WOMEN'S EMPOWERMENT, MASS MEDIA EXPOSURE AND NEONATAL MORTALITY IN GHANA.

BY

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DECLARATION

This is to certify that this thesis is the result of research undertaken by **ERIC OPOKU** towards the award of Master of Philosophy degree in Economics in the Department of Economics, University of Ghana. I hereby declare that with the exception of references made to works of other researchers, which have been duly acknowledged, this thesis is entirely my own work under the guidance of my supervisors and neither part nor whole has been presented for another degree elsewhere.

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ABSTRACT

DEDICATION

This work is dedicated to my sweet mother MRS. OSEI GLADYS who has been there for me since childhood especially in times of difficulties.

ACKNOWLEDGEMENT

I thank the Almighty God whose love has carried me through this programme. I also extend unique appreciation to my supervisors Dr. Monica Lambon-Quayefio and Dr. Edward Nketiah-Amponsah who motivated and guided me to be able to complete this work. I thank my friends and persons who contributed to the realization of this study. In spite of the guidance and help from my supervisors and friends, I assume total responsibility for errors in this study.

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LIST OF ABBREVIATIONS

UNICEF   United Nations Children's Fund

WHO   World Health Organization

GDHS   Ghana Demographic and Health Survey

GSS   Ghana Statistical Service

ENAP   Every Newborn Action Plan

GNHSAP   Ghana Newborn Health Strategy and Action Plan

CHERG   Child Health Epidemiology Reference Group

UN IGME United Nations Inter-Agency Group for Child Mortality Estimation

SDG   Sustainable Development Goal

FAO   Food and Agriculture Organization of the United Nations

MCEE   Maternal and Child Epidemiology Estimation Group

WEAI   Women's Empowerment in Agriculture Index

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Neonatal mortality, according to Neupane & Doku (2014), is a global public health challenge and every day, about 10,000 children that are newly born die within the neonatal stage (28 days of life). This may be because of decreased adaptation of the neonate to extra uterine life and/or a compromise to any of the enormous physiologic processes that happen in the immediate post-natal period (Siakwa et al., 2014).

Over the years, neonatal mortality has exhibited an inadequate rate of reduction. The reason may be that there has been high emphasis on child health/survival programs such as nutrition, vaccination and several health interventions that are rather necessary for curbing the major causes of other under-five deaths other than that of neonatal deaths. Moreover, less focus is placed on factors like hospital-related investments and perhaps improvement of women's status that are required for reduction in neonatal mortality especially in rural areas (Wagstaff et al., 2009; UNICEF, 2013). For this reason, some studies including Oestergaard et al. (2011) have recommended that policies and programs should give specific attention and visibility to neonatal mortality. To increase the probability of effectiveness of such child health/survival policies and programs, Kayode et al. (2014) adds that there is the need for several research works to be done in the area of neonatal mortality as a means of throwing more light on the particular factors associated with it (neonatal mortality) especially in Sub-Saharan Africa.

Given such recommendations, currently, an 'Every Newborn Action Plan (ENAP)' is being undertaken by many partners led by WHO and UNICEF to specifically tackle and reduce the high neonatal mortality worldwide. It has been showed and recommended by some researchers including Lambon-Quayefio & Owoo (2014) that the healthcare that a mother receives during and after delivery is a crucial factor in the survival of both the mother and her newborn. So, according to the Ghana Newborn Health Strategy and Action Plan (2014) report, the aim of the 'Every Newborn Action Plan (ENAP)'is to strengthen and invest in care around labor, child birth, the first day and week of life and improving quality of maternal and newborn care. Moreover, countries like Ghana has implemented the Ghana Newborn Health Strategy and Action Plan 2014-2018 which is also meant to specifically tackle neonatal mortality. Its specific goal is to contribute to the reduction of neonatal mortality rate from 32 per 1000 live births in 2011 to 21 per 1000 live births in 2018 (a 5% decrease per year) and to reduce the institutional neonatal mortality by at least 35% by 2018. The Ghana Newborn Health Strategy and Action Plan 2014-2018 is tasked to unambiguously improve care of preterm or low birth weight or growth-restricted babies and to manage adverse intrapartum events (including birth asphyxia) and neonatal infections or sick newborns. It is specifically designed to prioritize the first day and week of birth and to also prioritize breastfeeding, care of the sick baby and the labor period and delivery.

These Action Plans tackle the major causes of neonatal mortality and even prioritize the first day and week of birth which, according to (Yinger & Ransom, 2003), is the most vulnerable period for child survival. However, neonatal deaths occur in the home or outside the formal health sector/hospital where care and skilled birth attendants are absent especially in developing countries (Saving Newborn Lives, 2001). For instance, World Health Organization statistics note that approximately 99% of all neonatal deaths occur in low and middle income countries, 70% of which

are concentrated in Africa and South-East Asia and nearly half of these deaths have been seen to occur at home (Lawn et al., 2009). Adding to it, according to UNICEF (2009) report, skilled professionals attend to fewer than half of child deliveries and each year 60 million births occur outside health facilities in low- and middle-income countries. A study conducted in Kenya by Yego et al. (2013) showed that more than half of early neonatal deaths were referred admissions which, according to Siakwa et al. (2014), may be because a high number of neonates that were sick might have arrived at the health facility late. Hence, motivating the general public specifically women to deliver in the health facilities or seek health care services (like antenatal care) may be equally important since it may improve the probability of neonatal survival. For instance, a study by Lambon-Quayefio & Owoo (2014) found a negative relationship between antenatal care visits and neonatal mortality in Ghana.

According to Darmstadt et al. (2005) and Knippenberg et al. (2005), the thought that only expensive, high-level technology and facility-based care can reduce neonatal mortality is a wrong perception. Myriad researchers including Dhakal et al. (2011) and Wilson et al. (2011), as cited in Sipsma et al. (2014), argue that strategies for increasing maternal health service utilization, involving providing financing for maternity services and increasing the supply of trained birth attendants have had limited impact and hence, it (maternal health service utilization) may be influenced by additional parameters. Since Malapit & Quisumbing (2015) argue that policy interventions that improve women's status are more likely to improve women's and children's wellbeing as well, this study proposes women's empowerment and mass media as, perhaps, neglected measures of women's status (or bargaining power in the household) which can be explored.

Now, there have been several studies that have revealed that women's empowerment positively influence seeking skilled delivery assistance, contraceptive use, postnatal care and access to antenatal care (Goli et al., 2013;Sipsma et al., 2014; Hossain & Hoque, 2015). Even myriad studies have well established that women's empowerment has a strong and positive influence on child health as measured by children's nutritional status and under-five survival (Imai *et al.*, 2014; Rabbi, 2012; Ibrahim *et al.*, 2015). Women's empowerment is multidimensional and hence there is disagreements in its measurement and definition (Duflo, 2012). Williams (2005) defines women's empowerment as women's relative position or exercise of power within the gender system. It is also defined as the power (of women) to make choices (Malhotra, Schuler, & Boender, 2002). Eswaran (2002) argues that though the benefits related to having children are proportionally allocated to the couple, the costs related to it are disproportionately borne by the women. For instance, they (women) suffer a considerable loss of income during pregnancy, and also childbirth and childrearing may even cause them to skip (or not be available for) work (Eswaran, 2002). Eswaran (2002) then concludes that when women anticipate child mortality, they (women) would try to invest more in healthcare and other aspects that are related to improving the survival chances of the already born child including allocating more of her time to seek for healthcare for the child. So, empowering women may improve the probability of survival of children at the neonatal phase.

Furthermore, in developing countries, according to UNICEF (2007), high neonatal mortality rates are in part due to lack of community awareness of appropriate care of the newborn. According to Gupta et al. (2003), as cited in Leone *et al.* (2008), the exposure to mass media proxies an individual's exposure to information within a broader community network and hence anyone within a society or cluster who is exposed to the same mass media is likely to receive the same information. When mothers are exposed to the mass media, they are more likely to have access to

information on the beneficial effects of maternal health services utilization, on the survival of the newborn and on safe motherhood and child care. Thus, such an exposure may help a mother to be able to provide quality care to their newborn irrespective of whether she is a literate or not and perhaps seek maternal care regularly thereby improving the health outcomes of their newborns. For this reason, several studies have recommended that the public officials explore the mass media to spread information on the beneficial effects of accessing care and treatment like antenatal care and also to encourage the general public especially older women on the need for them to seek professional assistance during pregnancy and delivery (Lambon-Quayefio & Owoo, 2014; Lambon-quayefio & Owoo, 2013; Iram & Butt, 2008; Acharya et al., 2015). Several studies including Shahjahan et al. (2012), Kulkarni & Nimbalkar (2008), Islam & Odland (2011) and Bbaale (2011b) have even conducted research works that revealed mass media exposure of mothers have positive effect on antenatal care attendance. So, mass media exposure may affect maternal health care utilization like antenatal care which may also affect neonatal mortality.

By and large, this thesis intends to investigate how women's empowerment and mass media exposure affect neonatal mortality in Ghana.

1.2 Statement of the Problem

Neonatal mortality is defined as all deaths that occur within the first four weeks after birth and it is viewed as one of the most relevant predictors of health status of children (Ndayisenga, 2016; Donohue et al., 2015; Risso & Nascimento, 2011). Neonatal mortality that occurs in the first week of life is termed as early neonatal death and the late neonatal death is one that occurs between 7 and 28 days of life (Baiden et al., 2006; Ndayisenga, 2016).

Global reduction in under-five mortality is viewed by several researchers to be retarded by high neonatal mortality (Ndayisenga, 2016; Donohue *et al*., 2015; Siakwa *et al*., 2014; Mckinnon *et al*., 2014). This may be because, as noted by the Ghana National Newborn Health strategy and Action Plan 2014-2018 report, the trends in the under-five mortality at the global level and in many low-resource countries, including Ghana, have shown that as there has been a major stride in the reduction of under-five mortality (and in other mortalities), the reduction in neonatal mortality has been very slow. The report further indicated that, the proportion of neonatal mortality among children under five (5) years has increased from 37% in 1990 to 44% in 2012. This means that the reduction in neonatal mortality has not been satisfactory comparative to other mortalities like infant mortality and the like.

Neonatal mortality remains as a critical health challenge as far as survival of an African child is concerned. According to the Ghana Newborn Health Strategy and Action Plan (2014), even though Africa has just 11% of the population of the world, it accounts for 25% of the newborn deaths. A third of under-five deaths occurred during the neonatal period in Sub-Saharan Africa in 2013 which also recorded the highest neonatal mortality rate- accounting for 39 percent of global neonatal deaths (UNICEF, 2013). Moreover, Sub-Saharan Africa, together with Oceania, has recorded the least improvement over the last two decades, with the neonatal mortality rate declining by only 32 percent (UNICEF, 2013). Hence, it appears that children in Sub-Saharan African countries stand a huge risk of dying in the neonatal period.

However, research necessary to inform policy interventions to reduce neonatal mortality can be said to be in its embryonic stage or very limited (Kayode et al., 2014; Donohue et al., 2015). Even with the few existing research works, there is huge global variation. Until recently, 99% of neonatal research publications were conducted in high income countries relative to lower middle income

countries where it is mostly needed (Kayode et al., 2014) owing to non-availability or limited nationally representative data.

Also, according to Lambon-Quayefio & Owoo (2014), there may be a possible under-estimation of neonatal deaths (in perhaps Sub-Saharan African countries) due to significant under-reporting, especially when the death occurs within the first couple of weeks after delivery. Their explanation to this was that, some cultural practices in Sub-Saharan African countries like Ghana do not see newborns as humans in that, they see the birth process as complete only when the newborn reaches the age of 2 weeks where it is given a name. Published data on neonatal mortality rates in Ghana have ranged from about 17 per 1000 live births (Oestergaard et al., 2011) to more than 40 per 1000 live births (Edmond et al., 2007) however the (current) national average is 29 per 1000 live births (GDHS, 2014). Hence, with all the potential under-estimation, the neonatal mortality rate for Ghana is still very high.

By and large, neonatal mortality seems to pose the greatest risk to children especially those that reside in the Sub-Saharan African countries where research to influence policy on how best to reduce neonatal mortality is also very limited. This has motivated the current study to find out how improving women's status (through women's empowerment and exposure) may influence neonatal mortality in Ghana. As far as the author of this study is concerned, though some researchers have examined the effect of empowerment and mass media exposure of women on other mortalities (like infant and under-five mortality), child nutrition and/or immunization and their influence on demand for medical care (like antenatal care), none of them has explored their (women's empowerment and mass media exposure) effect on neonatal mortality in Ghana. This study also intends to examine other predictors that affect neonatal mortality in Ghana.

1.3 Research Questions

1. Are women's empowerment and mass media exposure independent dimensions of women's status in affecting neonatal mortality?

2. Does women's empowerment have a significant effect on neonatal mortality?

3. Does mass media exposure affect neonatal mortality in Ghana mainly through health input(s)?

1.4 Research Objectives

Generally, this study seeks to contribute to the existing literature on neonatal mortality and to fill the research gap by investigating the potential role that women's empowerment and mass media exposure play in neonatal deaths in Ghana. Specifically, this study intends to examine the effect of women's empowerment and mass media exposure on neonatal mortality in Ghana.

1.5 Hypothesis to be Tested

The hypothesis this study seeks to test are;

1. There is self-selection in women's empowerment.

2. Exposure to the mass media of mothers primarily affects neonatal mortality in Ghana through health input(s).

3. Women's empowerment has significant and independent effect on neonatal mortality irrespective of whether a woman seeks for health inputs.

1.6 Scope of the Study

This thesis attempts to find out the effect of women's empowerment and mass media exposure on neonatal mortality in Ghana since their (women's empowerment and mass media exposure) effect on other child mortalities has been already been explored. This is because neonatal mortality is seen or viewed as a bottleneck in the reduction of childhood mortality in many Sub-Saharan countries like Ghana. Meanwhile, children are precious and perhaps, their survival may be the source for sustaining the human race and economic development. Following Basu (2006) and Imai et al. (2014), the potential endogeneity of women's empowerment will be taken into consideration.

1.7 Justification of the Study

The India's National Population Policy (2000), as cited in Choudhury (2015), has emphasized that the low women's socio-economic empowerment in India is a relevant impediment to the attainment of maternal and child welfare goals (Government of India, 2000). This statement emphasizes the need to empower women and how that may translate into improvement in the lives and wellbeing of children. This study then intends to provide evidence on the beneficial effects of improving women's status (as measured by women's empowerment and mass media exposure) as far as neonatal survival is concerned.

The results of this thesis would help to identify the relevant correlates of neonatal mortality in Ghana. This is because the study attempts to investigate other determinants of neonatal mortality together with the variables of interest (women's empowerment and mass media exposure).

This study will pre-inform researchers on the effects of women's empowerment and mass media exposure on neonatal survival in Ghana. Hence, it will not only encourage further research in the area of neonatal mortality, but it will also serve as a guide and reference material to researchers in exploring the effects of women's empowerment and mass media exposure on child survival/health.

The findings of this thesis will also inform policy since the variables of interest (women's empowerment and mass media exposure) are relevant but neglected as far as policies and programs, specifically Ghana health policies are concerned.

1.8 Organization of the Study

This thesis is composed of Six (6) chapters. Chapter one encompasses introduction to the study: background, problem statement, research questions, research objectives, hypothesis to be tested, scope of the study, justification of the study, and organization of the study. Chapter two focuses on a review of the theoretical, and empirical literature. Chapter three presents an overview of neonatal mortality both at the global level and in Ghana. Chapter four (4) encompasses theoretical framework, estimation techniques, empirical estimation and source of data employed in this thesis. Chapter five presents the regression estimations and interpretation of results that have been generated using Statistical Analysis (Stata). The results are presented in tabular formats for interpretation. Chapter six presents the study's summary, key findings, conclusions and policy recommendations.

