

**THE EFFECTS OF HOUSEHOLD WEALTH ON SELECTED
INDICATORS OF MATERNAL AND CHILD HEALTH: EVIDENCE
FROM GHANA**

BY

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DECLARATION

This is to certify that, this thesis is the original research undertaken by *CHRISTIAN KWAKU OSEI* towards the award of a Master of Philosophy (MPhil.) degree in the Department of Economics, University of Ghana.

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ABSTRACT

Though Ghana has succeeded in halving poverty prior to the commencement of the new global agenda – Sustainable Development Goals, the country still faces high maternal and child mortality rates partly due to disparities in household wealth among other contextual factors. This study investigates the effect of household wealth on selected indicators of maternal and child health—antenatal care (ANC), modern contraceptive use and under-five mortality. In 2016, the WHO recommended a new guideline on the number of ANC visits in which the recommended ANC visits by expectant mothers was revised from four (4) to eight (8). This study therefore seeks to examine the effect of household wealth on the uptake of the revised recommended visit of eight (8). The study further seeks to ascertain the effect of household wealth on modern contraceptive usage as well as under-five mortality. Using data from the 2014 GDHS data and employing the logistic regression estimation technique, the findings reveal that household wealth has a positive and significant effect on ANC. The results also indicate that household wealth has a negative and significant relationship with under-five mortality whereas it has positive and insignificant relationship with modern contraceptive use. Furthermore, this study uniquely identifies a heterogeneous effect of household wealth on maternal healthcare service utilisation. In particular, women in rural areas whose partners/husbands have attained a minimum of secondary education are more likely to use healthcare services especially ANC. Hence, a holistic health education especially for males in the rural areas as well as interventions that improve livelihoods are crucial for improving maternal and child health.

DEDICATION

I dedicate this thesis to my entire family and friends who have supported in diverse ways to make sure my graduate studies is successful to the glory of the LORD, our GOD.

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LIST OF ACRONYMS/ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
ANC	Antenatal care
CHPS	Community-Based Health Planning and Services
CWI	Cumulative Wealth Index
GDHS	Ghana Demographic Health Survey
GHS	Ghana Health Service
GNFPP	Ghana National Family Planning Programme
GNI/p, PPP	Gross National Income per capita based on Purchasing Power Parity
iMMR	Institutional Maternal Mortality Ratio
ISSER	Institute of Statistical, Social and Economic Research
IUD	Intra-uterine Device
IWI	International Wealth Index
LAM	Lactational Amenorrhea
LEAP	Livelihood Empowerment Against Poverty
MAF	Millennium Acceleration Framework
MDG	Millennium Development Goal
NDA	Northern Development Authority
NDPC	National Development Planning Commission
NHIS	National Health Insurance Scheme
NPC	National Population Council
NSEZ	Northern Savannah Ecological Zone
RCH/PHD/G HS	Reproductive and Child health Unit of the Public Health Division of the Ghana Health Service
SADA	Savannah Accelerated Development Authority
SDG	Sustainable Development Goal
STI	Sexually Transmitted Infection
TFR	Total Fertility Rate
UN IGME	United Nations Inter-Agency Group for Child Mortality Estimation
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
VIF	Variance Inflation Factor
WHO	World Health Organisation
WHO- SEARO	World Health Organisation - South East Asia Region Office

CHAPTER ONE

1 INTRODUCTION

1.1 Background to the Study

Health and wealth are two seemingly correlated indicators of national growth and development. Improvements in wealth have come hand-in-hand with improvements in health. Everyone has different skills and knowledge that help them to be productive. This is what is referred to as human capital which has been clearly identified as a major stimulus for economic growth and development (Romer, 2012). Although Ghana has achieved some progress in economic growth over the past few years, increasing wealth disparities continue to remain as threats to economic progress. With the introduction of the Sustainable Development Goals (SDGs), various countries have tried to put in measures to ensure the set targets are achieved. The health sector is increasingly regarded by governments as a very important sub-sector in the economy and it aims at guaranteeing the right to all Ghanaians through an efficient and well-resourced sector.

Ghana was identified to have halved extreme poverty before the commencement of the implementation of the SDGs (UNDP, 2015). However, this was only recognized in seven out of the ten regions with progress being made in the three northern regions (UNDP, 2015). In addition to this, slow progress was reported to have been made in child and maternal mortality due to socioeconomic differences. In Ghana, the vast disparity in household wealth distribution has slowed maternal and child survival (Dixon et al. 2014). This, in effect, has caused preventable maternal and child mortalities which may be decreasing at a lower rate than desired.

