal mortality. The impeding factors includes health facilities now earn more than 80 per cent of their Internally Generated funds from insured clients of the National Health Insurance Scheme and this is the main source of funding for health facilities with Government funding of health facilities decreasing over the years. Thus long delays in reimbursement of health facilities for services rendered to insured clients by the various district schemes is affecting the ability of health facilities particularly non governmental

health facilities to procure drugs and supplies. This is bound to have a large impact on the quality of care offered by the health facilities. Delays in reimbursement have resulted from a number of factors among which are increases in the client base of the various district schemes resulting in an increase in the number of forms that must be submitted each month by the health facilities, delays in submission of claims leads to delays in vetting of claims by the schemes and this coupled with lack of funds at the district impedes the settlement of claims. Further, the National Health Insurance Authority inspection of health facilities indicated that most of the facilities obtained a grade C with only 3 per cent being awarded a grade A. The accreditation rating is a proxy of the quality of care being offered in a particular facility. This is an indication for an urgent need to support the majority of health facilities to improve their infrastructure, equipment and staffing in order to improve their ratings. Other factors impeding the success of the policy in reducing maternal mortality includes inadequate staffing and inequitable distribution of available staff to health facilities, lack of in-service training, overcrowding of health facilities as a result of the Free Maternal Care policy with inadequate expansion of health facilities and equipments, lack of adequate budgetary support from government and lack of effective supervision are factors identified to compromising the quality of maternal care services provided in the Free Maternal Care Policy thus despite the marginal increases in Antenatal care in the Free Maternal Care policy, maternal mortality has been increasing.

The coefficient of PNC_t (post-natal clinic attendance by delivered mothers in the current quarter of the year) is negative 0.0016 which means that PNC_t is negatively related to maternal mortality such that a one unit increase in PNC_t (post-natal clinic

attendance in the current quarter of the year) decreases maternal mortality by 0.002 units in the same quarter of the year holding all the other parameters in the model constant. This is consistent with the priori expectations of this research since the implementation of the Free Maternal Healthcare Policy is expected to increase utilization of postnatal services by delivered mothers in a current quarter of the year to impact to reduce postpartum maternal mortalities thus a negative relationship is expected between the variables. However, the t-ratio (-0.8963) is greater than the t critical value(-2.086) thus the t-ratio is not statistically significant and this means that the variable PNC_t is not statistically significant on impacting to decrease maternal mortality at thirty eight per cent(38 per cent) error level. This statistical insignificance may be explained by lack of quality in the provision of post-natal services provided by health facilities such as health facilities lacking modern equipments including theatres or operating rooms, laboratories, equipped maternity wards, lack of medical drugs, inadequate blood banks, understaffing of qualified health professionals such as doctors and nurses et cetera thus despite the negative relationship, PNC_t is not statistically significant on impacting to reduce maternal mortality.

Ghana Health Service Annual Report (2011) indicates that implementation of Free Maternal Care services in the National Health Insurance Scheme resulting in an increase in access and utilization of health services. The report indicates that PNC coverage has also been improving since 2008 from 53 pr cent in 2008, 56 per cent in 2009, 62 per cent in 2010 and 65 per cent in 2011. However, the marginal increases in these parameters since the implementation of the policy in 2008 is not yielding the necessary result and reports the following factors as compromising the quality of service provided in the Free

Maternal Care which is not making the policy to yield the results of reducing maternal mortality. The impeding factors includes health facilities now earn more than 80 per cent of their Internally Generated funds from insured clients of the National Health Insurance Scheme and this is the main source of funding for health facilities with Government funding of health facilities decreasing over the years. Thus long delays in reimbursement of health facilities for services rendered to insured clients by the various district schemes is affecting the ability of health facilities particularly non governmental health facilities to procure drugs and supplies. This is bound to have a large impact on the quality of care offered by the health facilities. Delays in reimbursement have resulted from a number of factors among which are increases in the client base of the various district schemes resulting in an increase in the number of forms that must be submitted each month by the health facilities, delays in submission of claims leads to delays in vetting of claims by the schemes and this coupled with lack of funds at the district impedes the settlement of claims. Further, the National Health Insurance Authority inspection of health facilities indicated that most of the facilities obtained a grade C with only 3 per cent being awarded a grade A. The accreditation rating is a proxy of the quality of care being offered in a particular facility. This is an indication for an urgent need to support the majority of health facilities to improve their infrastructure, equipment and staffing in order to improve their ratings. Other factors impeding the success of the policy in reducing maternal mortality includes inadequate staffing and inequitable distribution of available staff to health facilities, lack of in-service training, overcrowding of health facilities as a result of the Free Maternal Care policy with inadequate expansion of health facilities and equipments, lack of adequate budgetary support from government and lack of effective

supervision are factors identified to compromising the quality of maternal care services provided in the Free Maternal Care Policy thus despite the marginal increases in Postnatal care in the Free Maternal Care policy, maternal mortality has been increasing despite the marginal increases in Postnatal care services in the post-policy period.

R-squared for the post-policy regression model is 0.208 and this means that the explanatory power of the explanatory variables (ANC_{t-1} , PNC_t) on maternal mortality in the post-policy period is twenty one per cent (21 per cent)

5.4: RESULTS AND ANALYSIS: POOLED REGRESSION

Two results are presented in this section. The first, Table 5.4a, is the log-linear regression results for the pooled data for the 2003-2012 period. Table 5.4b shows the regression results of the linear function for the pooled data.