CHAPTER TWO

OVERVIEW OF NEONATAL MORTALITY

2.0 Introduction

This chapter gives more information and insight into how the neonatal mortality situation, worldwide and in Ghana, has been in the past, how it is currently and how it is expected to be in the future.

2.1 When do neonates die most?

According to UNICEF (2013), about 36% of newborns died the very day that they were born, another 37% died within the next six days of birth and only 27 percent occurred between day 7 and 27 in 2013. Nearly 1 million of the estimated 5.9 million child deaths in 2015 occurred in the first day of life whilst almost 2 million occurred in the first week (UNICEF, 2015). According to Ghana Newborn Strategy (2014), half (50%) of deaths of neonates occurred within the first 24 hours of birth and 75% occurred by the end of the first week. Welaga et al. (2013) undertook a study and it was revealed that 28% of neonates died in their first day of life, 53% died in the first 3 days and 65% died during the first week in Northern Ghana. This proposed global statistics about neonatal mortality shows that the early neonatal period poses the greatest threat to neonates.
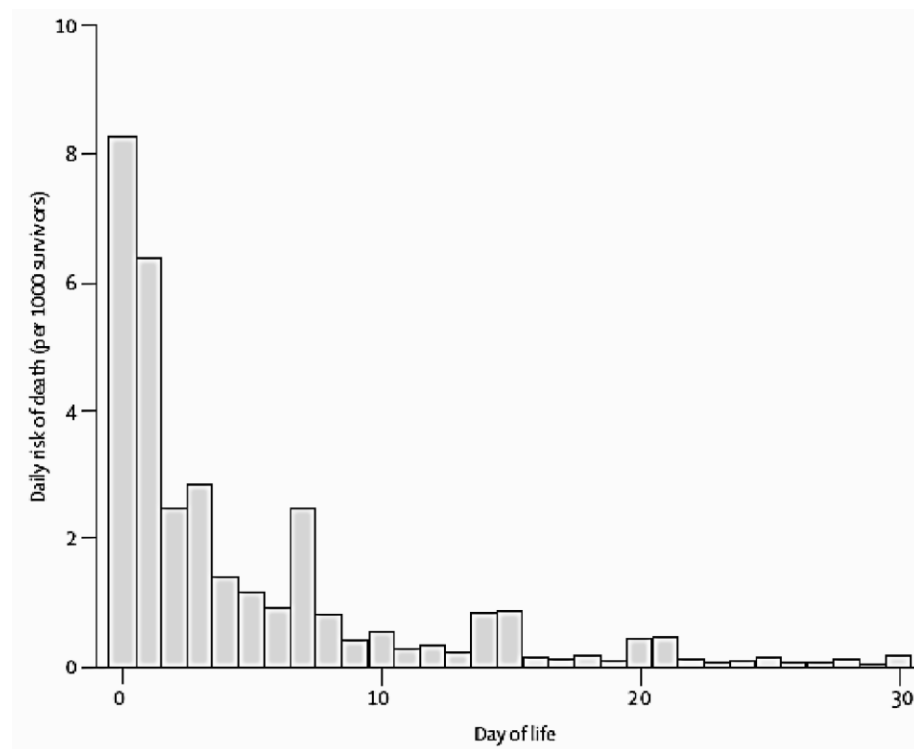
Figure 2. 1 **Timing of neonatal deaths**

Source: Lawn et al. (2005)

2.2 What do neonates die of?

Globally, the major causes of neonatal mortality were preterm birth complications, (35%), intrapartum related complications (24%), and neonatal sepsis (15%) in 2015 (UNICEF, 2015).
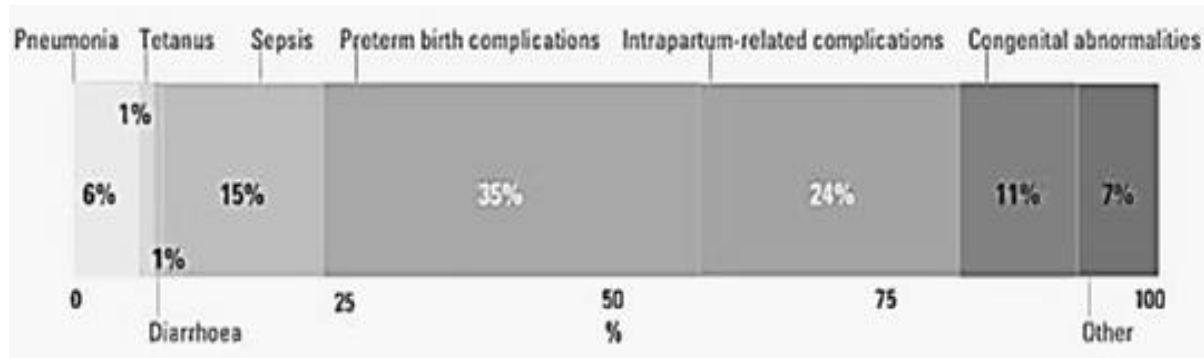
Figure 2. 2 **Global distribution of deaths among newborns (0-27 days) by cause, 2015**

Source: WHO and Maternal and Child Epidemiology Estimation Group provisional estimates

2015.

2.3 How is the death of children projected to be?

Since 1990, according to UNICEF (2013), the lives of 90 million children have been saved, those that have died before their fifth birthday are 216 million. Based on the current projections, an extra 35 million children will die between 2015 and 2028 meanwhile if the MDG (4) had been met on time, the lives of these children would have been saved. Additionally, there was an increase of neonatal deaths of about 37% in 1990 to 44% in 2013 among under-five deaths and this trend is projected to continue even as under-five mortality rates continues to decline (UNICEF 2013).
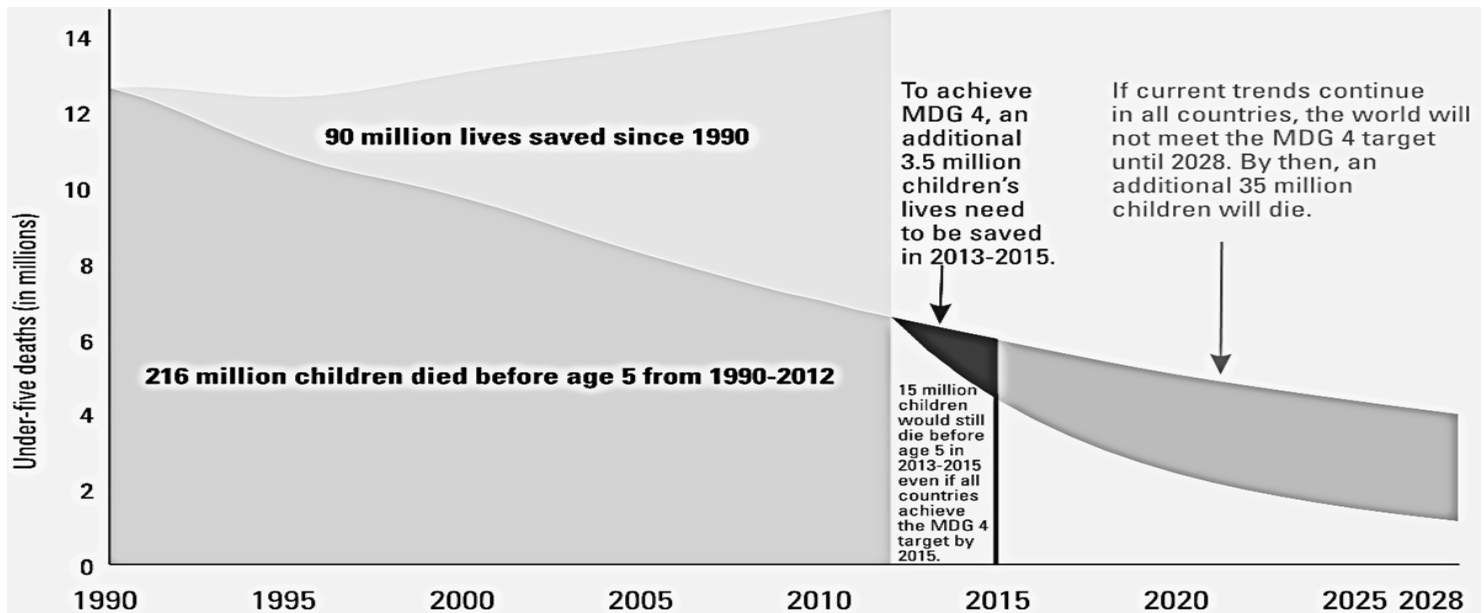
Figure 2. 3 **Lives lost, saved and to be saved.**

Source: UNICEF analysis based on IGME, WHO and CHERG 2013.

2.4 Neonatal Mortality situation in Ghana

According to Ghana Newborn Health Strategy and Action Plan (2014) report, till 2008 where there were stagnation and increase in neonatal mortality causing a reverse movement in under-five mortality, Ghana had made progress in the reduction of under-five mortality. Currently, according to GDHS (2014) report, the neonatal mortality rate in Ghana is 29 deaths per 1000 live births which is 2.2 times the post-neonatal rate. Neonatal mortality reduced by merely 3 percent as against a reduction of 41 percent, 21 percent, and 31 percent for post neonatal, infant and under-five mortality respectively over the 15-year period preceding the survey. The 2014 GDHS data also depicts a reduction of 29 percent and 50 percent in neonatal and post-neonatal mortality respectively since 1993. Hence, there is a reduction in the risk of death of a Ghanaian child that

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survives the first month of life by more than half (i.e 55 percent) in the remaining 11 months of the first year of life (GDHS, 2014). It is worth noting that, according to GDHS (2014), about 48 percent of all deaths among children under age 5 in Ghana take place during the first month of life. Moreover, in the period 0 to 4 years preceding the same survey, the ratio of early neonatal deaths to all neonatal deaths is 88 percent.

2.5 Conclusion

This chapter discussed how neonatal mortality has varied overtime globally and in Ghana and how it is expected to be in the future. It was revealed that the first day and week is the greatest threat to child survival. A greater number of children who could have been saved should the world had met the MDG (4) on time and sustained the progress are projected to die between 2015 and 2028. Moreover, it was showed that the major causes of neonatal death in 2012 were complications of prematurity, infections, and adverse intrapartum events, including birth asphyxia.

CHAPTER THREE

LITERATURE REVIEW

3.0 Introduction

The fundamental aim of this chapter is to shed more light on previous research works on neonatal mortality and to help identify gaps for which this study is tasked to fill. This chapter has three sections. First section outlines some theoretical perspectives whilst the second section presents empirical review of literature. The last section gives a brief conclusion of the chapter.

3.1 Theoretical Review

Before the 1960s, health issues were mostly discussed by medical experts. During the early 1960s, economists realized that health can also be discussed from the viewpoint of economics. So, Grossman (2007) made an attempt at formalizing the demand for health and healthcare. Other researchers and theorists have also attempted to mimic what Grossman did by theorizing and researching on the various possible determinants of health status of individuals, children and population. Many of these economists have engaged economic tools like the production and utility maximization theory etc. Some of these research works are reviewed below.

Panis & Lillard (1994) developed a simultaneous model of fetal and postnatal mortality risk and input demand equations for prenatal medical care and institutional delivery. The notion of household production functions especially as developed for health by Grossman (1972) underlies the basis of analysis of this model. The model is based on the assumption that health outcomes are determined by technical or biological processes. Thus, health inputs (example food, medical care) are converted into health outcomes by some production technology. They make the following

assumptions: (a) individuals attain some (higher) level of satisfaction for (good) health; thus, health has a direct utility benefits (b) some goods are demanded only because they are instrumental in the production of another good (health). Such goods are not demanded for their direct utility.

3.1.1 Model

Consider a married couple that maximizes its joint utility function:

U= U (C, X, Z) … (1)

Where *C* denotes child services, *X* is a vector of goods that affect utility both directly and through the production of child services, and *Z* is a vector of goods that are valued only for their contribution to the couple's utility. The flow of child services *C* is a function of the quantity and quality of children in the household. However, let *C* be quantity of children (or rather the probability of survival of children given their conception) with a production function:

C= C (X, Y, µ) … (2)

Where Y are goods that augment utility only via their effect on the production of children such as prenatal care and the like, *µ* denotes mother-specific health endowments such as genetic traits.

The couple maximizes its utility *U* subject to the child production function *(2)* and the budget constraint. The assumption of separability of commodity demands from labor supply is made, that is, the couple maximizes its utility by choosing the optimal levels of *X, Y* and *Z* is made:

X= X (p, I, µ) … (3)

Y=Y (p, I, µ) … (4)

Z=Z (p, I, µ) … (5)

Where p is the vector of prices of all publicly traded goods and I denote income. The demand equations *(3)* and *(5)* are substituted into the production function *(2)* to attain:

$C^* = C^* (Y, p, I, \mu)$

Where C^* is the production function to be estimated for child survival. C^* may be affected by parental/household and child characteristics.

It is worth noting that other economists have also made relevant contributions with respect to jointly maximizing the utility of the members (or couples) in the household. Other researchers have developed theories (or models) that recognizes the relevance of bargaining power in the household. This is discussed below.

3.1.2 The Intra-Household Resource Allocation

Until recently, the literature on household behavior was focused on the 'unitary approach' of modeling household behavior where irrespective of the number of members in the household, their behavior is usually analyzed using a single household utility function which is maximized subject to a budget constraint. Here, the individual preferences of the members in the household are aggregated up to a social preference function. However, this approach has demonstrated to be too restrictive. For instance, with respect to the application of the 'unitary approach', according to Chiappori & Donni (2009), Econometricians could only analyze the effect of economic policy on the behavior and welfare of the household only when certain restrictions hold. Though the 'unitary approach' attained some success, it could not be satisfactory since it does not consider the relevance of individual preference in the household.

For this reason, the non-unitary models of household behavior emerged which explicitly recognizes that the household encompasses different members who are distinct from each other in terms of their preferences. The models can be split into two major categories: cooperative (collective) and non-cooperative (strategic). With the non-cooperative model, an individual within a household is considered to maximize his or her own utility subject to his or her own budget constraints, taking the actions of other household members as given. This concept is based on the Cournot-Nash equilibrium and the allocation or the equilibrium outcomes are not pareto efficient. However, the cooperative model is based on the hypothesis that the decision process within the household, whatever that may turn out to be, produces Pareto-efficient outcomes. So, in terms of child health, the bargaining power (of perhaps women) in the household may be a crucial factor since parents are those that mostly take decision for their children.

3.1.3 Measurement of Bargaining Power (Women's Empowerment)

Economic analysis of bargaining power has mainly been concentrated on economic resources that are exogenous to labor supply (Maitra, 2004). They include assets, both current and those that are brought into marriage (Beegle et a., 2001, Quisumbing and Maluccio, 2000), or unearned income (Schultz, 1990) or transfer payments and welfare receipts (Lundberg et al., 1997). However, currently, economists have begun employing non-economic factors that affect the bargaining power within the household like violence or cognitive ability (Fafchamps, Kebede, & Quisumbing, 2009), women's capability to partake in decisions within the household which reflects their domestic, economic and movement autonomies (Asaolu et al., 2017; Thapa & Niehof, 2013; Do & Kurimoto, 2012; Ackerson & Subramanian, 2008; Afridi, 2010; Bloom et al., 2001). Bhagowalia & Quisumbing's (2012) study rather employed mobility, decision making and

attitudes toward verbal and physical abuse. Inheritance and divorce laws at the time of marriage (Fafchamps, Kebede, & Quisumbing, 2009; (Quisumbing & Maluccio, 2003), ratio of female to male life expectancy at birth and an educational level difference (Smith et al. 2003; Smith & Haddad, 2002) have also been used. However, according to Maitra (2004), the sociological/demographic literature has long measured the relative bargaining power of different members within the household by employing measures that can be categorized into two: (a)exposure to and interactions with the outside world and (b) degree of autonomy for women within the household (see Dyson and Moore, 1983; Basu, 1989).