As a result of this, various government programmes and policies were initiated to improve household wealth as well as improve maternal and child health. Some of these policies include the promulgation of the National Health Insurance Scheme (NHIS) law in 2003, free maternal healthcare between 2005 and 2008, the commencement of the Livelihood Empowerment Against Poverty (LEAP) in 2012, construction of Community-Based Health Planning and Services (CHPS) and recently, the formation of the Northern Development Authority (NDA) erstwhile Savannah Accelerated Development Authority (SADA) which targets mainly the Northern Savannah Ecological Zone (NSEZ) covering the three northern regions and selected districts of the Brong-Ahafo Region in Ghana.

The NHIS was established to abolish user fees and ensure more equitable access to health care. Through the NHIS also, the government's introduction of the free maternal health care was to reduce maternal deaths and reduce financial costs associated with healthcare service. Furthermore, the LEAP programme acts as a social cash transfer programme that provides cash and health insurance to the extremely poor households across the country to alleviate poverty and encourage long term human capital development. In addition, the CHPS compound health zones is to reduce the indirect cost of health related to travelling to the nearest health facility. Finally, the establishment of the Northern Development Authority for the northern sector was to provide avenues to reduce the wealth gap between the north and the south and to consequently improve maternal, child and reproductive health.

All these were to help in improving both child and maternal health as well as reducing health care cost. Most of these policies, however, achieved less than significant results due to their incomprehensive nature (Kayode et al., 2016).

The 2030 agenda for sustainable development addresses health as follows:

“To promote physical and mental health and wellbeing, and to extend life expectancy for all, we must achieve universal health coverage and access to quality health care. No one must be left behind. We commit to accelerating the progress made to date in reducing newborn, child and maternal mortality by ending all such preventable deaths before 2030. We are committed to ensuring universal access to sexual and reproductive health-care services, including for family planning, information and education” (UNDP, 2016).

The Agenda for Sustainable Development contains 17 goals and 169 targets, including one specific goal for health - “Ensure healthy lives and promote well-being for all at all ages” - with 13 targets, which have many linkages and cross-cutting elements, reflecting the integrated approach that underpins the SDGs (UNDP, 2016a). This study focuses on Antenatal care (ANC) visits and Modern Contraceptive Use as indicators for Targets 3.1, 3.2 and 3.7 which focuses on maternal health, under-five mortality and female reproductive health respectively.

Maternal mortality has been highly recognized as a significant determinant of the level of socioeconomic development and the quality of the health care system in the country. It is broadly referred to as deaths due to complications from pregnancy to childbirth. According to the WHO, in 2015, 99 per cent of all maternal deaths occurred in developing countries and it was higher in

women living in rural areas and among poorer communities (WHO, 2015b). The healthcare solutions for most preventable maternal deaths are well known. Available data from the Ghana Health Service's (GHS) annual report for 2016 indicates that Ghana's institutional maternal mortality rate (iMMR) has averaged around 157.41 deaths per 100, 000 live births from 2010 to 2016 with a marginal increase from 141.9 in 2015 to 151 deaths per 100, 000 live births in 2016 (GHS, 2016).

According to Ediau et al. (2013) and WHO (2016b), maternal morbidity and mortality continue to remain an issue of global concern due to inadequate antenatal care (ANC). To ensure safe and effective delivery with less complications, the WHO (2015b) recommended that, pregnant women attend at least four antenatal care visits during pregnancy with the first visit in the first trimester of the pregnancy. The policy of having all pregnant women to visit antenatal clinics at least four times during the course of their pregnancy was meant to keep track of the development of the foetus and any other health conditions that the mother may have. However, on November 7, 2016, a comprehensive guideline on ANC for pregnant women and adolescents was recommended by the World Health Organization for positive pregnancy experience. The new recommendations suggests that pregnant women should have at least eight visits/contacts with midwives or health workers before they give birth (Tunçalp et al., 2017). This is to help reduce significantly a higher likelihood of child and maternal deaths. According to the Family Health Division of the Ghana Health Service (G.H.S), Ghana is yet to adopt this new minimum requirement (GHS, 2016). In Ghana, the average ANC coverage by a pregnant woman at least once before birth has marginally decreased over the past five years from 93.80 per cent in 2012 to 84.1 per cent in 2016 (MOH, 2016).