From the pooled regression results depicted in table 5.4a, the coefficient of the constant is negative 2.0732 which means that maternal mortality is negatively related to the constant (other factors that impact on maternal mortality but excluded in this regression model) such that a one per cent increase in the constant, reduces maternal mortality by two hundred and seven per cent (207 per cent) holding the parameters in the model constant.

Table 5.4.a: Log-Linear Regression of the Maternal Mortality Function Using Pooled data.

| Variable | Coefficient | Standard error | t-ratio | p-value |
|----------|-------------|----------------|---------|---------|
|----------|-------------|----------------|---------|---------|

| | | | | |
|----------------------|-----------|----------|---------|---------|
| Constant | -2.07326 | 2.1397 | -0.9689 | 0.33904 |
| LnANC_{t-1} | 0.490066 | 0.169503 | 2.8912 | 0.00647 |
| LnPNC_t | 0.0968059 | 0.209606 | 0.4618 | 0.64697 |

| | |
|-------------------------|-----------------------|
| R-squared | 0.213132 |
| Adjusted R-squared | 0.169417 |
| F-value | 4.875509 (p=0.013373) |
| SER | 0.203042 |
| Log-likelihood Estimate | 8.401519 |
| DW | 1.512697 |
| Schwarz criterion | -5.812352 |
| Akaike criterion | -10.80304 |

(Source: Author's Regression Results)

This is consistent with the priori expectation of this research because there are some other factors excluded in this model that impact to reduce maternal mortality. Examples includes pregnant women accessing maternity services from traditional birth attendants(trained and untrained), private hospitals, public health facilities and also health lifestyle(dieting) of women during pregnancy, improved educational levels of women and improved income levels of women. However, the t-ratio (0.7000) is less than the t critical value (2.021) therefore the t-ratio is statistically not significant at thirty four per cent (34 per cent) error level and this means that the constant (other factors that impact to reduce maternal mortality but excluded in this regression model) is not statistically significant on impacting to reduce maternal mortality. The statistical insignificance may be explained

by challenges in terms of the quality of the variables included in the constant such as user fees charged for maternity services provided by health facilities and quality of services provided, geographical barriers such as long distances and access transportation to health facilities among other negative factors that affects the quality of variables included in the constant to cause a statistical insignificant impact on reducing maternal mortality.

The coefficient of LnANC_{t-1} (natural log of the lag of antenatal attendance by pregnant women in a quarter of the year) from figure 5.4.1 is positive 0.49 which means that LnANC_{t-1} is positively related to maternal mortality such that a one per cent increase in LnANC_{t-1} (previous quarter of the year antenatal clinic attendance by pregnant women) increases maternal mortality in the current quarter of the year (LnMM_t) by forty nine per cent (49 per cent) holding all the other parameters in the model constant. This relationship is not consistent with the research's priori expectation because antenatal clinic attendance by pregnant women in a previous quarter of the year (LnANC_{t-1}) is expected to impact to reduce maternal mortality in the current quarter of the same year (LnMM_t). However the t-ratio (2.8912) is greater than the t critical value (2.021) thus the t-ratio is statistically significant and this means that the variable LnANC_{t-1} is statistically significant on impacting to increase maternal mortality. This can be explained by challenges in the quality of antenatal services provided by health facilities such as inadequate and obsolete equipments such as x-ray machines, body scanners, laboratories, medical drugs among others used by health facilities and challenges of lack of qualified health personnel such as doctors and nurse in some health facilities in the provision of antenatal services to pregnant women thus despites the negative relation between

antenatal attendance by pregnant women in a previous quarter of the year, it is not statistically significant on impacting to reduce maternal mortality in the next quarter of the same year.

Africa Progress Panel report (2011) indicates that even when cost is not a primary obstacle; women are often unable to access quality maternal healthcare services when they need it most. Their study in Malawi found that only 13 per cent of clinics had 24 hour midwife care, a major hazard for women who face complications from childbirth or neonatal emergencies at night. The geographic and inequitable distribution of health workers complicates the issue of access. This can be particularly dangerous for women suffering from obstetric complications, where delays in reaching medical care can have permanent consequences; obstetric fistula, a painful and unhygienic consequence of obstetric labour over a long time is compounded by the inability to reach medical facility. Also pervasive attitudes about women in many areas frequently stop women from accessing existing maternal healthcare services. In many parts of Africa, women must seek permission from their husband or family to visit a clinic for maternal care. Even when permission is nominally given, women's lack of autonomy in their families can still prevent them seeking care. These factors or impediments combine and reinforce each other to prevent successful utilization of maternal healthcare services by many women. Therefore, to achieve real progress in maternal health; effective financing methods must consider these barriers.

The coefficient of PNC_t (natural log of post-natal clinic attendance by delivered mothers in the current quarter of the year) is positive 0.096 which means that PNC_t is

positively related to maternal mortality such that a one per cent increase in PNC_t (post-natal clinic attendance in the current quarter of the year) increases maternal mortality by about ten per cent (about 10 per cent) in the same quarter of the year holding all the other parameters in the model constant. This is not consistent with the priori expectations of this research since post-natal clinic attendance by delivered mothers in a current quarter of the year is expected to impact to reduce post-partum maternal mortalities thus a negative relationship is expected between the variables. However, the t-ratio (0.4618) is less than the t critical value (2.021) thus the t-ratio is not statistically significant and this means that the variable PNC_t is not statistically significant on impacting to increase maternal mortality at sixty five per cent (65 per cent) error level. This statistical insignificance may be due to the impact of other external factors such access to medical care including drugs from health facilities as a result of the Free Maternal Healthcare policy.