Adding to it, Maitra (2004) rather employed educational attainment of the husband and wife and sociological/demographic measures of the status of the woman within the household as measures of bargaining power, rather than employing economic resources. In the quest of capturing exposure to and interactions with the outside world as a measure of women's status (bargaining power of women), Maitra (2004) included these dummies: (a) whether the woman needs permission to visit family and friends (b)whether the woman needs permission to go to the market (c)whether the husband hits the woman if she goes out without informing him. To capture degree of autonomy for women within the household, Maitra (2004) included these dummies: (a)whether the woman is able to have money set aside (b)whether the woman has say in decision regarding cooking, obtaining health care, purchase jewelry, staying with the family (c) whether the husband hits the woman if she is unfaithful, if her family does not provide money, if she neglects house or children or if she does not cook properly.

3.2 Review of Empirical Literature

There have been several studies that have attempted to examine how women's status complement other non-medical and medical factors to affect child health/survival throughout the world. This section reviews some of these existing empirical literatures specifically geared towards neonatal mortality which is the (main) dependent variable of this thesis.

3.2.1 Literature on Women's empowerment and child health/mortality

Luz (2013) conducted a representative survey of ever married women of reproductive age in July 2006 and July 2009 in rural areas of four districts of Gaza province in southern Mozambique. Logistic regression was applied and it was found that a child whose mother has a higher decision-making autonomy is less likely to die. The effect of women's decision-making power was significant and independent of other traditional measures of women's status like education, employment, marriage and partner's characteristics. Also, a study was conducted by Choudhury (2015) aimed at examining the effect of parental education on the regional variations in infant mortality in India. It employed the logistic regression and data from the India's National Family Health Survey. It was found that parental education, women's socioeconomic empowerment and mass media exposure were associated with reducing infant mortality. These studies highlight women's empowerment and mass media exposure as important determinants of child survival.

Imai et al. (2014) employed Instrumental variable, Ordinary Least Square and Quantile regression and three rounds of India's National Family and Health Survey and National Council of Applied Economic Research data (1992–93, 1998–99 and 2005–06) to study whether mother's empowerment (as measured by mother's relative bargaining power) is related to children's

nutritional status. The results showed that mother's a positive and significant effect on nutritional status of children. Ibrahim et al. (2015) used the 2008 Nigeria Demographic and Health survey and 2005/2006 National Family and Health Survey to examine the effect of women's decision-making autonomy on child immunization and nutritional status. It was showed that there is a strong and positive effect of women's decision-making autonomy on children's health status (child immunization and nutritional status). These studies also show the relevance of women's empowerment on child health.

3.2.2 Literature on Mass Media Exposure of mothers and child mortality

Mounts, Ngange, & Achidi (2011) used (four rounds of) Demographic Health Surveys data on 35 Sub-Saharan African countries to test the hypothesis that mass media exposure would increase over time and it would be correlated with lower infant and neonatal mortality rates. It was revealed that neonatal mortality was negatively associated with mass media exposure and radio listening in all four periods. However, it was negatively related with television watching only in the middle two periods.

Pandey et al. (1998) conducted a study and employed data from 1992-1993 India's National Family Health Survey. It aimed at investigating the determinants of infant and child mortality. It was revealed that mother's literacy, their exposure to the mass media and household head's religion and tribe membership have substantial effects on infant and child mortality.

These studies highlight on the importance of mass media exposure on childhood mortality.

3.2.3 Women's Empowerment, mass media exposure and Health inputs

Zaky et al. (n.d.) used the recursive probit model and data from the Egypt Demographic and health survey (2008) to investigate whether women's empowerment and antenatal care are simultaneously determined. It was showed that women's empowerment has a positive and significant effect on receiving regular antenatal care and they were simultaneously determined. Put in another way, women's empowerment was endogenously determined in the antenatal care equation. The study also showed that mass media exposure, women's age, education, and work status play a major role to the higher level of women's empowerment. This study employed the recursive probit model since it is able to accommodate the potential endogeneity of women's empowerment in the antenatal care equation. In an attempt to ascertain the relationship between partner's abuse and antenatal care, Sipsma et al. (2014) used a logistic regression model to conduct a study. It was revealed that partner's abuse is directly related with inadequate use of antenatal care.

Hossain & Hoque (2015) employed data from 2011 Bangladesh Demographic survey and conducted a similar study. It was revealed that women's empowerment contributes positively and significantly to the decision and intensity of antenatal care utilization. Ghosh (2006) used data from 1998-1999 India's National Family Health Survey to conduct a study aimed at examining the effect of mother's exposure to mass media on the use of prenatal care services. A logistic regression was employed and the results showed that mass media exposure is related to prenatal cares services. Moreover, a similar research conducted by Acharya et al. (2015) showed that mass media had a positive influence on antenatal care utilization. A research by Simkhada et al. (2008)ascertained and examined variables that affect the use of antenatal care in developing countries. It was revealed that exposure to the mass media, husband's education, maternal

education, marital status, women's employment and household income were mostly identified by studies as having effect on the utilization of antenatal care. These studies show that women's empowerment and mass media exposure are important determinants of maternal health care inputs like antenatal care (which in turn affects child survival).

3.2.4 Literature on Determinants of Neonatal Mortality

Several researchers have employed diverse datasets from demographic health surveys or surveillance systems etc. and used models like logistic regression model, probit regression model, Cox Hazard Proportional regression model etc. to undertake research on mostly the risk factors associated with neonatal mortality in several countries and some of them are reviewed in this section.

Lambon-Quayefio & Owoo (2014) conducted a study to determine whether the number of antenatal visits and skilled delivery have effect on Neonatal mortality in Ghana by employing the Probit model and Instrumental Variable strategy. They used the 2008 Ghana Demographic Health Survey and it was revealed that antenatal care visits have a negative and significant effect on neonatal mortality in Ghana. Moreover, older women had a higher risk of losing their children at the neonatal phase relative to the younger women.

In an attempt to investigate the impact of place of delivery on neonatal mortality Ajaari et al. (2012) used data from Rufiji Health and Demographic surveillance system on all neonatal deaths and live births form January 2005 to December 2006. They employed logistic regression model and found that neonates that are delivered outside the health facility have a higher risk of mortality relative to those delivered in health facility. Abdullah et al. (2016) conducted a research and found

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similar results that home delivery has a positive effect on neonatal mortality. (Okantey, 2008) conducted a study by employing the logistic regression model and data from the Ghana Multiple Indications Cluster Survey 2006 to explore the risk factors associated with neonatal mortality. It was found that residing in a rural area had a higher risk of neonatal mortality, utilization of antenatal, postnatal care services and availability of skilled attendant were protective over neonatal mortality. In the quest to determine the individual and community determinants of neonatal mortality in Ghana, Kayode et al. (2014) employed the 2003 and 2008 Ghana Demographic Health survey to conduct a research. They employed the fixed and random effect models and found that being a child of multiple gestation was positively related with neonatal mortality. They also found that utilizing antenatal, delivery and postnatal services had a negative effect on neonatal mortality. Neupane & Doku (2014) conducted a study and it was revealed that utilizing prenatal care with a skilled attendant has a negative effect on neonatal mortality. Mother's education and wealth index were also found to affect neonatal mortality. Ikamari's (2013) study found that household wealth, and maternal age at birth significantly affect neonatal mortality.

Maraga (2010) employed data from the Navrongo Demographic surveillance system in Ghana and conducted a research to explore the risk factors associated with neonatal mortality. It was revealed that living in an urban area, children of single birth outcome, socio-economic status (like residing in the richest households) had a negative association with neonatal mortality. Ezeh et al. (2014) undertook a research with the aim of investigating the risk factors that are related with neonatal mortality in Nigeria by employing the 2008 Nigeria Demographic Health survey. They used the cox proportional hazard model and made a conclusion that male neonates are more likely to die relative to female neonates, neonates of mothers who are less than 20 years had a higher risk of mortality relative to neonates of mothers of age 20-29years, 30-39 years and 40-49 years, and

mothers residing in rural areas had a higher risk of losing their neonates relative to mothers residing in urban areas. In the quest of exploring risk factors associated with neonatal mortality Ndayisenga's (2016) conducted a study and found that neonates who were born to mothers of age less than 20 years were more likely to die relative to those that were born to mothers of age greater than 20 years. Moreover, mothers who had not completed all 4 antenatal clinic visits were more likely to experience neonatal mortality relative to their counterparts. Selemani et al. (2014) conducted a research and found that male neonates are more likely to die relative to female neonates and neonates born by mothers of age lesser than 20 years are more likely to die relative to those born by mothers of age 20-34 years. Moreover, Kojo (2012) undertook a research and he found that maternal age, region and wealth index significantly affect neonatal mortality.

In the quest of determining the effect of maternal education on neonatal mortality, Mostafa (2012) employed data from 2007 Bangladesh Demographic Health survey. Logistic regression model was employed. It was found that maternal education has a negative effect on neonatal mortality, neonates of adolescent mothers have a higher risk of mortality relative to neonates of adult mothers and mothers who did not attend antenatal visits had a higher risk of losing their neonates relative to their counterparts who attended antenatal visits. Place of residence and birth order were important determinants of neonatal mortality as well.

3.2.5 Literature on Determinants of Women's Empowerment

Research works on women's empowerment mostly employ the logit or probit regression model if it is measured as a binary variable (Mason & Smith, 2000; Kamal, 2006; Gupta and Yesudian, 2006; Allendorf, 2007; Khan and Awan, 2011).

Boateng et al. (2012) used data from the 2008 Ghana Demographic Health Survey to examine women's empowerment in Ghana. They employed the binary logistic regression model. They assessed the association between wealth and women's empowerment or involvement in decisions in the area of healthcare, large household purchases, daily household purchases and mobility. It was revealed that wealthier married women were significantly more likely to partake in decisions concerning their own healthcare. Moreover, married women in the Upper East region were significantly more probable to partake in three measures of decision-making except for decisions on large household purchases relative to those in the Greater Accra region. The effect of age, employment and tertiary education on women's involvement in the household decision-making were significant.

In the quest of examining the determinants of women's empowerment, Ragui et al. (2014) used data from the Egypt Labor Market Panel Survey (ELMPS) 2012 to conduct a research. They considered two dimensions of women's empowerment: the decision-making and the mobility aspects. The results showed that age of the woman, maternal education, employment, number of children, and having an adult son in addition to a woman's husband were significant determinants of women's empowerment. The regional dummy was also seen as relevant as far as empowerment of Egyptian women are concerned.

Studies by Allendorf (2007) and Khan et al. (2010) revealed that level of education is a very relevant predictor of women's empowerment. Similarly, Parveen & Leonhäuser (2004) conducted a study and it was revealed that formal and non-formal education in addition to information media exposure had a strong positive effect on women's empowerment in Bangladesh. Gupta & Yesudian (2006) used data from the DHS of India to conduct a study which took into consideration four dimensions of women's empowerment namely; household autonomy, mobility, and attitudes

toward gender and towards domestic violence. It was showed that age and media exposure have positive effect on freedom of movement and attitudes of gender equality. Moreover, the standard of living of the household was a determinant of household autonomy and age and education alone were negatively related to attitudes to domestic violence. However, women's education was a relevant predictor of all dimensions of women's empowerment. With the aim of investigating the determinants of women's empowerment, Kamal & Zunaid (2006) employed 2004 DHS data from Bangladesh to conduct a study. It was found that marital status, secondary education and asset ownership were significant determinants of empowerment.

3.3 Conclusion

This chapter began by explaining how economists began to talk about health like the medical practitioners. It further explained how Grossman (1972) made a great contribution and paved way for other researchers to apply economic analysis in explaining issues of health and to influence policy. It discussed the various perspectives and views of economists on the relevance and measurement of bargaining power in the household. There existed a research gap which involved finding out the effect of women's empowerment, and mass media exposure on neonatal mortality in Ghana whilst taking into consideration the potential endogeneity of women's empowerment.

CHAPTER FOUR

METHODOLOGY

4.0 Introduction

This chapter therefore explains an adopted theory and regression model for this thesis. It further explains the explanatory variables and source of data to be employed.

4.1 Theoretical Framework

The model by Panis & Lillard (1994) was also extended to capture the effect of bargaining power within the household and applied by Maitra (2004). The model as applied by Maitra (2004) is employed in this study.

4.1.1 A Simultaneous Model of Fetal and Postnatal Mortality Risk and Input Demand Equations

It is assumed in the model that parents make decision with regards to the quality (health and educational attainment) of their children within the household. This, however, is based on the assertion made by the Grossman model that, in the large extent, individuals can make efficient choices concerning them and their children without any form of outside interference. For instance, with respect to health, this asserts that individuals are of the full knowledge of their wage rate, existing health stock level and that of their children, the rate at which it depreciates, how to produce more of it, and can perceive their optimal level of health. The approach of the model is based on

the view that health outcomes are determined by technical or biological process: health inputs are channeled into health outcomes by some production technology.

Grossman (1972) also noticed and hence he made an assertion that health, like any other good, can be produced and consumed making the individual both the direct consumer and producer of (good) health. He viewed health as a durable good that is demanded by consumers as a consumption commodity; thus, sick days are a source of disutility and as an investment commodity where it describes the total amount of time existing for market and non-market activities. Based on this, the model assumes that parents derive positive utility from consumption goods that they purchase from the market X, child quality Q and from the leisure time spent by him or her h (Maitra, 2004). The mother's (m) and the father's (f) utility are then represented by U^m and U^f respectively. Hence, the individual's utility may be written as:

$U^i = U^i(X, Q, h_i); i=m, f$

To the production of health, Grossman (1972) realistically assumes that a change in human capital modifies the efficiency of the production process in the non-market sector of the economy in like manner as a change in technology modifies the efficiency of the production process in the market sector such that greater education will more likely lead to greater efficiency of the health production process. Thus, educated individuals are in a position to access, process and implement information about their health (and perhaps their children) better comparative to the illiterate. Hence, given a set of health inputs, both a highly educated mother and her child are likely to be healthier relative to an illiterate mother (and her child). So, based on this, Maitra (2004) assumes that child quality depends on Ω the household production efficiency.

Following Panis & Lillard (1994) and Grossman (1972), the model assumes that some goods like medical care (C) are demanded not for their direct utility but because they are instruments for the production of another good (health). For instance, a pregnant woman may only value antenatal care because of its beneficial impact on her unborn child (Panis & Lillard, 1994). Following Maitra (2004), Panis & Lillard (1994) and Grossman (1972), the child quality is produced according to the production function as follows:

$Q=Q\ (X,\ C;\ \Omega)\ i=m,f\ \dots\ (1)$

C represents health inputs, X represents consumption goods that are purchased from the market and Ω denotes the household's production efficiency parameter.

According to Maitra (2004) an individual can receive certain levels of utility from outside the household referred to as their reservation utility levels represented by U^{*m} and U^{*f}. They basically encompass prices and other features that affect an individual's ability to impose his or her preferences in the bargaining process. It was further explained by Maitra (2004) that, individual's reservation utility could encompass re-marriage market opportunities, social and family support as well as assets that an individual might take away should the household dissolve. Following Maitra (2004), the individual's reservation utility level is assumed to be a function of:

$U^{*i} = U^{*i}\ (p,\ Ai,\ \alpha_i);\ i=m,f\ \dots\ (2)$

Where p denotes a vector of prices, unearned or asset income is denoted by A_i and α_i represents a set of extra-household environmental parameters

The parents (mother m and father f) decide to maximize X, h_i $(i=m, f)$ and Q subject to the full income constraint which is Equation *(4)* and the household's production function given by equation *(1)*. So, the household's utility maximization problem is specified as follows:

Max $\quad$ $V= [U^m (X, Q, h_m) - U^{*m} (p, A_m, \alpha_m)] \times [U^f (X, Q, h_f) - U^{*f} (p, A_f, \alpha_f)]$ *... (3)*

subject to

$$pX = w_m (T_m - h_m) + w_f (T_f - h_f) + A_m + A_f \quad ... (4)$$

and the household's production function given by equation *(1)*.