Antenatal care services have been used as an indicator for access to health care during pregnancy by all women of reproductive age. Several literature have corroborated the positive relationship between ANC visits and decline in maternal mortality rates within and amongst countries (Arthur, 2012; Dahiru & Oche, 2015; Nketiah-Amponsah et al., 2013; Barasa, et al., 2015). Globally, several measures and implementation strategies concerning maternal and newborn health have been outlined. This includes “‘The Global Strategy for Women’s, Children’s and Adolescents’ Health’, ‘Strategies Toward Ending Preventable Maternal Mortality’” etc. (UNICEF, 2016a; WHO, 2015a). The Global Strategy (2016-2030) is a roadmap to ensure the survival and health of all women, children and adolescents.

One of the major activities and resources available during ANC visits is the provision of family planning services to expectant mothers and women of general reproductive age. Contraceptive use has been cited as a significant tool for family planning. One of the major challenges of developing countries is the surge in population growth which is unmatched with the corresponding economic growth. As cited in Nketiah-Amponsah et al. (2012), according to the UN, the use of family planning methods in the developing world over the periods 1960-65 and 1980-85 contributed to two-thirds reduction in total fertility rate. The contraceptive prevalence rate increased from 22 per cent among currently married women in 1998 to 25 per cent in 2003 and has since declined by 1 percentage point in the past five years to 24 per cent in 2008 (Nketiah-Amponsah et al., 2012). Target 3.7 of the SDG 3 is “to ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes by 2030” (UNDP, 2016b). According

to the Reproductive and Child Health unit of the Public Health Division of the Ghana Health Service (RCH/PHD-GHS), during the implementation of the Millennium Accelerated Framework (MAF) Programme, there was a decline in maternal mortality ratio from 2013 to 2015 (Ghana Health Service (GHS), 2015a). One of the key priority interventions under the programme was centered on family planning through contraceptive use. According to the GHS, the Millennium Acceleration Framework (MAF) was initiated towards enhancing maternal health through the use of evidence-based, feasible and cost effective interventions at both community and health care facilities in order to achieve accelerated decline in maternal and child mortality (GHS, 2016).

Furthermore, one of the key concerns of global health concern is the high under-five mortality rate. Despite positive improvements during the MDG era, reducing child mortality is still a critical concern in Ghana. Global estimates from WHO in 2016 showed that “5.6 million children died before reaching their fifth birthday, mostly from preventable diseases. This translates to 15,000 under-five deaths per day, an intolerably high number of largely preventable child deaths” (WHO, 2018b). There is an uneven distribution of the burden of under-five deaths. About 80 per cent of under-five deaths occur in two regions, sub-Saharan Africa and South Asia (WHO, 2017). In Ghana, over 40 per cent of all under-five deaths are made up of new born deaths which forms an important component of child mortality (GHS, 2016). Socioeconomic differences especially the uneven distribution of wealth is widely known to have long and adverse effects on child survival (Lartey et al. 2016).

Furthermore, it is also worthy to note that a woman’s health does not solely rely on her individual characteristics. Education of the woman as well as the partner have recently been argued to

influence a woman's health behavior. According to Kumi-Kyereme & Amo-Adjei (2013), partner's education shows the 'class dimension' in accessing healthcare in Ghana. It was further argued that women whose partners are educated and wealthier are more likely to access healthcare services.

This study therefore seeks to provide further analysis on the role household wealth plays in maternal healthcare service utilisation and child under-five mortality. In addition, it will further explore the heterogeneity effect of partner's education on maternal healthcare service utilization.

1.2 Problem Statement

Ghana's performance of halving extreme poverty in 2015 was expected to have implied an increase in average household wealth across the country. Government's intervention in health through NHIS, LEAP, free maternal healthcare and construction of CHPS zones was to further reduce healthcare cost and improve wealth status of households. However, Ghana still experiences high maternal and child mortality.

According to the National Development Planning Commission (NDPC), "although evidence shows that there has been a significant reduction in child and maternal mortality rates in Ghana, they continue to pose a challenge to the national development effort" due to low socioeconomic status of households (NDPC, 2014).