Africa Progress Panel report (2011) indicates that even when cost is not a primary obstacle; women are often unable to access quality maternal healthcare services when they need it most. Their study in Malawi found that only 13 per cent of clinics had 24 hour midwife care, a major hazard for women who face complications from childbirth or neonatal emergencies at night. The geographic and inequitable distribution of health workers complicates the issue of access. This can be particularly dangerous for women suffering from obstetric complications, where delays in reaching medical care can have permanent consequences; obstetric fistula, a painful and unhygienic consequence of obstetric labour over a long time is compounded by the inability to reach medical facility. Also pervasive attitudes about women in many areas frequently stop women from

accessing existing maternal healthcare services. In many parts of Africa, women must seek permission from their husband or family to visit a clinic for maternal care. Even when permission is nominally given, women's lack of autonomy in their families can still prevent them seeking care. These factors or impediments combine and reinforce each other to prevent successful utilization of maternal healthcare services by many women. Therefore, to achieve real progress in maternal health; effective financing methods must consider these barriers.

R-squared for the pooled regression is 0.21 and this means that the explanatory power of the explanatory variables ($\ln \text{ANC}_{t-1}$, $\ln \text{PNC}_t$) on maternal mortality in the pooled regression is twenty one per cent (21 per cent).

Table 5.4b: Linear Regression of the Maternal Mortality Function Using Pooled data.

| Variable | Coefficient | Standard error | t-ratio | p-value |
|------------------------|-------------|----------------|---------|---------|
| Constant | 12.1328 | 8.22549 | 1.4750 | 0.14890 |
| $\ln \text{ANC}_{t-1}$ | 0.00127943 | 0.000426368 | 3.0008 | 0.00487 |
| $\ln \text{PNC}_t$ | 0.000342827 | 0.00111426 | 0.3077 | 0.76010 |

| | |
|-------------------------|-----------------------|
| R-squared | 0.221287 |
| Adjusted R-squared | 0.178025 |
| F-value | 5.115058 (p=0.011087) |
| SER | 6.652166 |
| Log-likelihood Estimate | -127.6805 |
| DW | 1.539632 |
| Schwarz criterion | 266.3517 |
| Akaike criterion | 261.3611 |

(Source: Author's Regression Results)

From the pooled regression results depicted in table 5.4b using linear specification of the model, the coefficient of the constant is positive 12.13 which means that maternal mortality is positively related to the constant (other factors that impact on maternal mortality but excluded in this regression model) such that a one unit increase in the constant, increases maternal mortality by 12.13 units holding the parameters in the model constant. This is not consistent with the priori expectation of this research because there are some other factors excluded in this model that impact to reduce maternal mortality. Examples includes pregnant women accessing maternity services from traditional birth attendants(trained and untrained), private hospitals, public health facilities and also health lifestyle(dieting) of women during pregnancy, improved educational levels of women and improved income levels of women thus a negative relationship is expected between the variables. However, the t-ratio (1.4750) is less than the t critical value (2.021) therefore the t-ratio is statistically not significant at fifteen per cent (15 per cent) error level and this means that the constant (other factors that impact to reduce maternal mortality but

excluded in this regression model) is not statistically significant on impacting to increase maternal mortality. The statistical insignificance may be explained by some other variables included in the constant such as pregnant women accessing maternity services from traditional birth attendants(trained and untrained), private hospitals, public health facilities and also healthy lifestyle(dieting) of women during pregnancy, improved educational levels of women and improved income levels of women that impact to reduce maternal mortality hence despite the positive relationship, the constant is not statistically significant on impacting to increase maternal mortality.

The coefficient of ANC_{t-1} (the lag of antenatal attendance by pregnant women in a quarter of the year) from figure 5.4.1 is positive 0.0013 which means that ANC_{t-1} is positively related to maternal mortality such that a one unit increase in ANC_{t-1} (previous quarter of the year antenatal clinic attendance by pregnant women) increases maternal mortality by 0.001 units holding all the other parameters in the model constant. This relationship is not consistent with the research's priori expectation because antenatal clinic attendance by pregnant women in a previous quarter of the year (ANC_{t-1}) is expected to impact to reduce maternal mortality in the current quarter of the same year (MM_t). However the t-ratio (3.0008) is greater than the t critical value (2.021) thus the t-ratio is statistically significant and this means that the variable ANC_{t-1} is statistically significant on impacting to increase maternal mortality at 0.5 per cent error level. This can be explained by challenges in the quality of antenatal services provided by health facilities such as inadequate and obsolete equipments such as x-ray machines, body scanners, laboratories, medical drugs among others used by health facilities and challenges of lack of qualified health personnel such as doctors and nurse in some health

facilities in the provision of antenatal services to pregnant women thus increases in antenatal clinic attendance in a previous quarter of the year(ANC_{t-1}) being statistically significant on impacting to increase maternal mortality in the next quarter of the same year.