Where w_i is the wage rate, T_i is the time endowment of individual i, $i = m, f$.

In the end, child quality Q^* which is a reduced form demand equation is attained and it is a function of:

$Q^* = Q^* (p, C, A_m, A_f, \alpha_m, \alpha_f; \Omega)$ *... (5)*

However, to obtain its empirical version where:

$Q^* = Q^* (p, C, \varphi; \Omega)$ *... (6)*

Let φ be the set of variables reflecting each member's relative authority and power within the household that affects the demand for goods so that those set of variables will include unearned or asset income of the different members (A_i) and the extra-household environmental parameters (α_i). From an empirical perspective, according to Maitra (2004), any variable that reflects relative authority or bargaining power within the household is a candidate for φ.

Following Maitra (2004), it is assumed that child quality Q^* also depends on child specific characteristics *(V)*, community variables *T,* and household/parental characteristics *(H)*. Price effect

will be dropped in this study because of lack of data in GDHS 2014. So, the child health production function can be written as:

$Q^*=Q^*$ *(C, φ*; *Ω, V, H, T) ...   (6)*

Where *Q** will be measured as neonatal mortality (or survival). Thus, a quality child or a child that has a good or quality health is also more likely to survive 28 days of its life after birth relative to its counterparts.

C will be measured as Health care inputs like antenatal care and the like.

Following Grossman (1972) household's production efficiency parameter, *Ω,* is measured as education level of both the father and mother. This is because the model assumes that there are two individuals in the household; the mother (m) and the father (f) and they are the decision makers in the household.

V will be measured as child specific characteristics

H will be measured as Household/parental characteristics.

T will be measured to encompass place and region of residence.

Let *φ* represent bargaining power of women in the household since women are more likely to be seen as the primary care givers of children hence their (women) bargaining power is very crucial to the health quality or survival of children. Following Dyson and Moore (1983), Basu (1989) and Maitra (2004), *φ* will be measured by employing the non-economic criteria that has long been used in the sociological/demographic literature to measure women's status or bargaining power within the household. Thus; (a) women's exposure to and interactions with the outside world and (b) degree of autonomy for women within the household (Dyson and Moore, 1983; Basu, 1989 as

cited in Maitra, 2004). To capture the effect of women's exposure to and interactions with the outside world, a set of dummy variables are included: woman's exposure to (a)television (b)radio (c)newspaper/magazine. These are merged to form an index for mass media exposure of mothers. The second is the degree of autonomy for the women. To capture the effect of degree of autonomy for women within the household, a set of dummy variables are included and these dummy variables measure: (a)woman's decision-making power within the household (b) woman's economic empowerment (c)whether the woman is subjected to domestic violence. These are merged to form an index for women's empowerment in the household.

The study also attempts to use two sets of criteria for measuring women's bargaining power as a means of shedding light on how the two categories used in measuring bargaining power independently affect neonatal survival.

As far as the objectives of this thesis is concerned, this particular model is best. It is selected over the other models of child health production because it is easy to comprehend and apply. Also, it recognizes the relevance of the preferences of the individuals in the household as distinct from each other (that is, mother and father) by considering bargaining power of parents in the household. Moreover, it makes it possible to integrate the effect of both women's empowerment and mass media exposure on neonatal mortality.

4.2.0 Endogeneity of Women's Empowerment (Self-selection)

Women's empowerment is viewed as potentially endogenous in child health/survival production functions by several researchers including Basu (2006) and Imai et al. (2014). Moreover, several researchers or research works have showed that women's empowerment is significantly affected

by parental/household characteristics (Boateng et al., 2012; Gupta & Yesudian, 2006; Ragui et al., 2014). Hence, it is likely that there may be some unobserved mother-specific characteristics or heterogeneities that affect child health outcome both directly, as they feed into the production technology, and indirectly, through their effect on women's empowerment. A woman's desire to make decision concerning the health of her child may, for example, be triggered by an instance where perhaps her child is at a (huge) health risk or the probability of losing her child is very high. Thus, there is a possibility of self-selection in women's empowerment. Self-selection in women's empowerment is reflected in the correlation between the heterogeneity components in the women's empowerment and neonatal mortality regression. The statistical significance of the estimates of the correlation between the heterogeneity coefficients implies that there is evidence of self-selection in women's empowerment.

Following Chiappori & Donni (2009), Malapit & Quisumbing (2015) and literature on women's empowerment, this study will define women's empowerment φ to depend on the number of children (v), whether husband has more than one wife- polygyny (b), and parental/household characteristics (H).

4.2.1 Mass Media Exposure, Women's Empowerment and Child Health

With respect to the effect of mass media exposure on child health, when mothers are exposed to the mass media (television, radio, newspaper), they are exposed to and interact with people (or the world) and they are more likely to have access to, perhaps, information on the beneficial effects of health inputs (like antenatal and postnatal care) and the like. Such mothers are more likely to seek for healthcare for herself (and for her child) relative to her other counterparts who are not exposed to the mass media and hence their children may more probably survive the neonatal stage. Most

researchers including Acharya et al. (2015) have found a positive effect of mass media exposure antenatal care utilization. Maybe it is not mass media exposure (of mothers) per se that affects child health/survival but it may primarily affect child health/survival via health inputs.

With respect to women's empowerment, though, empowered women may demand for healthcare which may improve neonatal survival, empowered women may also have direct impact on the health of their child. A mother's decision to allocate most of their time resources to cater for the child may also have an effect on the health of the child. For instance, every day, a mother may decide to cover the newborn (with a cloth or the like) at the appropriate times or breast feed the newborn child on time and at all time when necessary. These and other decisions by the mother may improve neonatal survival. Hence, a mother who is empowered and hence, can make decisions in the household may have a direct (independent) effect on child health/survival.

4.3 Estimation Techniques

Neonatal mortality which is the dependent variable of interest is measured as a binary variable (Y=1 if the neonate dies and Y=0, if it does not). The standard probit regression model which emerges from Normal Cumulative Distribution Function is selected over Logit regression model since factors that cause newborns to die within first 28 days of their life may not differ much.

4.3.1 Probit Model

Following Gujarati (2003), the probit model will be presented based on the utility theory or rational choice perspective on behavior. Let *y* be the probability of a neonate dying or not. Assume that *y*

depends on an unobservable latent variable y^* which is determined by one or more observable explanatory variables $Xi, i=1, 2... n$ in such a way that:

$$y = \begin{cases} 1 \text{ if } y^* > 0 \\ \\ 0 \text{ if } y^* \text{ is lesser than or equal to } 0 \end{cases}$$

Gujarati (2003) rationally assumes that there exist a particular or critical level of the y^* that is unobservable, but if normal distribution assumption is imposed, then the estimation of $Xi, i=1, 2...$ n and also retrieving some information about the y^* itself becomes possible. Thus, given the assumption of normality, the probability $y=1$ can be computed from the standardized Normal Cumulative Distribution Function (CDF) as:

$P_i = P(y=1/X) = P (Z_i \leq \beta_1 + \beta_2 X_i) = F (\beta_1 + \beta_2 X_i) ... (1)$

Where $P(y=1/X)$ means the probability that an event occurs given the value(s) of the $Xi,$ or explanatory variable(s) and where Z_i is the standard normal variable, i.e., $Z \sim N (0, \sigma2)$. F is the Standard Normal Cumulative Distribution Function (CDF). However, in probit models all the regressors are involved in computing the changes in probability. Thus, to find out the effect of a unit change in X on the probability that Y=1, we take the derivative of eqn (1) with respect to X (marginal effect):

$$\frac{dPi}{dXi} = f\ (\beta1 + \beta2Xi)\ \beta2$$

Where $f (\beta1 + \beta2X_i)$ is the standard normal probability density function evaluated at $\beta_1 + \beta_2 Xi$.

This model does not control for endogeneity in an explanatory variable.

4.3.2 Bivariate Probit Model (Standard)

The bivariate probit model is able to jointly estimate two distinct binary probit models (or two distinct equations) that are interrelated with each other in that, they may be have the same explanatory variables. It is based on the assumption that, there may be common unobserved characteristics of individuals that affect both outcomes (or events or decisions) represented by the probit equations but captured in their respective error terms. Hence, this model allows the interaction of the error terms of the two equations to show whether correlation between the error terms (or unobserved heterogeneity components that are captured in the error terms) of the two equations is non-zero.

4.3.3 Seemingly Bivariate Probit Model

This particular model is analogous to the previously discussed model in several ways however it uniquely considers the possibility that even though the two outcomes (or the two equations) may be interrelated with each other, there may be factors (or explanatory variables) that are specific to the two outcomes (or the two equations). Put in a different way, some factors may affect one equation and not the other. For instance, polygyny may affect women's empowerment but it may not affect neonatal mortality.

4.3.4 The Recursive Bivariate Probit Model

The Recursive bivariate probit model is also a kind of bivariate model which seeks a way to estimate two equations. However, it has a unique feature which allows the potentially endogenous

variable (women's empowerment) which is also the dependent variable for the selection equation to enter the outcome equation (where neonatal mortality is the dependent variable). In the literature, researchers have argued that there should be at least one variable in the selection equation (women's empowerment) that may not be found in the outcome equation (neonatal mortality) so that parameters of the neonatal equation will be identified (Greene, 2003). In this study, number of living children, and whether husband has more than one wife- polygyny; are chosen as restrictive variables and hence they are only found in the women's empowerment equation but not in the neonatal mortality equation. The estimation models are specified as follows:

The outcome equation involves a structural equation:

$$N^* = \psi_0 + \psi_1 Z^{*n} + \psi_2 W^* + \xi n$$

The selection equation has a reduced form:

$$W^* = \pi_0 + \pi_1 k + \pi_2 Z^{*w} + \xi w$$

Let k be a vector representing restrictive variables. It encompasses number of children (v), and whether husband has more than one wife- polygyny (p). $Z^{*i} i=n, w$ denotes explanatory variables specific to the various dependent variables, ψ_0 and π_0 are constant terms, and ψ_1, π_2 are the vectors of parameters to be estimated. N* denotes neonatal mortality, W* represents women's empowerment. They (N* and W*) are latent variables and they are related to the binary dependent variables as follows:

$$N= \begin{cases} 1 \text{ if } N^*>0 \\ \\ 0 \text{ if } N^* \text{ is less than or equal to } 0 \end{cases}$$

$$W= \begin{cases} 1 \text{ if } W^*>0 \\ \\ 0 \text{ if } N^* \text{ is less than or equal to } 0 \end{cases}$$

$\xi_i = (\eta_i + \varepsilon_i)$ $i=n, w$ denotes error term where η_i represents mother-specific unobserved heterogeneities. N denotes neonatal mortality and W represents women's empowerment. All other residual variation(s) is captured by ε_i with $\varepsilon_i \sim$ IIDN $(0, 1)$. The error terms in both equations consist of a part ε_i (i=n, w) that is unique to that equation and a second part η_i that is common to both equations. Since the ξ_i depends on η_i which is common to both equations, the error terms ξ_i of both models could be correlated or put in another way, the correlation between the error terms of both equations could be non-zero. Thus, $\rho = \text{cov} (\xi_n, \xi_w)$ could be non-zero. Both equations are assumed to be distributed as bivariate normal such that:

$E(\xi_n) = E(\xi_w) = 0$, $\text{var}(\xi_n) = \text{var}(\xi_w) = 1$ and $\rho = \text{cov} (\xi_n, \xi_w)$.

The Wald Test will provide evidence to show whether or not there is a significant correlation between the unobserved heterogeneities or the error terms of both equations: women's empowerment and neonatal mortality. It tests the null hypothesis that there is no endogeneity bias (rho= $\rho = 0$). If the Wald Test proves that the errors between the two probit models or equations are independent of each other, that is, if $\rho = \text{cov} (\xi_n, \xi_w) = 0$ then the two models (women's

empowerment and neonatal mortality) may be estimated separately with the Standard Probit model. However, if it (Wald Test) shows that women's empowerment is endogenous, that is to say, the correlation between the error terms of the two probit equations is non-zero (ρ is non-zero) and significant, then the estimates of the recursive bivariate probit model will be most appropriate to report since it accommodates (the recursive bivariate probit model) endogeneity. The results of ignoring endogeneity in a regression is biased estimates.

4.4 Empirical Estimation

Given the theoretical framework, and the empirical literature review, the variables in the two cases will include neonatal mortality N, women's empowerment W, number of children (v), whether husband has more than one wife- polygyny (p), mass media exposure of the mother M, Health inputs C, child level characteristics V, parental/household characteristics H, and a term that captures unobserved heterogeneity (η). In order to account for the regional variations in Ghana, the model includes the term R which captures the ten regions in Ghana. Also, the term A is included to differentiate the probability of neonatal deaths (and women's empowerment as a dependent variable) by area of residence (rural or urban). Denote $Z^{*n} = (W, M, C, V, H, R, A)$; as the relevant vector of explanatory variables in the equation characterizing neonatal mortality and $Z^{*w} = (v, p, M, H, R, A)$ for that of women's empowerment equation. The heterogeneity component (η) is assumed to be uncorrelated with the other covariates. So, the estimated equations are:

$N = \psi_0 + \psi_1 Z^{*n} + \eta_i + \varepsilon_i$

$W = \alpha_0 + \alpha_1 Z^{*w} + \eta_i + \varepsilon_i$

Where α_1 and ψ_1 are the vectors of parameters to be estimated. α_0 and ψ_0 are constant terms. All other residual variation(s) is captured by ε with $\varepsilon \sim IIDN\ (0,\ 1)$.

Let $\xi_n = \eta_i + \varepsilon_n$

Specifically;

$N = \psi_0 + \tau W + \pi M + \beta_1 occ + \beta_2 Mage + \beta_3 medc + \beta_4 fedc + \beta_5 I + \beta_6 twin + \beta_7 Csex + \beta_8\ caesar + \beta_9 ante + \beta_{10} mid + \beta_{11}\ del + \Gamma_1\ Pres + \Gamma_2\ reg + \xi_n$

$W = \alpha_0 + \alpha_1 v + \alpha_2 p + \alpha_3\ occ + \alpha_4 M + \alpha_5 Mage + \alpha_6\ medc + \alpha_7\ fedc + \alpha_8 I + \alpha_9\ Pres + \alpha_{10}\ reg + \xi_w$

Where N denotes neonatal mortality, W denotes women's empowerment, M represents mass media exposure of the mother, *occ* denotes mother's occupation, *Mage* denotes mother's current age, *medc* represents mother's education, f*edc* denotes father's education, *I* denote household wealth, *Csex* represents child's sex, *caesar* represents caesarean delivery, *ante* denotes antenatal care visits, *mid* represents seeking (health professional) assistance at birth, *del* denotes place of delivery, *Pres* denotes place of residence, *reg* denotes region of residence dummy, number of children *(v)*, whether husband has more than one wife- polygyny *(p)*, and ξ_n denotes the error term.

4.5 Data Diagnostic and Estimation Procedure

Variance Inflation Factor (VIF) will be performed to identify the existence of multicollinearity in the model. Gujarati (1995) expressed VIF as:

$VIF\ (Xj) = (1 - Rj^2)^{-1}$

Where Rj^2 represents coefficient of determination after regressing one of the explanatory variables on other explanatory variables. A *VIF* exceeding 10 or Rj^2 >0.90 implies a presence of multicollinearity (Gujarati, 1995).

The Cronbach's Alpha will be used to test for the reliability of the various employed distinct variables in measuring women's empowerment. An alpha coefficient above or between 0.65 and 0.75 is very (or moderately) preferable. However, same will not be done on mass media exposure since, following the literature and given the 2014 GDHS, the most appropriate and available measure for mass media is exposure to television, radio and newspaper.