In Ghana, while average ANC coverage remains high at 84.1 per cent in 2016, the coverage of at least four ANC visits remains low at approximately 76 per cent below the national target of 85 per cent (GHS, 2016). As a result, the Institutional Mortality Ratio (iMMR) has also increased from 142/100,000 lb in 2015 to 163.5/100,000 lb in 2016 (GHS, 2016).

According to the National Population Council (NPC) 17 per cent of pregnancies in Ghana are unwanted (NPC, 2018). Modern contraceptives as a family planning method is essential to sustainable economic development. Modern contraceptive prevalence among married women between 2014 and 2015 increased from 22.4 per cent to 29.2 per cent but below the national target of 50 per cent (Kwankye & Cofie, 2015; NPC, 1994). According to Kwankye & Cofie (2015), over the years, the modern methods of contraceptive prevalence has not steadily increased. Individuals of lower socioeconomic status are unable to purchase modern contraceptives hence reducing the contraceptive prevalence rate in the country. This could have an effect on population growth. According to the National population Council (NPC), Ghana's current population growth rate of 2.5 per cent is alarming if it is not matched by increasing economic growth. As a result, there has been a recent campaign to limit the number of children a family is expected to have to three children. However, others have argued that, control of Ghana's birth rate can be addressed through economic factors. Economic growth, however, is partially marked by the wealth status of households.

For under-five mortality, it is reported that 1 out of every 17 Ghanaian children dies before his/her fifth birthday (GDHS, 2014a). According to the Ghana Poverty and Inequality Report, between

2006 and 2011, the disparity in child mortality rates between the rich and the poor has doubled, with children in rich groups now twice as likely to survive as poor children (Cooke et al., 2016).

Wealth signifies the economic status of the household member. However, there still exists a gap in the literature on the effects of household wealth status on reproductive, maternal and child health in Ghana given the objective of achieving the new development goals - SDG health targets – as well as meeting the national targets for these health indicators.

In Ghana, wealth differences are also marked by differences in geographical location. Probst et al. (2004) argue that the availability of health care services will vary over geographic location/area, and that, there is usually less health care available in low socioeconomic areas. According to Jewell (2009), the availability of these health care services measure the “variations in the transportation cost component of the total price and variations in price associated with supply adjustments of health”. According to the Ghana Poverty and Inequality Analysis (GPIA) report (2016), the Northern, Upper East and Upper West regions continue to have the highest rate of poverty even in terms of depth and severity. Given its combination of a relatively high poverty rate and a relatively large population size, the Northern region for example, holds the highest number of poor persons in Ghana (Cooke et al., 2016). This is a very significant indicator for the measure in variation of the regional health status.

Recent studies have also argued on the role partners play in the health behaviour of women (Kumi-Kyereme & Amo-Adjei, 2013; Mboane & Bhatta, 2015; Pokhrel et al., 2015). Paternal characteristics such as education of the partner/husband has also been identified to influence a

woman's healthcare service utilization. In Ghana, it is evidenced that the ratio of educational attainment for male and female is largely in favour of the males (ISSER, 2016). Partners/husbands who have attained higher levels of education are expected to influence the health decision of women. Coupled with rural-urban differences, this study will seek to find out whether partner's education still matter in the use of ANC and contraceptives in Ghana.

In conclusion, despite the introduction and implementation of the various national and regional policies and programmes to increase household wealth, Ghana has not been able to achieve it's national as well as global target of the average minimum ANC attendance, under-five mortality and modern contraceptive use. This has been partially determined by differences in household wealth as well as other financial costs associated with health. Also, others have argued to the indirect role a woman's partner/husband play in her health decision making.

1.3 Research Questions

This study seeks to find answers to the differentials in household wealth in the country and it's implication on maternal, child and female reproductive health. In particular, it seeks to address the following questions:

1. How does household wealth affect ANC visits?
 - 1.1. Does household wealth affect the new minimum requirement of eight ANC visits?
2. Does the differences in wealth status affect modern contraceptive usage?
3. Does wealth affect under-five child deaths?
4. Will paternal education have an effect on maternal ANC and contraceptive use in Ghana?

1.4 Research Objectives

The main objective of the study is to find out how the wealth status in Ghana's households affect maternal, child and reproductive health and to further underscore the effect of paternal characteristics on maternal health.