Africa Progress Panel report (2011) indicates that even when cost is not a primary obstacle; women are often unable to access quality maternal healthcare services when they need it most. Their study in Malawi found that only 13 per cent of clinics had 24 hour midwife care, a major hazard for women who face complications from childbirth or neonatal emergencies at night. The geographic and inequitable distribution of health workers complicates the issue of access. This can be particularly dangerous for women suffering from obstetric complications, where delays in reaching medical care can have permanent consequences; obstetric fistula, a painful and unhygienic consequence of obstetric labour over a long time is compounded by the inability to reach medical facility. Also pervasive attitudes about women in many areas frequently stop women from accessing existing maternal healthcare services. In many parts of Africa, women must seek permission from their husband or family to visit a clinic for maternal care. Even when permission is nominally given, women's lack of autonomy in their families can still prevent them seeking care. These factors or impediments combine and reinforce each other to prevent successful utilization of maternal healthcare services by many women. Therefore, to achieve real progress in maternal health; effective financing methods must consider these barriers.

The coefficient of PNC_t (post-natal clinic attendance by delivered mothers in the current quarter of the year) is positive 0.0003 which means that PNC_t is positively related to maternal mortality such that a one unit increase in PNC_t (post-natal clinic attendance in the current quarter of the year) increases maternal mortality by 0.0003units in the same quarter of the year holding all the other parameters in the model constant. This is not consistent with the priori expectations of this research since post-natal clinic attendance by delivered mothers in a current quarter of the year is expected to impact to reduce post-partum maternal mortalities thus a negative relationship is expected between the variables. However, the t-ratio (0.3077) is less than the t critical value (2.021) thus the t-ratio is not statistically significant and this means that the variable PNC_t is not statistically significant on impacting to increase maternal mortality at seventy six per cent (76 per cent) error level. This statistical insignificance may be due to the impact of other external factors such access to medical care including drugs from health facilities including private midwives and public health facilities.

Africa Progress Panel report (2011) indicates that even when cost is not a primary obstacle; women are often unable to access quality maternal healthcare services when they need it most. Their study in Malawi found that only 13 per cent of clinics had 24 hour midwife care, a major hazard for women who face complications from childbirth or neonatal emergencies at night. The geographic and inequitable distribution of health workers complicates the issue of access. This can be particularly dangerous for women suffering from obstetric complications, where delays in reaching medical care can have permanent consequences; obstetric fistula, a painful and unhygienic consequence of obstetric labour over a long time is compounded by the inability to reach medical facility.

Also pervasive attitudes about women in many areas frequently stop women from accessing existing maternal healthcare services. In many parts of Africa, women must seek permission from their husband or family to visit a clinic for maternal care. Even when permission is nominally given, women's lack of autonomy in their families can still prevent them seeking care. These factors or impediments combine and reinforce each other to prevent successful utilization of maternal healthcare services by many women. Therefore, to achieve real progress in maternal health; effective financing methods must consider these barriers

R-squared for the pooled regression is 0.2212 and this means that the explanatory power of the explanatory variables (ANC_{t-1} , PNC_t) on maternal mortality in the pooled regression is twenty two per cent (22 per cent).

5.5 HYPOTHESIS TEST RESULTS

Three main hypotheses were tested. These were related to antenatal care impact test, postnatal care impact test and structural stability (or shift) test. Due to computational inconsistencies and challenges encountered, each hypothesis is reported for both log-linear and linear functions under the pre-policy, post-policy and pooled data periods, as follows.

5.5.1: Antenatal Care Impact Hypothesis

H_0 : Antenatal care (attendance) in previous quarter (of the year) has no impact on maternal mortality in the current period.

H_1 : Antenatal care (attendance) in previous quarter (of the year) has an impact on maternal mortality in the current period.

Pre-Policy Period

For the log-linear function (based on Table 5.2a), $t^* = -0.1780$ but the critical t-value = -2.120. Thus H_0 is not rejected. The implication is that antenatal care (attendance) in previous quarter (of the year) has no impact on maternal mortality in the current period in the pre-policy period.

For the linear function (based on Table 5.2b), $t^* = -0.1206$ but the critical t-value = -2.120. Thus H_0 is not rejected. The implication is that antenatal care (attendance) in previous quarter (of the year) has no impact on maternal mortality in the current period in the pre-policy period.

Post-Policy Period

For the log-linear function (based on Table 5.3a), $t^* = 2.1397$ but the critical t-value = 2.120. Thus H_0 is rejected. The implication is that antenatal care (attendance) in previous quarter (of the year) has an impact on maternal mortality in the current period in the post-policy period.

For the linear function (based on Table 5.3b), $t^* = 2.0223$ but the critical t-value = 2.120. Thus H_0 is not rejected. The implication is that antenatal care (attendance) in previous quarter (of the year) has no impact on maternal mortality in the current period in the post-policy period.

Pooled Regression

For the log-linear function (based on Table 5.4a), $t^* = 2.8912$ but the critical t-value = 2.021. Thus H_0 is rejected. The implication is that antenatal care (attendance) in previous quarter (of the year) has an impact on maternal mortality in the current period.

For the linear function (based on Table 5.4b), $t^* = 3.0008$ but the critical t-value = 2.021. Thus H_0 is rejected. The implication is that antenatal care (attendance) in previous quarter (of the year) has an impact on maternal mortality in the current period.