The robust standard errors of the model coefficients would be estimated to minimize heteroskedasticity. In this thesis, Stata 13.0 software package will be employed for model estimation.

4.6 Definition of explanatory variables and Recoding of Variables

4.6.1 Neonatal Mortality

Women's empowerment: Factor analysis is employed by some researchers including Hussein (2009), as cited in Zaky & Hussein (n.d.), to construct an indicator for women's empowerment. Some researchers, as cited in Zaky et al. (n.d.), including Bloom et al. (2001), Kamal (2006) and Shafei (2005), have also employed the sums of binary input variables to create the women's empowerment indicator where women will be scored 1 for responses to each variable that depicts (a higher degree of) women's empowerment, otherwise they will be scored zero. Gupta & Yesudian (2006) and Hashemi et al. (1996) employed the sums of binary input variables approach to create a categorical women's empowerment index and a composite (binary) empowerment

indicator respectively. Zaky et al. (n.d.) also used the sums of binary input variables approach to construct an index for women's empowerment. The sums of binary input variables will also be employed to create an index for women's empowerment in this thesis since it is easy to comprehend, explain and apply. Ten (10) variables are considered in creating the women's empowerment indicator which, following Bloom et al. (2001), Malhotra et al. (2002) and Kwagala et al. (2016), were encompassed into three dimensions of measurement of women's empowerment: economic empowerment, decision making power and domestic violence. Some questions were asked in the 2014 GDHS to capture these dimensions of measurement of empowerment.

A woman's decision-making power includes women's participation in decisions concerning the questions on who decides on (i) their own health; (ii) large household purchases; and (iii) visits to their family or relatives. Four options were offered as responses to each question: 1) respondent alone 2) respondent and husband/partner 3) husband/partner alone 4) someone else. Categories 1 and 2 were merged to be "1" which means the woman participates in decisions (empowered), as well as category 3 and 4 to be "0" and this means that the woman does not participate in decisions (not empowered). Economic empowerment included women's responses to questions on whether the woman owns (a) a house or (b) a land. Four options were offered as responses to each question: 0) does not own 1) alone only 2) jointly only 3) both alone and jointly. Categories 1, 2, and 3 were merged to be "1" which means that the woman is economically empowered, as well as category 0 to be "0" and this means that the woman is not economically empowered. An index is developed for domestic violence using five questions: whether a woman justifies beating if a wife a) goes out without telling the husband   b) neglects the children   c) argues with husband   d) refuses to have sex with husband e) burns the food. Two options were offered as responses to each question: 1)

No 2) Yes. The woman is not seen to experience domestic violence if she responded "No" which is coded "1" –meaning she is empowered; and "0" for otherwise.

Following Bloom et al. (2001), Gupta & Yesudian (2006), Hashemi et al. (1996) and Zaky et al. (n.d.), an index is then created to construct women's empowerment indicator using the sums of the ten (10) binary variables (within the three dimensions of the measurement of women's empowerment). It ranged from 0 to 10 according to the responses of the respondents on the fourteen (10) questions. Categories from 0 to 4 are merged to be "0" which, according to this index, means the woman is not empowered as well as categories from 5 to 10 are also merged to be "1" meaning the woman is empowered. Women's empowerment is expected to negatively and significantly affect neonatal mortality. This is because, according to Desai and Johnson (2005), empowered women are more likely to decide on allocating their time for routine vaccination, better hygiene, feeding practices, treatment procedures and the like without having to seek for permission from their husbands or mothers-in-law. Hence, Desai and Johnson (2005) concludes that empowered women are able to address child needs more efficiently. Moreover, A study by Choudhury (2015) revealed that women's socio-economic empowerment has a negative and significant effect on infant mortality.

Maternal mass media exposure: The sums of binary input variables were employed to create an indicator for mass media exposure. Three variables were considered in creating the mass media exposure indicator i.e whether the women are exposed to: i) radio ii) television iii) magazine/newspaper. They were asked how frequent they listened to the radio, watched television and read the newspaper/magazine in a week and the responses were grouped into three (3) options: 0) not at all 1) less than once a week 2) at least once a week. A binary variable is created from the various mass media sources. Categories 1 and 2 in the various mass media sources were merged

to be "1" – meaning she is exposed to the mass media; as well as Category 0 was coded to be "0" – meaning she is not exposed to the mass media.

An index is then created to construct the mass media exposure indicator using the sums of the three (3) binary variables. It ranged from 0 to 3 according to the responses of the respondents on the three (3) questions. Categories 2 and 3 are merged to be "1" meaning the woman is exposed to any of the mass media sources and the categories 0 and 1 were made to represent that the woman is not exposed to the mass media; thus "0". Mass media exposure of mothers is expected to significantly affect neonatal mortality. A study by Choudhury (2015) revealed that mass media exposure of mothers has a negative and significant effect on infant mortality.

Mothers' education: This measures the highest educational level attained by the mother. It is categorized into: no education, primary education, and secondary education and higher. The reference category is no education. Education has the ability to improve the knowledge of women on healthy living before, during and after pregnancy (Bhattacharya, 2016). Numerous studies have showed that child mortality, in particular, neonatal mortality, is associated with parental education (Abuqamar et al., 2011; Chowdhury et al., 2010;Titaley et al., 2008). A study by Mostafa (2012) found strong significant negative association between maternal education and neonatal mortality. So, mothers' education is expected to have a negative effect on the death of neonates.

Father's education: This measures the highest educational level attained by the father. It is categorized into: no education, primary education, and secondary education and higher. The reference category is no education. Though the effect of father's education on child health/survival is not widely explored, it is an important determinant. It is expected to have a negative effect on neonatal mortality. A study by Choudhury (2015) revealed that father's education has a significant and negative effect on infant mortality.

Mother's occupation: This measure whether the mother is currently working or not. It is a binary variable taking 1 if yes and 0 if no. Employed mothers are able to mingle with other women since employment can provide exposure to the world outside the homes and thereby broadening their knowledge on healthy living (Bhattacharya, 2016). Kanmiki et al. (2014), Benjamin et al. (2009), and Kayode et al. (2014) have established positive relationship between childhood deaths and mothers in low paid occupations or mothers who are just housewives. So, children of employed mothers may be expected to survive the neonatal period.

Wealth index: This measures the wealth status of the mother. It is categorized into: poorest, poorer, middle, richer and richest where poorest is the reference category. When mothers find themselves in a higher wealth quintile, they are able to afford healthcare and hence, they are more likely to demand maternal health services which may in turn lead to child survival. As an example, several researchers including Nketiah-Amponsah et al. (2013) and Aseweh et al. (2013) also found in their study that women of higher wealth status are more likely to utilize antenatal care than those in the lower wealth quintile in Ghana. A study by Maraga (2010) found that socio-economic status (like residing in the richest households) has a negative effect on neonatal mortality. A study by Ikamari (2013), Kojo (2012) and Neupane & Doku (2014) found wealth to significantly influence neonatal mortality. So, mothers who find themselves in the higher wealth quintile are expected to be associated with lower risks of neonatal death.

Place of residence: This measure whether the mother resides in an urban or rural area. It is a binary variable taking "1" rural and "0" urban. Numerous studies have showed that child mortality, in particular neonatal mortality, is associated with place of residence (Mahmood, 2002; Titaley et al. 2008). A study by Mostafa (2012) found that place of residence has a significant effect on neonatal death. People living in rural areas may experience poor access to health care services, poor

personal and environmental hygiene, poor nutrition, ignorance of the importance of health care services etc. which are not desirable to child health outcome. Studies conducted by Goro (2007) and Jacoby & Wang (2004), have indicated that children from urban areas are more likely to survive than their rural counterparts. A study by Maraga (2010) found that residing in urban areas has a negative effect on neonatal mortality. Hence, mothers that reside in the rural areas are expected to be associated with higher risks of neonatal death.

Mother's current age: This measures the age of the mother at her first birth. It is a continuous variable ranging from 15-42 years. It is recoded as below 25 years, between 25 and 34 years and 35 years and above. Below 25 years is the reference category. A study by Selemani et al. (2014) indicated an increase in risk of neonatal mortality among neonates born to young mothers aged 13–19 years compared with those whose mother's age were between 20–34 years. Hence, it is expected that mother's age has a significant and negative effect on neonatal mortality.

Child sex: This measures the gender of the newborn whether it is a male or a female. It is a binary variable taking 1 if child is male and 0 if female. The gender of a baby is an important determinant of childhood survival. Numerous studies have showed that child mortality, in particular neonatal mortality, is associated with sex of child (Mahmood, 2002; Titaley et al. 2008; Kaldewei, 2010). Many studies have showed that the male gender is a significant risk factor for neonatal sepsis (Onyedibe et al., 2011; Chandan et al., (2012) which is a major cause of neonatal deaths. A study by Selemani et al. (2014) found male born neonates to have an increased risk of neonatal mortality as compared to their female counterparts. Hence, male neonates are expected to be associated with higher probability of (neonatal) death.

Multiple birth: This is recoded as single birth "0", and if multiple birth "1". According to Kayode et al. (2014), the reason that being a child of multiple birth may more likely have a negative effect

on neonatal survival is that multiple births have a higher risk of prematurity and small-for-gestational age (SGA) and these conditions will make the child more vulnerable to crucial medical conditions which may not be well managed in low-resource settings. Hence, multiple birth is expected to be associated with higher probability of (neonatal) death.

Antenatal care visits: Number of ANC visits were captured from the responses on the question of how many times the respondent received antenatal care during pregnancy. It is measured as a continuous variable. A study by Owoo and Lambon-Quayefio (2014) found antenatal care to negatively and significantly affect neonatal mortality in Ghana. Hence, antenatal care is expected to have a negative effect on neonatal mortality.

Caesarean delivery: This measure whether the woman underwent a caesarean section during delivery or not. It is measured as a binary variable taking "1" if she underwent caesarean delivery and "0" if otherwise. This is expected to have a negative effect on neonatal mortality.

Skilled assistance during birth: This measure whether the woman sought for a health professional/skilled assistance (doctor, nurse or midwife) during birth or not. It is measured as "1" if she sought for health professional/skilled assistance and "0" if otherwise. Several studies including Adam et al. (2005) and (Darmstadt et al. (2008) have emphasized the relevance of skilled assistance during birth delivery as a significant source of reducing neonatal mortality. Hence, this variable is expected to have a negative effect on neonatal mortality.

Place of Delivery: This measures the place that the mother delivered or gave birth to her newborn. It is categorized into Home delivery, Public health facility delivery and Private health facility delivery. Home delivery is the reference category. This is expected to have a negative association

with neonatal mortality since mothers that deliver at the health facility are more likely to receive proper care, advice and medications that may increase the chances of neonatal survival.

Region: This measures the region of residence of the mother. It is categorized into: Western, Central, Greater Accra, Volta, Eastern, Ashanti, Brong Ahafo, Northern, Upper East and Upper West. Greater Accra region is the reference category. It is likely that causes of neonatal deaths may differ by region due to differences in cultural practices, availability of medical resources and other social determinants of health. Numerous studies have showed that child mortality, in particular neonatal mortality, is associated with region of residence (Mahmood, 2002; Titaley et al., 2008). A study by Kojo (2012) showed that, region of the woman was a risk factor that significantly caused neonatal mortality. Hence, categories of region of residence are expected to have significant effect on neonatal deaths.

4.6.2 Women's empowerment

Polygyny: This measure whether the woman's husband has other wives. It is expected that the more other wives there are, the less likely will the woman be empowered. It is measured as a continuous variable. Polygyny is expected to have a negative effect on women's empowerment.

Number of Children: This is a continuous variable measured as the number of living children that the woman has. It is expected that the more children a woman has or may have, the more likely will she be empowered in the household. It is expected to have a negative effect on women's empowerment.

Mother's current age: This measures the age of the mother at her first birth. It is a continuous variable ranging from 15-42 years. It is recoded as below 25 years, between 25 and 34 years and

35 years and above. Below 25 years is the reference category. This is expected to have a positive effect on women's empowerment. This is because women who may deliver before 25 years may be viewed as inexperience and hence, their decisions may not be taken into consideration relative to their counterparts.

Mass media exposure of mothers: An indicator is created for this variable by employing the sum of binary variables. Its created index then measures "1" if mother is exposed to the mass media and "0" if otherwise. When mothers are exposed with mass media, they interact with the world and hence, they are more likely to be well informed which may make them more likely to be empowered.

Mothers' education: This measures the educational level attained by the mother. It is categorized into: no education, primary education, and secondary education and higher. The reference category is no education. This is expected to have a positive effect on women's empowerment.

Fathers' education: This measures the highest educational level attained by the father. It is categorized into: no education, primary education, and secondary education and higher. The reference category is no education. This is expected to have a positive effect on women's empowerment since educated fathers may tend to respect the decisions of their wives.

Mother's occupation: This measure whether the mother is currently working or not. It is a binary variable taking 1 if yes and 0 if no. This is expected to have a positive effect on women's empowerment since working mothers may earn and hence, they may attain certain level of autonomy in the household.

Household wealth: Wealth is categorized as poorest, poorer, middle, richer and richest whilst poorest is the reference category. This is expected to have a positive effect on women's empowerment.

Geographic characteristics: There are likely to be great differences between and within the regions of Ghana as far as empowerment is concerned hence the need to include regional and place of residence. They are to capture the impact of location on empowerment. Place of residence is measured as a binary variable (rural or urban). Region of residence is categorized into: Western, Central, Greater Accra, Volta, Eastern, Ashanti, Brong Ahafo, Northern, Upper East and Upper West. Greater Accra region is the reference category.

4.7 Source of Data

The women file of the sixth round (2014 Ghana Demographic Health Survey) was employed for this thesis. Various facets of women's empowerment and maternal health conditions within the nation are covered in the Demographic and Health Survey and hence it was deemed suitable for this thesis. Even though the sample size for the study encompassed 9,396 women (aged 15-49) from 11,835 households nationwide, 5,884 had given birth within the five-year period preceding the survey. The 2010 Population and Housing Census (PHC) served as an updated frame for the conduction of the 2014 Ghana Demographic Health Survey.

The survey encompassed two-stage sample design for the purpose of permitting estimates of core indicators at the national level. The initial phase encompassed selection of sample points (clusters) constituting enumeration areas (EAs) outlined for the PHC where 427 clusters were designated constituting 216 from urban and 211 from rural areas. The next phase employed systematic

sampling of households where household inventory operation was conducted in all the identified enumeration areas (EAs). Later, the households to be considered for the survey were chosen from the list randomly.

4.8 Conclusion

This chapter threw more light on the model that is employed for this thesis and how it is extended to capture the effect of both mass media exposure and women's empowerment. The model is based on the Grossman's (1972) health demand theory. The model was developed by Panis and Lillard (1994). However, it is extended to capture bargaining power and applied by Maitra (2004). This chapter also discussed the regression model that is suitable taking into consideration the objective of this thesis. Thus, the Recursive bivariate probit model will be employed if women's empowerment dummy is endogenous otherwise the Standard probit model will be employed. The next chapter presents the regression results and their analysis.

CHAPTER FIVE

PRESENTATION OF RESULTS AND ANALYSIS

5.0 Introduction

Following the empirical specification in the previous chapter, the statistical distribution of the dependent and independent variables employed in this study as found in the 2014 GDHS are presented here. Moreover, the chapter presents the regression results of the Standard Probit and the Recursive Bivariate Probit regression models. This will be followed by the interpretation of results. Other tests including Variance Inflation Factor (VIF) and Cronbach's alpha are also conducted in this chapter.

5.1 Empirical Results

Table 5.1 presents the summary statistics of employed variables. All regressions are obtained by using Stata 13 econometric package. The results of the Cronbach's alpha and the VIF are presented in appendix 4 and 5 respectively. Appendices 3 and 6 present the results of the standard probit regression models (as they appear in Stata). Table 5.2 presents the results of the recursive bivariate probit model. Appendix 1 to 2 presents the output of the regression results in Table 5.2 as seen in Stata 13.