The specific objectives are:

1. To examine the differential effects of household wealth status on
 - the utilization of antenatal care services for ANC4+ and ANC8+
 - modern contraceptive usage by women in Ghana
 - under-five child deaths
2. To test for the heterogeneity effect of paternal education and maternal residential location on the utilization of ANC and modern contraceptives in Ghana

1.5 Significance of the Study

The study considers selected indicators for maternal healthcare service utilization and child mortality. A country's level of economic development is strongly linked to the composition of its national wealth (Oxfam, 2018).

Moreover, this study also provides useful pointers to policy makers on the effects of household wealth given the new WHO guidelines on the minimum number of ANC visits by expectant mothers.

Consequently, the answers to the research questions outlined becomes very crucial to the justification of how household wealth may play a role in the attainment of quality health among women and children in Ghana. Also, we shall look at the influences of paternal characteristics in the rural setting in addressing maternal healthcare service utilization. The study will assist policy makers on the areas to explore towards achieving maternal, child and female reproductive health. In other words, how should policies be driven at households which fall within the various wealth quintiles in attaining better health, thereby helping to meet the national as well as global targets on these selected indicators – ANC, modern contraceptive use and under-five child deaths?

1.6 Limitation of the Study

The study only focuses on quantitative measures of the relationship between household wealth distribution on ANC, under-five child deaths and female modern contraceptive use in Ghana. The qualitative analysis of these relationship is not considered in this work.

However, given the challenges of the cross-sectional nature of the dataset such as misreporting and omission, the GDHS datasets provide a more representative and accurate means of information.

1.7 Organization of the Study

The study is divided into six (6) chapters. As part of this introductory chapter, we have the background of the study, problem statement and the justification of the study. Chapter two presents an overview of the wealth status of households and trends of the selected health targets in Ghana. Chapter three reviews the existing theoretical as well as the empirical literature on the topic. This is followed by chapter four which focuses on the methodology and the source of data used for the study. The results of the study are presented and discussed in chapter five whiles chapter six discusses the conclusion and policy recommendations from the findings of the study.

CHAPTER TWO

2 OVERVIEW OF WEALTH, MATERNAL AND CHILD HEALTH INDICATORS

2.1 Introduction

This chapter looks at the overview and trends in the main variables of the study with the help of graphs and tables. Maternal, child and female reproductive health indicators discussed here are Antenatal Care visits (ANC), Under-five mortality and modern contraceptive usage respectively. The global concern and debate on child, maternal and reproductive health has gained increasing attention since the introduction of the MDGs and this has transcended to its recognition and inclusion in the SDGs.

2.2 The Gradient Between Wealth and Health

One key microeconomic determinant of economic growth and development is the wealth (net worth and assets) of a household which has significant effects on poverty reduction and improvement in the health status of an individual and the economy in the long run. While both income and wealth (which will be used interchangeably hereafter) are measures of economic status, they are not necessarily equivalent concepts. Income can vary substantially due to market fluctuations while wealth is much less volatile (Rutstein & Staveteig, 2014a).

“The wealth index has been used in many DHS reports to measure inequalities in household characteristics, in the use of health and other services, and in health outcomes” (GDHS, 2014b).

Wealth and health have long been considered as significant factors that affect the development of human capital, hence, the improvement of standard of living of an individual. Woolf et al., (2015) establishes that “though it is easy to imagine how health is tied to wealth for the very poor or the very rich, the relationship between wealth and health is a gradient such that they are connected step-wise at every level of the economic ladder”. And this relationship is also seen as a vicious cycle: across countries, those with better health are generally richer, and those that improve their citizens’ health grow faster (The Economist, 2008). On the other hand of the cycle, wealth is one of the prolonged causes of stress related health issues.

There is the growing desire of many countries on meeting the health-related targets under the SDGs. As a result, household wealth has become very crucial across the nations. In order to improve health, most countries embark on the provision of logistics, services, social and capital intervention programmes to improve the wealth status of inhabitants aimed at spurring economic growth. The availability and the quality of assets possessed by the household ultimately determines the quality of health in a nation. Household wealth is therefore very important in every effort in improving the health status of every nation due to its numerous effects, all things being equal.