5.5.2: Postnatal Care Impact Hypothesis

H_0 : Postnatal care (attendance) in current quarter (of the year) has no impact on maternal mortality in the current period.

H_1 : Postnatal care (attendance) in current quarter (of the year) has an impact on maternal mortality in the current period.

Pre-Policy Period

For the log-linear function (based on Table 5.2a), $t^* = 1.6750$ but the critical t-value = 2.120. Thus H_0 is not rejected. The implication is that postnatal care (attendance) in current quarter (of the year) has no impact on maternal mortality in the current period in the pre-policy period.

For the linear function (based on Table 5.2b), $t^* = 1.4484$ but the critical t-value = 2.120. Thus H_0 is not rejected. The implication is that postnatal care (attendance) in current quarter (of the year) has no impact on maternal mortality in the current period in the pre-policy period.

Post-Policy Period

For the log-linear function (based on Table 5.3a), $t^* = -1.2545$ but the critical t-value = -2.120. Thus H_0 is not rejected. The implication is that postnatal care (attendance) in current quarter (of the year) has no impact on maternal mortality in the current period in the post-policy period.

For the linear function (based on Table 5.3b), $t^* = -0.8963$ but the critical t-value = -2.120. Thus H_0 is not rejected. The implication is that postnatal care (attendance) in current quarter (of the year) has no impact on maternal mortality in the current period in the post-policy period.

Pooled Regression

For the log-linear function (based on Table 5.4a), $t^* = 0.4618$ but the critical t-value = 2.021. Thus H_0 is not rejected. The implication is that postnatal care (attendance) in current quarter (of the year) has no impact on maternal mortality in the current period.

For the linear function (based on Table 5.4b), $t^* = 0.3077$ but the critical t-value = 2.021. Thus H_0 is not rejected. The implication is that postnatal care (attendance) in current quarter (of the year) has no impact on maternal mortality in the current period.

5.5.3: The Structural Stability Test

H_0 : There is parametric stability (no structural change in the maternal mortality function).

H_1 : There is structural change (structural change in the maternal mortality function).

The test was conducted using Gregory Chow's F-test, defined as

$$F^* = \frac{RSS_5 / k}{RSS_4 / (n_2 + n_3 - 2k)}$$

Where k = the number of parameters

$$RSS_5 = RSS_1 - RSS_4$$

$$RSS_4 = RSS_2 + RSS_3$$

Such that RSS_1 = Residual sums of squares for the pooled regression with sample size n_1

RSS_2 = Residual sums of squares for the pre-policy regression of sample size n_2

RSS_3 = Residual sums of squares for the post-policy regression of sample size n_3

From the regression results using log-log specification of the model;

$$RSS_1 = 1.4841$$

$$RSS_2 = 0.6481$$

$$RSS_3 = 0.5933$$

$$RSS_4 = 1.2414$$

$$RSS_5 = 0.2427$$

$$k = 3$$

$$F^* = 2.0851$$

$$\text{But } F_{0.05, 3, 32} = 2.92 \text{ and } F_{0.10, 3, 32} = 2.82$$

Therefore H_0 is accepted which means that there is structural or parameter stability at 5% and 10 % error levels.

From the regression results using linear specification of the model;

$$RSS_1 = 1593.047$$

$$RSS_2 = 577.0994$$

$$RSS_3 = 832.2325$$

$$RSS_4 = 1409.3319$$

$$RSS_5 = 183.7151$$

$$k = 3$$

$$F^* = 1.39$$

$$\text{But } F_{0.05, 3, 32} = 2.92 \text{ and } F_{0.10, 3, 32} = 2.82$$

Therefore H_0 is accepted which means that there is structural or parameter stability at 5% and 10 % error levels.

An alternative stability test was performed by including the policy variable as a dummy in the pooled regression, first to account for the change in the intercept (parallel shift) of the function; and then to account for a change in the intercept and partial slopes of the function. The results indicated that the policy variable did not cause any parallel shift of the function, on the basis of statistical significance, for both the linear and log-

linear specifications. In a similar manner, and on the basis of statistical significance, the policy dummy variable did not appear to cause both autonomous and induced shifts in the maternal mortality function. The detailed results of the regressions estimated are provided in tables at the appendix (Table A5.1 – Table A5.4). The conclusions from these results are not inconsistent with those obtained in Gregory Chow’s test.

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CHAPTER SIX

SUMMARY AND RECOMMENDATION

6.1 SUMMARY OF FINDINGS

(1) The trend analysis indicated that, the trend in maternal mortality in the pre-policy period (2003-2007) was relatively stable but there is a declining trend in maternal mortality in the post-policy period (2008-2012).

The trend analysis also indicated that, the trend in antenatal care (attendance) in the pre-policy period (2003-2007) was relatively stable but there is an increasing trend in antenatal care (attendance) in the post-policy period (2008-2012).

The trend analysis further indicated that, the trend in postnatal care (attendance) in the pre-policy period (2003-2007) was relatively stable but there is an increasing trend in postnatal care (attendance) in the post-policy period (2008-2012).

(2) In the pre-policy period (2003-2007), in the log-linear specification model, maternal mortalities was negatively related to antenatal care (attendance) in a previous quarter of the year ($\ln \text{ANC}_{t-1}$) such that a one per cent increase in antenatal care (attendance) in a previous quarter of the year ($\ln \text{ANC}_{t-1}$) reduced maternal mortalities by ten per cent (10 per cent) in the current quarter.