Table 5. 1 Summary statistics

Variables	Obs.	Mean	Std. Dev.
Dependent Variable:			
Neonatal Mortality	23118	0.0339995	0.1812317
Woman is empowered	23118	0.8752055	0.3304929
Woman is exposed to mass media	23113	0.5357591	0.4987304
Wealth: (base—Poorest)			
Poorer	23118	0.2285232	0.4198904
Middle	23118	0.1964703	0.3973368
Richer	23118	0.141924	0.3489798
Richest	23118	0.1082706	0.3107286
Woman is working	23104	0.8720135	0.334082
Education level of Woman:			
(base—No education)			
Primary School	23118	0.2038671	0.4028801
Secondary School	23118	0.3496842	0.4768805
Higher	23118	0.0223635	0.147866

Residence Type:

Rural   23118   0.6032529   0.4892333

Region of Residence: (base—Greater Accra)

Western   23118   0.0992733   0.2990351

Central   23118   0.102604   0.3034476

Volta   23118   0.0839606   0.2773346

Eastern   23118   0.0975863   0.2967609

Ashanti   23118   0.1066701   0.3087001

Brong Ahafo   23118   0.1075785   0.309854

Northern   23118   0.1405831   0.3475985

Upper East   23118   0.0970672   0.2960557

Upper West   23118   0.0898434   0.2859635

Education Level of man: (base—No education)

Primary School   22384   0.1096319   0.3124373

Secondary School   22384   0.450411   0.497546

Higher   22384   .0750536   0.2634837

Age of Woman: (base— Below 25 years)

Between 25 and 34 years   23118   0.3007181   0.4585802

35 years and above	23118	0.6340081	0.4817176
Multiple Birth	23118	.0378493	0.1908358
Child is Male	23118	0.5137555	0.4998216
Number of Children	23118	4.327191	2.015654
Polygyny	19368	0.2866068	0.5872101
Skilled Assistance during Birth	5883	0.6624171	0.4729257
Caesarean section	5884	0.1046907	0.3061805
Place of Delivery: (base—Home Delivery)			
Public Facility Delivery	5882	0.6314179	0.4824613
Private Facility Delivery	5882	0.0634138	0.2437265
Antenatal Care	4272	6.263811	2.818629

Std. Dev. Standard Deviation, Obs. Observation. Source: Author's computation from the 2014

GDHS

Table 5.2 Results of Recursive Probit model.

VARIABLES	Model A Coefficient	Model B Coefficient
Woman is Exposed to mass media	-0.107***	-0.0000552
	(0.0342)	(0.0806)

Woman is empowered	1.591***	1.726***
	(0.109)	(0.269)
Wealth		
(base—poorest)		
Poorer	-0.110**	-0.103
	(0.0437)	(0.0942)
Middle	-0.122**	-0.0573
	(0.0524)	(0.121)
Richer	-0.297***	-0.328**
	(0.0688)	(0.143)
Richest	-0.322***	-0.312*
	(0.0896)	(0.179)
Woman is working	-0.0838*	-0.0172
	(0.0478)	(0.0917)
Education Level of Woman:		
(base— No Education)		
Primary School	-0.0722*	-0.107
	(0.04)	(0.0877)
Secondary School	-0.220***	-0.215**
	(0.0418)	(0.0872)
Higher	-0.299**	-0.514**
	(0.118)	(0.216)
Residential Type:		
Rural	-0.0354	-0.0545
	(0.0386)	(0.0843)
Region of Residence:		

(base— Greater Accra)		
Western	0.0558	0.216
	(0.08)	(0.172)
Central	0.126	0.167
	(0.079)	(0.167)
Volta	0.195**	0.463***
	(0.0812)	(0.161)
Eastern	-0.173*	0.375**
	(0.0927)	(0.161)
Ashanti	0.206***	0.331**
	(0.0801)	(0.159)
Brong Ahafo	0.209***	0.346**
	(0.0757)	(0.165)
Northern	0.534***	0.837***
	(0.0843)	(0.206)
Upper East	-0.316***	-0.176
	(0.102)	(0.192)
Upper West	0.168**	0.435***
	(0.0824)	(0.164)
Education Level of Man:		
(base— No Education)		
Primary School	-0.120**	0.0416
	(0.0477)	(0.0963)
Secondary School	-0.219***	-0.101
	(0.0421)	(0.0923)
Higher	-0.0814	-0.0751

		(0.0716)	(0.159)
Age of Woman:			
(base— below 25 years)			
Between 25 and 34years		-0.116*	-0.101
		(0.0622)	(0.0798)
35 years and above		-0.192***	-0.059
		(0.0626)	(0.0923)
Multiple		0.568***	0.514***
		(0.0633)	(0.109)
Child is Male		0.0894***	0.0972*
		(0.025)	(0.053)
Skilled assistance during birth			0.0761
			(0.102)
Caesarean section			0.187**
			(0.0946)
Place of Delivery:			
(base— Home Delivery)			
Public Facility Delivery			0.0201
			(0.108)
Private Facility Delivery			0.114
			(0.142)
Antenatal care			-0.0472***
			(0.0147)
Constant		-2.411***	-2.917***
		(0.12)	(0.225)

Women's Empowerment (Dependent Variable)		
Woman is Exposed to mass media	0.202***	0.156***
	(0.0276)	(0.0535)
Wealth (base—poorest)		
Poorer	0.0852**	-0.0134
	(0.0368)	(0.0719)
Middle	0.0694	-0.13
	(0.0452)	(0.089)
Richer	0.341***	0.329***
	(0.0617)	(0.12)
Richest	0.588***	0.465***
	(0.0904)	(0.171)
Woman is working	0.213***	0.178***
	(0.0366)	(0.059)
Education Level of Woman: (base— No Education)		
Primary School	0.0516	0.0192
	(0.0358)	(0.0679)
Secondary School	0.245***	0.278***
	(0.039)	(0.0715)
Higher	0.253*	0.165
	(0.144)	(0.202)
Residential Type:		
Rural	-0.00323	0.0431
	(0.0337)	(0.0658)

Region of Residence:		
(base— Greater Accra)		
Western	0.0867	-0.287*
	(0.0787)	(0.159)
Central	-0.0033	-0.258
	(0.0769)	(0.158)
Volta	-0.186**	-0.522***
	(0.0764)	(0.155)
Eastern	0.533***	-0.112
	(0.0859)	(0.162)
Ashanti	0.0666	-0.0385
	(0.0795)	(0.168)
Brong Ahafo	-0.160**	-0.409***
	(0.0735)	(0.152)
Northern	-0.702***	-1.132***
	(0.0733)	(0.152)
Upper East	0.688***	0.318*
	(0.0852)	(0.172)
Upper West	0.000546	-0.416***
	(0.0773)	(0.158)
Education Level of Man:		
(base— No Education)		
Primary School	0.155***	0.0371
	(0.0414)	(0.0765)
Secondary School	0.341***	0.266***

	(0.034)	(0.0663)
Higher	0.314***	0.352***
	(0.0737)	(0.13)
Age of Woman: (base— below 25 years)		
Between 25 and 34years	0.154***	0.143**
	(0.0557)	(0.07)
35 years and above	0.473***	0.376***
	(0.0592)	(0.0943)
Polygyny	-0.111***	-0.0813
	(0.0219)	(0.0506)
Number of children	-0.0382***	-0.0423**
	(0.00799)	(0.0188)
Constant	0.415***	0.895***
	(0.0999)	(0.189)
Observations	19,331	5,078
/athrho		
	-1.521***	-1.529***
	(0.238)	(0.537)
rho	-0.9088286	-0.9103209

Figures in Bracket represent standard errors. *** significant at 1% level; ** significant at 5%;

*significant at 10% level; Source: Author's computation from the 2014 GDHS

5.2 Analysis

It is worth noting that no priors with respect to whether mass media exposure is the more important determinant relative to women's empowerment is imposed however, the data is allowed to operate. First of all, this study attempted to investigate whether the variables of interest (women's empowerment and mass media exposure) are independent dimensions of women's status. Additionally, the study intended to examine whether the variables of interest (women's empowerment and mass media exposure) are relevant determinants on neonatal mortality even after controlling for other confounding factors. Finally, healthcare variables are introduced into the model to find out how it affects the effects of the interest variables (see model B of Table 5.2).

The results from Variance Inflation Factor (VIF) showed that there is no multicollinearity in the employed explanatory variables hence they can be used to make analysis (see Appendix 5). The Cronbach's Alpha coefficient is 0.7453 which indicates that the individual measures for the women's empowerment are moderately reliable (see Appendix 4). There was no Cronbach's Alpha test for mass media exposure since, as far as research works that study the effect of mass media exposure on child health/survival and 2014 GDHS is concerned, radio, television and newspaper/magazine are the mostly adopted and available measures for mass media exposure.

5.2.1 Summary Statistics

From Table 5.1, it is found that about 3.4% of children born to women as sampled in the 2014 GDHS survey died in the neonatal phase.

In terms of women's characteristics, 88% of the women were empowered, 54% were exposed to the mass media and 87% of them were working. The proportion of women who were found in the

poorest, poorer, middle, richer and richest wealth quintiles were 32.5%, 22.9%, 19.6%, 14.2% and 10.8% respectively. Moreover, the 2014 GDHS showed that men attain higher level of education relative to women. As 45% and 7.5% of men had attained secondary and higher level of education respectively, only 35% and 2.2% of women had attained same. Additionally, whilst about 30.1% gave birth at an age between 25 and 34 years, 63.4% gave birth at age 35years and above.

In terms of birth characteristics, 51% were males and 3.8% of the children were of multiple births. 66% of the women said they sought for skilled assistance during birth. 10% of them gave birth through caesarean section. Most women delivered at health facilities especially at public health facilities relative to home delivery. 6% of the women said they delivered at a private health facility as against 63% who said they delivered at a public health facility. The average number of antenatal care visits is approximately six (6) and it is greater than the four visits recommended by the WHO.

The average number of living children of the sampled women was four (4). About 29% of the women lived in polygynous homes. Only 40% were from the urban areas whilst 60% were from the rural areas. Most of the sampled women were from the Northern region (14%) and the Upper West had the least which is 9%.

5.2.2 Self-selection in Women's empowerment

The correlation between the error terms of both the neonatal mortality and women's empowerment equations (see Model B in Table 5.2) is negative and high. It is signified by rho= -0.9103209. Moreover, the Chi square statistic for the Wald Test at 1 degree of freedom is 8.10566 and significant at 1% level of significance (Prob Chi square=0.0044). The Wald test then fails to accept the null hypothesis that there is no endogeneity bias (or self-selection). This means that

endogeneity of self-selection is confirmed. This outcome is unexpected but not without an explanation and it is actually explained in three scenarios.

Thus, women who are at a higher risk of having complications at birth or of losing their children tend not to make any decisions but rather she may allow her husband (or any other person) to make all decisions and vice-versa.

In the first scenario, it may be because a sick mother may not be able or may not be in a good position to make any decisions even concerning her own health so she tends to allow perhaps her husband to make all subsequent decisions relating to her own health.

In the second scenario, a mother who is at higher risk of losing her sick child may be scared and such fear may cause her to, perhaps, leave all subsequent decisions concerning the health of her sick child to her husband (or any other person).

Last but not the least, women who are not at a higher risk of having complications at birth or of losing their children are more likely to be in the right sense of mind (perhaps without fear) to make decisions concerning their health and that of their children. Hence, they are more likely to make decisions in such instances.

This results above supports the first hypothesis that there is self-selection in women's empowerment.

5.2.3 Determinants of neonatal mortality

The Wald test proved that there is endogeneity bias (self-selection) in both models (A and B) in Table 5.2. This suggests that much credence cannot be put on results from Standard probit model

since the unobservables may be biasing the estimates. Hence, the Recursive bivariate probit model which controls for or can accommodate endogeneity in women's empowerment will be best to report. Since there are two models in Table 5.2, model A begins the analysis and it will also serve as the base model or the basis of analysis. With respect to the analysis, focus is given to women's empowerment and mass media exposure.

From model A in table 5.2, it is revealed that women's empowerment and mass media exposure still have significant effects on neonatal mortality irrespective of a woman's educational status, occupational status, wealth, place and region of residence and other confounding factors. This means that women's empowerment and mass media exposure are independent dimensions of women's status. This results thus supports the second hypothesis that women's empowerment and mass media exposure are independent dimensions of women's status. It also proves that women's empowerment and mass media exposure are important determinants of neonatal mortality in Ghana. It could be observed that when the potential endogeneity of women's empowerment is ignored, women's empowerment and mass media exposure were insignificant in the neonatal mortality equation (see Appendix 3 and 6). However, when the potential endogeneity of women's empowerment was explicitly taken into consideration, it is revealed that women's empowerment and mass media exposure have significant association with neonatal mortality (see Table 5.2). Hence the true effects of women's empowerment and mass media exposure are missed when self-selection in the women's empowerment is ignored.

From model A, there is a positive and significant relationship between women's empowerment and neonatal mortality. This may be because when mothers are empowered, they may rather decide not to seek for healthcare or perhaps skilled assistance during delivery especially in instances where they perhaps feel that health professional do not treat them with respect and patience. This

may consequently lead to neonatal death since they may not get some necessary medications and advice if they do not deliver at the health facility. A study conducted in Ghana by Ameyaw et al. (2016) revealed that women who have the final say on visits and those that also have a final say on household large purchases were less likely to give birth in health facility relative to those that do not have such chance of participation in decision making.

Mass media exposure has a negative and significant association with neonatal mortality. This may be because mothers that are exposed to the mass media are more likely to have information about the beneficial effects of seeking healthcare and hence they may demand for healthcare which may consequently improve the survival chance of their neonates.

In model B of Table 5.2, all the health inputs are introduced into the model based on the assumption that the health inputs may possibly be correlated with each other. The results are explained below.

Women's empowerment has a positive coefficient which is also significant. Intuitively, this means that though women's empowerment may be related to health inputs, it has an independent effect on neonatal mortality in Ghana in that, children born by empowered mothers are more likely to die irrespective of mothers' demand for healthcare (relative to children born by mothers that are not empowered). This result is in support of the third hypothesis that women's empowerment has significant and independent effect on neonatal mortality irrespective of whether a woman seeks for health inputs.

 This outcome should be explained with care since it does not mean that women's empowerment supports neonatal mortality. This outcome may be because since mothers are more likely to love their children and they also bear relatively higher cost in childbirth, as argued by Eswaran (2002), mothers that are not empowered may rather take very good care of their newborns so they

(neonates) do not even get sick, in the first place, let alone they die. This is so because they know that they may not even be allowed to partake in decision-making when their children are sick so they rather take very good care of their children lest they get sick or die. In the other instance, since empowered mothers know they will take part in decisions concerning the health of their neonates, they may be complacent in taking very good care of their children relative to mothers that are not empowered, leading to perhaps their (empowered mothers) children's sickness and/or death. Thus, their (empowered mothers) value of care for their children's health may be relatively lower than that of mothers that know that their decisions will not matter if their children finally get sick.

Caesarean delivery has a positive and significant effect on neonatal mortality. Thus, neonates that are born through caesarean section have a significantly higher risk of dying relative to those that were not born through caesarean section. This is consistent with a study by Ezeh et al. (2014) which revealed a significant and positive effect of caesarean delivery on neonatal mortality in Nigeria. This outcome may be ascribed to the bad or negative perceptions like fear that have been associated with caesarean delivery by Ghanaian women.

There was a negative and significant association between antenatal care visits and neonatal mortality. This then means that as mothers seek for antenatal care where they are more likely to receive advice, treatment and medications, their children too are more likely to survive the neonatal phase. This outcome is consistent with a study conducted by Lambon-Quayefio & Owoo (2014) which revealed that antenatal care has a negative and significant effect on neonatal mortality in Ghana.