The linear specification model also indicates a negative relationship between maternal mortalities and antenatal clinic attendance a previous quarter of the year (ANC_{t-1}) such that a one unit increase in antenatal clinic attendance in a previous quarter of the year (ANC_{t-1}) decreased maternal mortalities by 0.002 units in the current quarter.

(3) In the pre-policy period, the log-log specification model indicated that maternal mortalities in a current quarter of the year ($\ln \text{MM}_t$) was positively related to postnatal clinic attendance in a current quarter of the year ($\ln \text{PNC}_t$) such that a one per cent

increase in postnatal clinic attendance in a current quarter of the year ($\ln PNC_t$) increased maternal mortalities by fifty-four per cent (54 per cent) in the current quarter.

The linear specification model also indicates a positive relationship between Maternal Mortalities in a current quarter of the year (MM_t) and postnatal clinic attendance in the current quarter of the year (PNC_t), such that a one unit increase in postnatal clinic attendance in a current quarter of the year (PNC_t) increased maternal mortalities by 0.002 units in the current quarter.

(4) In the post-policy period (2008-2012), in the log-linear specification model, maternal mortalities was positively related to antenatal clinic attendance in a previous quarter of the year ($\ln ANC_{t-1}$) such that a one per cent increase in antenatal clinic attendance in a previous quarter of the year ($\ln ANC_{t-1}$) increased maternal mortalities by 115 per cent in the current quarter.

The linear specification model also indicates a positive relationship between maternal mortalities and antenatal clinic attendance in a previous quarter of the year (ANC_{t-1}) such that a one unit increase in antenatal clinic attendance in a previous quarter of the year (ANC_{t-1}) increased maternal mortalities by 0.003 units in the current quarter.

(5) In the log-log specification model, maternal mortalities in a current quarter of the year ($\ln MM_t$) was negatively related to postnatal clinic attendance in a current quarter of the year ($\ln PNC_t$) such that a one per cent increase in postnatal clinic attendance in a current quarter of the year ($\ln PNC_t$) increased maternal mortalities by thirty nine per cent (39 per cent) in the current quarter.

The linear specification model also indicates a negative relationship between maternal mortalities in a current quarter of the year (MM_t) and postnatal clinic attendance in the current quarter of the year (PNC_t) such that a one unit increase in postnatal clinic attendance in a current quarter of the year (PNC_t) decreased maternal mortalities by 0.002 units in the current quarter.

(6) In the pre-policy period, both the log-linear and linear model specifications indicated that antenatal care (attendance) in previous quarter of the year ($\ln ANC_{t-1}$) was not statistically significant on impacting on maternal mortality in the current quarter (of the same year)

In the post-policy period, both the log-linear and linear model specifications indicated that antenatal care (attendance) in previous quarter of the year ($\ln ANC_{t-1}$) was statistically significant on impacting on maternal mortality in the current quarter (of the same year).

(7) In the pre-policy period, both the log-linear and linear model specifications indicated that postnatal care (attendance) in a current quarter of the year ($\ln PNC_t$) was not statistically significant on impacting on maternal mortality.

In the post-policy period, both the log-linear and linear model specifications indicated that postnatal care (attendance) in a current quarter of the year ($\ln PNC_t$) was not statistically significant on impacting on maternal mortality.

(8) The parametric stability tests using Gregory Chow's F-test in both log-linear and linear model specification indicated that, there was parametric stability (no structural change in the maternal mortality function).

An alternative stability test was performed by including the policy variable as a dummy in the pooled regression, first to account for the change in the intercept (parallel shift) of the function; and then to account for a change in the intercept and partial slopes of the function. The results indicated that the policy variable did not cause any parallel shift of the function, on the basis of statistical significance, for both the linear and log-linear specifications. In a similar manner, and on the basis of statistical significance, the policy dummy variable did not appear to cause both autonomous and induced shifts in the maternal mortality function.

6.2 RECOMMENDATIONS

(1) From the trend analysis of the three main variables studied, namely antenatal, postnatal and maternal mortalities, there has been an increasing trend in antenatal and postnatal care (attendance), while there is a declining trend in maternal mortality in the post-policy period. It is therefore recommended that efforts must be made by concerned agencies both local and international particularly the ministry of health and government of Ghana to sustain this policy and increase public awareness and patronage so as to help curb the high maternal mortality rate in the country and in achieving MDG 5 by 2015.

(2) The hypothesis test also indicates that, antenatal care (attendance) is statistically significant on impacting on maternal mortality in the post-policy period hence efforts must be made to increase utilization and quality provision of antenatal care so as to

impact to decrease maternal mortality and help the country in achieving MDG 5 by 2015.

(3) The hypothesis test also indicates that, postnatal care (attendance) is not statistically significant on impacting on maternal mortality in the post-policy period hence concerned agencies must address all obstacles that may be militating against the effectiveness of this policy on impacting to decrease maternal mortality.

(4) From the findings of this research, there are some other factors excluded in my regression models that may be statistically significant on impacting to reduce maternal mortalities. It is thus relevant to identify some of these other factors and create a working policy on them so as to help reduce this menace of maternal mortality and help the country at large in achieving the Millennium Development Goal 5 on maternal health by 2015.

6.3: CONCLUDING NOTE

It can be concluded from this research findings that the Free Maternal Healthcare Policy implemented in 2008 by the Government of Ghana to curtail the high maternal mortality in the country has not had a statistically significant impact on reducing maternal mortality thus some of the problems identified in this research for the ineffectiveness of the policy and recommendations made, must be addressed and implemented by the concerned agencies so as to help the country achieve it MDG 5 by 2015.

6.4: LIMITATIONS OF THE STUDY

This work encountered limitations in my study including accessing research literatures on maternal mortalities and policies to tackle it particularly locally and also accessing data on my variables of study in this research work as health facilities lack modern record keeping systems. It is obvious that the data problem in terms of quality and accuracy affected the regression results as far as some diagnostic statistics (eg. R-squared) were concerned. The availability of reliable data can overcome these challenges.

Also, there is always a question of omitted variables



BIBLIOGRAPHY

- (1)AFRICA Progress Panel (2010), ‘Africa maternal health Report’.
(<http://www.africaprogresspanel.org>)

(2)ASAMOAH et al(2011) “Distribution of causes of maternal mortality”,
(<http://www.biomedcentral.com/1471-2458/11/159>)

(3)BOATENG, K, (2008): “Development Economics”. Department of Economics,
KNUST

(3)CHILDINFO.org “Statistics by Area - Maternal mortality – Overview”,
(http://www.childinfo.org/maternal_mortality.html), (accessed 2012 October 13)

(4)CIA World Factbook ‘Handbook of International Statistics’
(<http://www.odic.gov/cia/publications/pubs.html>), (accessed 2013 January 15)

(5)DIRECTORATE of Corporate Affairs & Strategic Direction (2010), ‘National Health
Insurance Scheme Annual Report’, (<http://www.nhis.gov.gh>), (accessed 2013 March 4)

(6)GHANA Statistical Service (GSS), Ghana Health Service (GHS) and Macro
International (2003) “Demographic and Health Survey 2003”,
(<http://www.statsghana.gov.gh>), (accessed 2012 October 6)

(7)GHANA Statistical Service(GSS), Ghana Health Service(GHS), and Macro
International(2008) “Demographic and Health Survey 2008”,
(<http://www.measuredhs.com>), (accessed 2012 November 30)

(8)GHANA Health Service “Health Sector in Ghana”,
(<http://www.ghanahealthservice.org>), (accessed 2013 March 9)

(9)IMPACT(2005),The Effect of Free Delivery Policy in
Ghana,(<http://www.abdn.ac.uk/impact>)

(10)KAREN Grepin, (2009) ‘The Effect of a Delivery Fee Exemption Policy on the Utilization of Maternal Health Services in Ghana.(<http://www.people.fas.harvard.edu/grepin/>)

(11)MENSAH T. Robert “How is Ghana Dealing with Maternal Mortality? Feature Article on Ghanaweb Saturday, 23 April 2010)

(12)Ministry of Health (Ghana) “Annual Report”, (<http://www.ghana.gov.gh>), (accessed 2012 November 19)

(13)MINISTRY of Health (Ghana) “Annual Report”, (<http://www.moh-ghana.org/>), (accessed 2012 November 20)

(14)OPOKU O.A (2009) ‘Utilization of Maternal Care Services in Ghana by Region after the Implementation of Free Maternal Care Policy’’ (<http://digitalcommons.hsc.edu/theses/78>)

(15) ‘‘SOCIO-demographic factors associated with maternal deaths in Ghana’’, (<http://uaps.2011.princeton.edu/papers/110343>)

(16)THE maternal Health Study ‘‘maternal and neonatal program Effort Index, (<http://www.futuresgroup.com>), (accessed 2012 March 13)

(17)WIKIPEDIA, the free encyclopedia “Maternal Death”, (<http://wikipedia.org/>), (accessed 2012 September 16)

(18)WIKIPEDIA, thefreeencyclopedia. (<http://www.health-policy-systems.com/content/8/1/24>) (accessed 2013 March 15)

(19)WORLD Health Organization “Maternal Health”,
(<http://www.who.int/topics/maternal/>),(Accessed 2012 November 1)

(20)WORLD Health Organization “Maternal Mortality”, (<http://www.who.int/>), (accessed 2012 September 10)

(21)WORLD Bank “Improve Maternal Health by 2015”, (<http://www.worldbank.org/mdgs>), (accessed 2012 November 15)

(22)WORLD Health Organisation “Health systems service delivery”,
(<http://www.who.int/healthsystems/topics/delivery/en/>), (accessed 2012 October 19)

(23)WORLD Health Organization “International statistical classification of diseases and related health problems, 10th revision (ICD-10)”, (<http://www.who.int/topics/maternal/>), (accessed 2012 October 29)

(24)UNITED Nations Population Fund (UNFPA) (2012) “Maternal Mortality Estimates”,
(<http://www.unfpa.org>), (accessed 2013 February 6)

(25)UNITED Nations “Millennium Development Goals”, (<http://www.un.org/millenniumgoals>), (accessed 2012 November 13)

(26)UNITED Nations Population Fund “Trends in Maternal Mortality”,
(<http://www.unfpa.org>), (accessed 2012 November 5)