There was no significant relationship between skilled attendance during birth and neonatal mortality. Though this outcome is unexpected, it is consistent with Lambon-Quayefio & Owoo

(2014) who also found no evidence to suggest that seeking skilled attendance during birth was associated with better survival chances of neonates in Ghana.

Whether a neonate was born in the public or private health facility did not have any significant relationship with neonatal mortality. This is consistent with Nathan & Mwanyangala (2012) who did not also find any evidence to show that health facility delivery was associated with better chances of survival of children in the neonatal stage.

Though from Model A mass media exposure of mothers proved to be an important determinant of neonatal mortality, the introduction of all the health inputs rendered mass media exposure of mothers insignificant (see Model B in Table 5.2). So, this means that mass media exposure of mothers picks out the effect of health inputs, put in a different way, mass media exposure of mothers negatively affects neonatal mortality solely or primarily through health inputs. Thus, when mothers are exposed to the mass media, they may more likely demand for healthcare like antenatal care which in turn have a negative and significant effect on neonatal mortality. Hence, mass media exposure of mothers affects neonatal mortality indirectly through health inputs. This results thus supports the second hypothesis that mass media exposure affects neonatal mortality primarily through health inputs.

Also, it is worth noting that since seeking of skilled delivery and health facility delivery during birth and mass media exposure were all insignificant, it may mean that they are highly correlated with each other that it prevents inference of any effects of the three variables independently. However, since antenatal care visits and caesarean section had significant relationship with neonatal deaths in Ghana, it means that though they (antenatal care visits and caesarean section) may be related with mass media exposure, they (antenatal care visits and caesarean section) also

have independent effect on neonatal mortality in Ghana. The effects of other determinants of neonatal mortality are discussed below (see model B in Table 5.2).

Wealth status has a negative relationship with neonatal mortality however, it is only when the woman falls into the richer or richest category that this effect is significant on neonatal mortality. This is consistent with Maraga (2010) who also found socio-economic wealth inequality to significantly affect neonatal mortality.

Mother's educational level have negative association with neonatal mortality relative to mothers who have no education however this effect is only significant if a mother has attained secondary or higher level of education. This is indicative that mothers that attain higher than just primary level of education are very well able to process (health) information properly and hence avail or produce good health to their children relative to the illiterate (or a mother of no education). A study by Mostafa (2012) found strong significant negative association between maternal education and neonatal mortality.

There was a little evidence in support of regional variations in neonatal mortality since most regional dummies are significantly related to neonatal mortality.

The study also reveals that there is a positive and statistically significant relationship between multiple birth and neonatal mortality. This result is consistent with Kayode et al. (2014) et al. (2014), Diallo et al. (2011) and Jahn et al. (2006) who also found multiple birth to be positively associated with neonatal mortality.

Male children are more likely to die and the results is statistically significant. This means that, with respect to child sex, there is neonatal mortality differential. This is consistent with Ezeh et al. (2014), Titaley et al. (2008) and Mondal, Hossain, & Ali (2009) who also found that male neonates

are more likely to die relative to female neonates. The reason, according to some researchers, is that male neonates are highly vulnerable to infectious diseases (Alonso, Fuster, & Luna, 2006). Others also believe that, the rate of death of female neonates is low because of their (female neonates) development of early fetal lung maturity in first week which results in lower incidence of respiratory diseases in female neonates relative to male neonates (Ezeh 2014).

There is also no evidence of residential type differences in neonatal mortality since its results is insignificant. This is inconsistent with a study conducted by Ezeh (2014) who found that neonates of mothers residing in the rural areas had a higher risk of mortality relative to those (neonates) of mothers residing in the urban areas and it was statistically significant.

Moreover, father's education did not have any significant effect on neonatal mortality. This is inconsistent with Choudhury (2015) who found a significant and negative relationship between father's education and infant mortality.

There is also no significant association between employed mothers and the probability of death of a neonate. This finding is inconsistent to Kanmiki et al. (2014), Benjamin et al. (2009), and Kayode et al. (2014) whose studies have established positive (significant) relationship between childhood deaths and mothers in low paid occupations or mothers who are just housewives.

Also, all categories of the age of a woman did not have statistically significant effect on neonatal mortality relative to mothers whose age is below 25 years though they have the expected negative sign. This is inconsistent with a study conducted by Lambon-Quayefio & Owoo (2014) which revealed that older women stands a higher risk of losing their neonates and it was significant. The outcome is also inconsistent with a study conducted by Selemani et al. (2014) which indicated an

increase in risk of neonatal mortality among neonates born to young mothers aged 13–19 years compared with those whose mother's age were between 20–34 years. This result was significant.

5.2.4 Determinants of women's empowerment

The results from Model B in Table 5.2 have revealed certain variables as having high relevance to women's empowerment in Ghana. It is chosen to be reported since Model B encompasses all explanatory variables as employed in this study. These are exposure to the mass media of mothers, wealth status, occupational status, educational level of both parents (father and mother), women's age, place of residence, number of living children of mothers, and the presence of other wives (polygynous marriage).

Mass media exposure is positively and significantly related with women's empowerment. Mothers that are exposed to the mass media also interact with the outside world and hence, they are more likely to imitate their role models and consequently have a say in the household. This is consistent with Gupta & Yesudian (2006) who found that women that are exposed to the mass media are more probable to have high decision making autonomy relative to those that are not exposed to the mass media. This findings is also consistent with a study by Zaky et al. (n.d.) that revealed that exposure to media of mothers contribute to higher level of women's empowerment.

Wealth is positively related with women's empowerment (relative to women in the poorest quintile). However, it is only when a woman is in the richer or richest category that the results is significant (see Model B in Table 5.2). Thus, mothers that find themselves in the richer or richest households are more likely to be empowered. This results is consistent with Gupta & Yesudian (2006) found that women of high standard of living are more likely to have high autonomy in

decision making relative to others. Boateng et al. (2012) also found that wealthier married women were significantly more likely to partake in decisions concerning their own healthcare.

Moreover, working mothers are also more likely to be empowered. This may be because working mothers may earn hence they are more likely to have autonomy in decision making in the household. Boateng et al. (2012) found employment of women as a relevant determinant of women's empowerment. The results are consistent with research works by Zaky et al. (n.d.) and Ragui et al. (2014) which revealed that employed women are more likely to be empowered.

Educated women are more likely to be empowered. This result is only significant when the woman has attained a secondary level of education. Ragui et al. (2014) conducted a study which also revealed that secondary level of education of women has a positive effect on women's empowerment. Moreover, this study has no evidence to show that when a woman attains a higher level of education than just the secondary level, it has positive effect on women's empowerment. This is inconsistent with a study conducted by Boateng et al. (2012) which revealed that tertiary education of women affect women's involvement in the household decision-making. Studies conducted by Gupta & Yesudian (2006) and Zaky et al. (n.d.) revealed that women's education contributes to higher level of women's empowerment.

Also, it is only women's partners have attained secondary or higher level of education that the education of their (women's) husbands has a positive effect on their (women) empowerment. This may be that when people are educated, they learn virtues above cultural beliefs or traditions that may make them disrespect their partner's decisions. A study by Ragui et al. (2014) revealed that the father's educational levels, except for intermediate and post university levels, compared to not educated at all have a positive significant impact on women's empowerment or decision-making.

Also, there is a positive and significant effect of all categories of mother's age and women's empowerment relative to women who are below 25 years. Thus, older women are more likely to be empowered relative to the younger ones. This is consistent with Kamla Gupta & Yesudian (2006) who also found that women of age 40-49 years are more likely to have autonomy in decision making relative to women of age 15-29 years. Ragui et al. (2014) and Zaky et al. (n.d.) also revealed that women's age contribute to higher level of women's empowerment.

Number of children is negatively and significantly related with women's empowerment. This may mean that, perhaps, after men have had what they want, thus, by giving birth to a lot of children with their wives, they (men) may tend not to value them (their wives) and their (their wives) decisions any longer. This result is inconsistent with a study conducted by Ragui et al. (2014) which revealed that women's decision-making power and mobility is positively affected by the number of children she has.

A woman whose husband has other wives and a woman that reside in the rural area are less likely to be empowered, however, these results are not significant. No evidence was provided for regional variation in women's empowerment since almost all of the regional dummies are not statistically significant. In this study, women from the Volta region, Upper West and Northern region were less likely to be empowered relative to women in Greater Accra region. Moreover, women in Upper East and Western region are more likely to be empowered relative to women in Greater Accra region. These results were significant. This findings is consistent with Boateng et al. (2012) who found that married women in the Upper East region were significantly more probable to partake in three measures of decision-making except for decisions on large household purchases relative to those in the Greater Accra region. Ragui et al. (2014) found that the regional dummy was a relevant determinant of women's empowerment.

CHAPTER SIX

SUMMARY AND CONCLUSION

6.0 Introduction

This chapter seeks to shed more light on the key findings of this study, and provide recommendations. It shall summarize and make conclusions on the correlates of neonatal mortality in terms of health inputs, parental/household and child characteristics whilst focusing on women's empowerment and mass media exposure. It will also discuss the determinants of women's empowerment.

6.1 Summary

Neonatal mortality is attaining overwhelming attention globally. This is not only because neonates or children are very important in the quest to achieving economic growth and development but also most implemented policies have performed better as far as the other mortalities (infant, under-five mortality etc.) are concerned meanwhile reduction in neonatal mortality is still not improving. This has caused several action plans and strategies to be directed in its reduction but this thesis proposes two perhaps neglected variables (women's empowerment and mass media exposure) that may help supplement such action plans and strategies in reducing neonatal mortality.

Notwithstanding that children are very precious and the reduction in neonatal mortality is not improving, less research has been done to find out the true correlates of neonatal mortality especially in lower and lower middle-income countries where neonates are more likely to die relative to their counterpart countries. This served as a motivation for this study to find out the role

that the interest variables (women's empowerment and mass media exposure) play in neonatal deaths in Ghana. To achieve this, the current study adopted a model developed by Panis and Lillard (1994) which was extended and applied by Maitra (2004). This model is grounded on the Grossman (1972) health demand theory where the individual is seen as both the consumer and producer of health. This study attempted to investigate the effect of women's empowerment and mass media exposure on neonatal mortality. It also aimed to understand the channels through which the mass media exposure may translate into neonatal survival. Following the employed model, the proposed mechanisms were health inputs encompassing: seeking skilled assistance during delivery, health facility delivery, antenatal care visits and caesarean delivery.

Latest data from the Ghana Demographic Health Survey 2014, was employed. The study then employs recursive bivariate probit model to jointly estimate the probability of a newborn dying within its 28 Days of life (neonatal mortality) and the probability of a woman being empowered (women's empowerment). This regression was to serve as a means of controlling for the potential endogeneity of women's empowerment in the neonatal mortality equation as proved by the Wald Test. There are certain captivating findings as discussed below.

6.2 Conclusions

The Wald test showed that there is self-selection in women's empowerment hence the estimates of the Standard Probit model will be biased. So, the results of the Recursive Bivariate Probit Model is rather reported. The Cronbach's Alpha coefficient also proved that the variables that are employed to construct the index for women's empowerment are reliable. The Variance

Inflation Factor also showed that there is no multicollinearity in the employed regression model hence, the employed explanatory variables are reliable for analysis.

6.2.1 Neonatal Mortality

Baseline estimates or the results from the base model (model A of Table 5.2) revealed that women's empowerment and mass media exposure are independent dimensions of women's (socioeconomic) status. Additionally, the introduction of health inputs (in Model B of Table 5.2) revealed that (a) caesarean delivery has a positive and significant effect on neonatal mortality (b) women's empowerment has an independent, significant and positive effect on neonatal mortality (c) antenatal care visits have a negative and significant effect on neonatal mortality (d) other factors like wealth status, mother's educational level, multiple birth, and sex of child proved to be relevant determinants of neonatal mortality in Ghana (e) mass media exposure of mothers has a negative and indirect effect on neonatal mortality through health inputs like antenatal care visits. This is in line with a policy recommendation made by Owoo and Lambon-Quayefio (2013) that programs designed to increase women's participation in antenatal care utilization should take advantage of certain social networks like television and radio to spread important information about medical care.

Two critical points must be well noted. Firstly, controlling for the endogeneity (self-selection) of women's empowerment in the outcome equation (neonatal mortality) is very key as it was only when the endogeneity of women's empowerment was explicitly taken into consideration (by the recursive probit model) that it was revealed that women's empowerment (and mass media exposure) has a significant effect on neonatal mortality. Secondly, the findings showed that though wealth status has a negative effect on neonatal mortality and positive effect on women's

empowerment, it's effect is only significant when the woman falls in the richer or richest category. Last but not the least, perhaps the most fascinating finding emerging from the analysis is that women's empowerment and mass media exposure are relevant determinants of neonatal mortality and independent dimensions of women's status. However, unlike women's empowerment, mass media exposure of mothers works (primarily) through health inputs like perhaps antenatal care visits in affecting neonatal mortality. So, it was relevant to split the categories for measuring bargaining power in the household since they were showed to have different impact or effect (in terms of direction, magnitude and means) on neonatal survival

6.2.2 Women's empowerment

It was revealed, from model B in Table 5.2, that mother's exposure to the mass media, wealth, educational level of both parents, mother's employment status, number of children and age of woman have significant effect on women's empowerment.

6.3 Recommendation

Based on the above-mentioned findings of both the descriptive and regression analysis of neonatal mortality, the following recommendations can be introduced:

It may be true that most pregnant women especially the (less privileged) ones residing in rural areas are not well informed about the availability of quality maternal health care services at the health facilities aimed at improving neonatal survival. Hence, the government should help to increase the availability of information centers, radio stations and the like in especially the rural

areas. In addition, the National Commission for Civic Education in Ghana (NCCE), together with other public health officials, should undertake awareness programs on neonatal mortality via the mass media to make women aware of their risk of losing their children and also encourage especially women (or mothers) residing in the rural areas to seek health care and also to deliver at health facilities.

More efforts should be channeled into improving women's empowerment inside the country. For instance, women's empowerment programs should be undertaken in the various regions of the country especially in the rural areas.

Since women's empowerment and mass media exposure are independent dimensions of women's status, most researchers should explore them. Further research works, using more accurate measures of women's empowerment and mass media exposure are required to draw more robust empirical results.

Collecting information about how women who went through caesarean section were satisfied with the services offered to them, the problems they went through before, during and after the caesarean section and how other women perceive or think about caesarean section is relevant to solving the problems (or fears) that are posed by caesarean delivery.

The public officials should explore the mass media in spreading news on the need for women to attend antenatal care visits if their children are to survive especially the neonatal phase.

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Appendix 1. Recursive Bivariate Probit (No health input variables)- Base Model

```
Seemingly unrelated bivariate probit              Number of obs   =      19331
                                                  Wald chi2(53)   =    3993.45
Log pseudolikelihood = -9167.1831                 Prob > chi2     =     0.0000
```

	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf. Interval]	
neomort						
massexpo	-.1070001	.0342017	-3.13	0.002	-.1740342	-.0399661
empowered	1.590898	.1092705	14.56	0.000	1.376732	1.805064
wealth						
poorer	-.1098647	.0436567	-2.52	0.012	-.1954303	-.0242991
middle	-.1221893	.0524458	-2.33	0.020	-.2249812	-.0193973
richer	-.2970922	.0688073	-4.32	0.000	-.4319521	-.1622323
richest	-.3219204	.0895572	-3.59	0.000	-.4974494	-.1463915
womanwork	-.0838375	.047813	-1.75	0.080	-.1775494	.0098743
mothedc						
primaryeducation	-.0722381	.0399635	-1.81	0.071	-.150565	.0060888
seconeducation	-.2197009	.0418263	-5.25	0.000	-.3016789	-.1377228
higher	-.2992428	.11826	-2.53	0.011	-.5310281	-.0674575
place	-.0354102	.0386119	-0.92	0.359	-.1110882	.0402678
region						
western	.055815	.0800442	0.70	0.486	-.1010688	.2126987
central	.1261347	.0790492	1.60	0.111	-.0287989	.2810683
volta	.1953773	.0812198	2.41	0.016	.0361895	.3545652
eastern	-.1730388	.0927371	-1.87	0.062	-.3548002	.0087225
ashanti	.2062402	.0800627	2.58	0.010	.0493203	.3631602
brong	.2087638	.0756504	2.76	0.006	.0604917	.3570358
northern	.5335354	.0842755	6.33	0.000	.3683584	.6987124
uppereast	-.3160403	.1018468	-3.10	0.002	-.5156563	-.1164243
upperwest	.1679807	.0823688	2.04	0.041	.0065408	.3294206
fathedc						
primaryeducation	-.1204974	.0477296	-2.52	0.012	-.2140457	-.0269491
seconeducation	-.2193866	.0421283	-5.21	0.000	-.3019564	-.1368167
higher	-.0814408	.0715833	-1.14	0.255	-.2217416	.0588599
womanage						
btn25and34	-.1158985	.0621598	-1.86	0.062	-.2377296	.0059326

35andabove	-.1918562	.0625927	-3.07	0.002	-.3145356	-.0691768
multiple	.5680086	.0633221	8.97	0.000	.4438995	.6921178
malechd	.0894001	.0250452	3.57	0.000	.0403124	.1384878
_cons	-2.410665	.1203228	-20.03	0.000	-2.646494	-2.174837
empowered						
massexpo	.2016999	.0276288	7.30	0.000	.1475486	.2558513
wealth						
poorer	.0851741	.0368111	2.31	0.021	.0130257	.1573225
middle	.0693532	.0452349	1.53	0.125	-.0193056	.1580119
richer	.3410286	.0617108	5.53	0.000	.2200777	.4619796
richest	.588148	.0903787	6.51	0.000	.411009	.7652869
womanwork	.2127514	.0365968	5.81	0.000	.1410229	.2844799
mothedc						
primaryeducation	.0515556	.0358325	1.44	0.150	-.0186748	.1217861
seconeducation	.2449476	.0390025	6.28	0.000	.1685041	.321391
higher	.2532271	.1435281	1.76	0.078	-.0280829	.534537
place	-.0032266	.0337061	-0.10	0.924	-.0692894	.0628362
fathedc						
primaryeducation	.1549315	.0413794	3.74	0.000	.0738294	.2360337
seconeducation	.3412852	.0340054	10.04	0.000	.2746359	.4079346
higher	.3143869	.0736773	4.27	0.000	.169982	.4587917
womanage						
btn25and34	.1543838	.0556698	2.77	0.006	.045273	.2634947
35andabove	.4727054	.059181	7.99	0.000	.3567127	.588698
polygyny	-.1112402	.0218922	-5.08	0.000	-.1541482	-.0683323
numchldrn	-.0382296	.0079863	-4.79	0.000	-.0538824	-.0225768
region						
western	.0867244	.0787408	1.10	0.271	-.0676048	.2410535
central	-.0033019	.0768839	-0.04	0.966	-.1539916	.1473878
volta	-.1857151	.0764304	-2.43	0.015	-.335516	-.0359142
eastern	.5334416	.0858724	6.21	0.000	.3651348	.7017484
ashanti	.0666155	.0795079	0.84	0.402	-.0892171	.2224481

brong	-.1596114	.0735179	-2.17	0.030	-.3037037	-.015519
northern	-.701701	.073272	-9.58	0.000	-.8453115	-.5580905
uppereast	.6883473	.0851862	8.08	0.000	.5213855	.8553091
upperwest	.0005465	.0772759	0.01	0.994	-.1509115	.1520044
_cons	.4152231	.0998951	4.16	0.000	.2194323	.6110139
/athrho	-1.520752	.2379053	-6.39	0.000	-1.987038	-1.054466
rho	-.9088286	.0414028			-.9631003	-.7835366

Wald test of rho=0:   chi2(1) =   40.8609   Prob > chi2 = 0.0000

Appendix 2. Recursive Bivariate Probit Model (All Health Inputs included).

```
Seemingly unrelated bivariate probit          Number of obs    =      5078
                                               Wald chi2(58)    =   1122.31
Log pseudolikelihood = -2407.4977              Prob > chi2      =    0.0000
```

	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf. Interval]	
neomort						
massexpo	-.0000552	.0806457	-0.00	0.999	-.1581179	.1580075
empowered	1.725692	.2689076	6.42	0.000	1.198643	2.252741
wealth						
poorer	-.1027293	.0942325	-1.09	0.276	-.2874216	.081963
middle	-.0572978	.1214463	-0.47	0.637	-.2953282	.1807327
richer	-.3277821	.1430194	-2.29	0.022	-.6080949	-.0474693
richest	-.3121359	.1788973	-1.74	0.081	-.6627682	.0384964
womanwork	-.0172142	.091661	-0.19	0.851	-.1968665	.1624381
mothedc						
primaryeducation	-.1066109	.08766	-1.22	0.224	-.2784213	.0651995
seconeducation	-.2153523	.0872474	-2.47	0.014	-.386354	-.0443505
higher	-.5135536	.2157711	-2.38	0.017	-.9364571	-.0906501
place	-.0545009	.0843378	-0.65	0.518	-.2198001	.1107982
region						
western	.2160524	.1724224	1.25	0.210	-.1218893	.5539941
central	.1670928	.1669701	1.00	0.317	-.1601626	.4943483
volta	.4632499	.1612094	2.87	0.004	.1472852	.7792146
eastern	.3752432	.160927	2.33	0.020	.0598321	.6906542
ashanti	.3313011	.1585271	2.09	0.037	.0205937	.6420085
brong	.3459804	.164908	2.10	0.036	.0227667	.6691941
northern	.8369391	.2057325	4.07	0.000	.4337108	1.240167
uppereast	-.1762808	.1920696	-0.92	0.359	-.5527304	.2001687
upperwest	.4353473	.1636897	2.66	0.008	.1145213	.7561733
fathedc						
primaryeducation	.041575	.0962502	0.43	0.666	-.1470719	.230222
seconeducation	-.1005224	.0923205	-1.09	0.276	-.2814672	.0804225
higher	-.0751492	.1587626	-0.47	0.636	-.3863182	.2360198
womanage						

btn25and34	-.1013296	.0798206	-1.27	0.204	-.2577752	.0551159
35andabove	-.0589678	.0923136	-0.64	0.523	-.2398992	.1219637
multiple	.5138381	.1093888	4.70	0.000	.29944	.7282362
malechd	.0971807	.05302	1.83	0.067	-.0067366	.201098
skllasst	.0760684	.1018022	0.75	0.455	-.1234602	.275597
caesar	.1872065	.0946342	1.98	0.048	.0017268	.3726862
healthfct						
pblic	.0201465	.1077825	0.19	0.852	-.1911033	.2313963
privte	.1141243	.1416427	0.81	0.420	-.1634902	.3917388
antenatal	-.0472198	.014734	-3.20	0.001	-.0760979	-.0183417
_cons	-2.916612	.225397	-12.94	0.000	-3.358382	-2.474842
empowered						
massexpo	.1562782	.0535369	2.92	0.004	.0513479	.2612085
wealth						
poorer	-.0133707	.0719486	-0.19	0.853	-.1543874	.127646
middle	-.1297458	.0889848	-1.46	0.145	-.3041528	.0446612
richer	.3286224	.1202258	2.73	0.006	.0929841	.5642606
richest	.4650098	.1708953	2.72	0.007	.1300613	.7999584
womanwork	.178327	.0589795	3.02	0.002	.0627293	.2939247
mothedc						
primaryeducation	.0191768	.0679493	0.28	0.778	-.1140015	.1523551
seconeducation	.2775152	.0714714	3.88	0.000	.1374338	.4175965
higher	.1645472	.2017933	0.82	0.415	-.2309604	.5600548
place	.0431434	.0657658	0.66	0.512	-.0857551	.1720419
fathedc						
primaryeducation	.0370891	.076455	0.49	0.628	-.11276	.1869382
seconeducation	.2655572	.0663046	4.01	0.000	.1356025	.3955118
higher	.3521106	.1297708	2.71	0.007	.0977645	.6064566
womanage						
btn25and34	.1425636	.0700121	2.04	0.042	.0053425	.2797847
35andabove	.3762112	.0943379	3.99	0.000	.1913123	.5611101
polygyny	-.0813446	.0505979	-1.61	0.108	-.1805147	.0178255
numchldrn	-.0422694	.0188272	-2.25	0.025	-.0791701	-.0053687

Appendix 3. Results of Standard Probit Model (No Health input included)

```
Probit regression                              Number of obs    =        22348
                                               Wald chi2(27)    =       250.90
                                               Prob > chi2      =       0.0000
Log pseudolikelihood = -3192.3583              Pseudo R2        =       0.0345
```

neomort	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
massexpo	.0039967	.0393125	0.10	0.919	-.0730544	.0810477
empowered	.0572064	.054437	1.05	0.293	-.0494881	.163901
wealth						
poorer	-.048426	.053666	-0.90	0.367	-.1536095	.0567575
middle	-.0480698	.0630118	-0.76	0.446	-.1715706	.075431
richer	-.1161624	.0801289	-1.45	0.147	-.2732122	.0408875
richest	-.0461011	.0924141	-0.50	0.618	-.2272294	.1350271
womanwork	.0446248	.0540465	0.83	0.409	-.0613044	.150554
mothedc						
primaryeducation	-.0330476	.0489936	-0.67	0.500	-.1290733	.0629781
seconeducation	-.0591941	.0481638	-1.23	0.219	-.1535934	.0352052
higher	-.0976533	.1251535	-0.78	0.435	-.3429496	.147643
place	-.0577919	.0460073	-1.26	0.209	-.1479647	.0323808
region						
western	.039032	.0868538	0.45	0.653	-.1311984	.2092624
central	.0859457	.0860195	1.00	0.318	-.0826494	.2545409
volta	.012501	.093613	0.13	0.894	-.170977	.195979
eastern	-.0051294	.0900382	-0.06	0.955	-.181601	.1713423
ashanti	.2154803	.0806623	2.67	0.008	.0573851	.3735755
brong	.0302117	.0868165	0.35	0.728	-.1399456	.200369
northern	.0001571	.0925895	0.00	0.999	-.181315	.1816292
uppereast	.0242125	.0954319	0.25	0.800	-.1628307	.2112556
upperwest	.1380916	.0914768	1.51	0.131	-.0411997	.3173829
fathedc						
primaryeducation	-.0458243	.060692	-0.76	0.450	-.1647785	.0731299
seconeducation	-.0105971	.0467639	-0.23	0.821	-.1022527	.0810584
higher	.101758	.0767336	1.33	0.185	-.0486371	.252153
womanage						
btn25and34	-.0824351	.0801045	-1.03	0.303	-.2394371	.0745669
35andabove	.0304281	.0770764	0.39	0.693	-.1206389	.1814952
multiple	.7915038	.0569138	13.91	0.000	.6799549	.9030528
malechd	.1507812	.0331138	4.55	0.000	.0858792	.2156831
_cons	-2.009227	.1351032	-14.87	0.000	-2.274025	-1.74443

Appendix 4. Cronbach's Alpha for Women's Empowerment

Test scale = mean(standardized items)

Item	Obs	Sign	item-test correlation	item-rest correlation	average interitem correlation	alpha
decisionon~h	19357	+	0.4566	0.2954	0.2408	0.7406
decisionla~h	19357	+	0.4631	0.3029	0.2398	0.7396
decisionvi~t	19357	+	0.4139	0.2475	0.2474	0.7473
houseown	19357	+	0.4089	0.2419	0.2481	0.7481
landown	19357	+	0.4337	0.2696	0.2443	0.7443
goingout	19357	+	0.6918	0.5771	0.2048	0.6986
neglects	19357	+	0.6783	0.5601	0.2069	0.7013
argues	19357	+	0.6907	0.5758	0.2050	0.6989
sexrefuse	19357	+	0.6709	0.5508	0.2080	0.7027
burns	19357	+	0.6033	0.4676	0.2184	0.7155
Test scale					0.2264	0.7453

Appendix 5. Variance Inflation Factor

Variable	VIF	1/VIF
skllasst	8.34	0.119914
healthfct	8.12	0.123104
empowered	6.56	0.152421
wealth	6.23	0.160618
fathedc	5.02	0.199303
womanwork	4.99	0.200420
mothedc	4.40	0.227126
womanage	3.85	0.259733
region	3.74	0.267134
place	3.40	0.294022
massexpo	3.26	0.306908
antenatal	2.81	0.355386
malechd	2.01	0.497614
caesar	1.25	0.801984
multiple	1.09	0.915409
Mean VIF	4.34	

Appendix 6. Standard Probit (All Health inputs included)

```
Probit regression                                  Number of obs    =       5448
                                                   Wald chi2(32)    =     125.95
                                                   Prob > chi2      =     0.0000
Log pseudolikelihood = -629.76224                  Pseudo R2        =     0.0924
```

neomort	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf. Interval]	
massexpo	.1374794	.0881938	1.56	0.119	-.0353773	.3103362
empowered	.1883119	.1236057	1.52	0.128	-.0539508	.4305746
wealth						
poorer	-.0430084	.1270066	-0.34	0.735	-.2919367	.2059199
middle	-.0988762	.1619271	-0.61	0.541	-.4162474	.218495
richer	-.1023793	.1816166	-0.56	0.573	-.4583414	.2535828
richest	-.0244014	.2152586	-0.11	0.910	-.4463005	.3974978
womanwork	.0609484	.0987692	0.62	0.537	-.1326358	.2545326
mothedc						
primaryeducation	-.0894887	.1148659	-0.78	0.436	-.3146218	.1356443
seconeducation	-.0536709	.1043242	-0.51	0.607	-.2581426	.1508007
higher	-.3421148	.2591028	-1.32	0.187	-.849947	.1657174
place	-.0036549	.1118017	-0.03	0.974	-.2227822	.2154723
region						
western	.0287763	.2037847	0.14	0.888	-.3706344	.428187
central	-.0026921	.1996253	-0.01	0.989	-.3939506	.3885664
volta	.2445668	.1944421	1.26	0.208	-.1365327	.6256663
eastern	.4084257	.1807977	2.26	0.024	.0540687	.7627826
ashanti	.3520405	.1755136	2.01	0.045	.0080401	.6960408
brong	.1375585	.1967119	0.70	0.484	-.2479897	.5231067
northern	.2197051	.2151976	1.02	0.307	-.2020744	.6414847
uppereast	.070869	.2234447	0.32	0.751	-.3670746	.5088126
upperwest	.3030353	.2019794	1.50	0.134	-.0928369	.6989076
fathedc						
primaryeducation	.0904698	.133922	0.68	0.499	-.1720124	.3529521
seconeducation	.0809591	.1077342	0.75	0.452	-.130196	.2921142
higher	.1337887	.1799978	0.74	0.457	-.2190006	.486578
womanage						
btn25and34	-.0299464	.1064364	-0.28	0.778	-.238558	.1786651
35andabove	.1600286	.1123988	1.42	0.155	-.060269	.3803262
multiple	.6709533	.1108181	6.05	0.000	.4537538	.8881527
malechd	.0951828	.0737295	1.29	0.197	-.0493245	.23969
skllasst	.071196	.155998	0.46	0.648	-.2345545	.3769466
caesar	.2231142	.1137446	1.96	0.050	.0001789	.4460496
healthfct						
pblic	.0876466	.1662084	0.53	0.598	-.2381159	.4134091
privte	.1593628	.2190086	0.73	0.467	-.269886	.5886117

antenatal	-.0685532	.0127069	-5.39	0.000	-.0934582	-.0436482
_cons	-2.421405	.2856066	-8.48	0.000	-2.981184	-1.861627