APPENDIX

Table A5.1: Log-linear Pooled Regression with Autonomous Policy Dummy

| | <i>Coefficient</i> | <i>Std. Error</i> | <i>t-ratio</i> | <i>p-value</i> |
|----------------------|--------------------|-------------------|----------------|----------------|
| constant | -1.33657 | 3.9104 | -0.3418 | 0.73455 |
| lnANC _{t-1} | 0.407875 | 0.401639 | 1.0155 | 0.31682 |

| | | | | |
|--------------------|-----------|--------------------|-----------|---------|
| $\ln PNC_t$ | 0.0994656 | 0.212748 | 0.4675 | 0.64302 |
| D_t | 0.0355564 | 0.157059 | 0.2264 | 0.82222 |
| Mean dependent var | 3.414856 | S.D. dependent var | 0.222790 | |
| Sum squared resid | 1.481973 | S.E. of regression | 0.205772 | |
| R-squared | 0.214283 | Adjusted R-squared | 0.146936 | |
| F(3, 35) | 3.181764 | P-value(F) | 0.035795 | |
| Log-likelihood | 8.430052 | Akaike criterion | -8.860105 | |
| Schwarz criterion | -2.205858 | Hannan-Quinn | -6.472618 | |
| rho | 0.197190 | Durbin-Watson | 1.524198 | |

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Table A5.2: Linear Pooled Regression with Autonomous Policy Dummy

| | <i>Coefficient</i> | <i>Std. Error</i> | <i>t-ratio</i> | <i>p-value</i> |
|--------------------|--------------------|--------------------|----------------|----------------|
| constant | 10.3138 | 12.0138 | 0.8585 | 0.39646 |
| ANC_{t-1} | 0.0014652 | 0.000983492 | 1.4898 | 0.14524 |
| PNC_t | 0.000328726 | 0.00113134 | 0.2906 | 0.77310 |
| D_t | -1.05605 | 5.02216 | -0.2103 | 0.83467 |
| Mean dependent var | 31.17949 | S.D. dependent var | 7.337258 | |
| Sum squared resid | 1591.037 | S.E. of regression | 6.742271 | |
| R-squared | 0.222269 | Adjusted R-squared | 0.155607 | |
| F(3, 35) | 3.334243 | P-value(F) | 0.030378 | |
| Log-likelihood | -127.6559 | Akaike criterion | 263.3118 | |
| Schwarz criterion | 269.9661 | Hannan-Quinn | 265.6993 | |
| rho | 0.202737 | Durbin-Watson | 1.536514 | |

Table A5.3: Log-linear Pooled Regression with Autonomous and Induced Policy

Dummy

| | <i>Coefficient</i> | <i>Std. Error</i> | <i>t-ratio</i> | <i>p-value</i> |
|-----------------|--------------------|-------------------|----------------|----------------|
| constant | 1.64237 | 5.62248 | 0.2921 | 0.77203 |
| $\ln ANC_{t-1}$ | -0.148721 | 0.552764 | -0.2690 | 0.78957 |
| $\ln PNC_t$ | 0.348813 | 0.270814 | 1.2880 | 0.20670 |

| | | | | |
|-----------------------|--------------|--------------------|-----------|---------|
| D_t | -0.318969 | 0.716685 | -0.4451 | 0.65918 |
| $\ln ANC_{t-1} * D_t$ | 8.14806e-05 | 5.02653e-05 | 1.6210 | 0.11453 |
| $\ln PNC_t * D_t$ | -0.000103476 | 6.31062e-05 | -1.6397 | 0.11056 |
| Mean dependent var | 3.414856 | S.D. dependent var | 0.222790 | |
| Sum squared resid | 1.299785 | S.E. of regression | 0.198463 | |
| R-squared | 0.310876 | Adjusted R-squared | 0.206463 | |
| F(5, 33) | 2.977377 | P-value(F) | 0.025137 | |
| Log-likelihood | 10.98798 | Akaike criterion | -9.975957 | |
| Schwarz criterion | 0.005413 | Hannan-Quinn | -6.394727 | |
| rho | 0.174196 | Durbin-Watson | 1.616142 | |

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Table A5.4: Linear Pooled Regression with Autonomous and Induced Policy

Dummy

| | <i>Coefficient</i> | <i>Std. Error</i> | <i>t-ratio</i> | <i>p-value</i> |
|--------------------|--------------------|--------------------|----------------|----------------|
| constant | 19.5619 | 21.2794 | 0.9193 | 0.36462 |
| ANC_{t-1} | -0.000290869 | 0.0017244 | -0.1687 | 0.86708 |
| PNC_t | 0.00180891 | 0.00154367 | 1.1718 | 0.24966 |
| D_t | -14.8226 | 28.2421 | -0.5248 | 0.60320 |
| $ANC_{t-1} * D_t$ | 0.00290443 | 0.00208828 | 1.3908 | 0.17359 |
| $PNC_t * D_t$ | -0.00337936 | 0.00222109 | -1.5215 | 0.13766 |
| Mean dependent var | 31.17949 | S.D. dependent var | 7.337258 | |
| Sum squared resid | 1425.831 | S.E. of regression | 6.573204 | |
| R-squared | 0.303025 | Adjusted R-squared | 0.197423 | |
| F(5, 33) | 2.869499 | P-value(F) | 0.029356 | |
| Log-likelihood | -125.5181 | Akaike criterion | 263.0362 | |
| Schwarz criterion | 273.0176 | Hannan-Quinn | 266.6174 | |
| rho | 0.176700 | Durbin-Watson | 1.625678 | |