2.3 Measuring Wealth: Levels and Trends in Wealth¹

Measuring household wealth and wealth across and within nations has always been a daunting task. Direct estimates of household income and expenditures in health-related surveys are desirable

¹ Extensive insight is drawn from the DHS Methodological Reports No. 9, 2014

but not practical (Rutstein & Staveteig, 2014b). Health-related survey has been challenged with the collection of accurate income or expenditure data by factors such as seasonality, volatility, misreporting, and limited interview time (Deaton, 1997; Montgomery, Gragnolati, Burke, & Paredes, 2000). Various methods, notwithstanding their varied limitations, and alternate measures of economic status and poverty have been introduced such as the DHS household wealth index, the Gross National Income per capita based on purchasing power parity (GNI/p, PPP), Unsatisfied Basic Needs (UBN), Multidimensional Poverty Index (MPI) and World Health Survey Methods of Economic Status.

In this section, we extract the measurement, levels and trends in wealth (index) for Ghana using the DHS Comparative Wealth Index (CWI) (Rutstein & Staveteig, 2014a) and the International Wealth Index (IWI) (Smits & Steendijk, 2013) because of its widespread comparability and adoption for analyzing differences in population and health indicators between wealth quintiles. The trends in the Gross National Income per capita based on purchasing power parity (GNI/p, ppp) will also be used as an alternative indicator of wealth since it is highly positively correlated with the mean of the CWI (Rutstein & Staveteig, 2014b) and the selected indicators for maternal, child and female reproductive health in Ghana. This is to help analyze the trajectory of movements of wealth (as an indicator of socioeconomic status) and health.

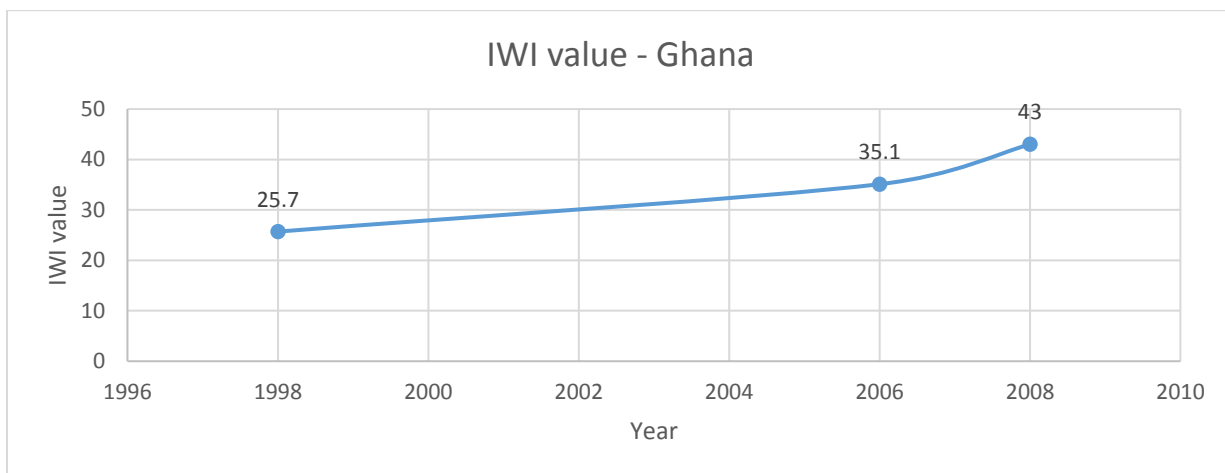
2.3.1 Trends in Wealth: Ghana

Figure 2.1 emphasizes the trends in wealth changes in Ghana as illustrated in the International Wealth Index (IWI) by Smits and Steendijk (2013). The IWI was to help provide a stable and

understandable yardstick for evaluating and comparing the economic situation of households, social groups and societies across all regions of the developing world. A household's position on IWI indicates to what extent the household or its members own a basic set of assets that is valued highly by people across the globe (Smits & Steendijk, 2013). The IWI scale runs from 0 to 100, with 0 indicating that the household owns none of the consumer durables, and therefore has lowest quality housing and no connection to public utilities hence low wealth index. A scale of 100 on the other hand indicates that the household owns all included consumer durables, hence has highest quality housing and good access to public utilities.

It is observed from Figure 2.1 that, in general, Ghana's household wealth has consistently increased over the period from 1998 to 2008. In effect, this is expected to reduce the adverse effects of maternal, reproductive and child health. However, with an IWI value still below 50.0, this implies that most of the households are still lacking certain basic assets which acts as economic denominators of growth. This, inadvertently, is expected to affect the health output/outcomes of the members of the household.

Figure 2.1: Ghana's Average IWI values



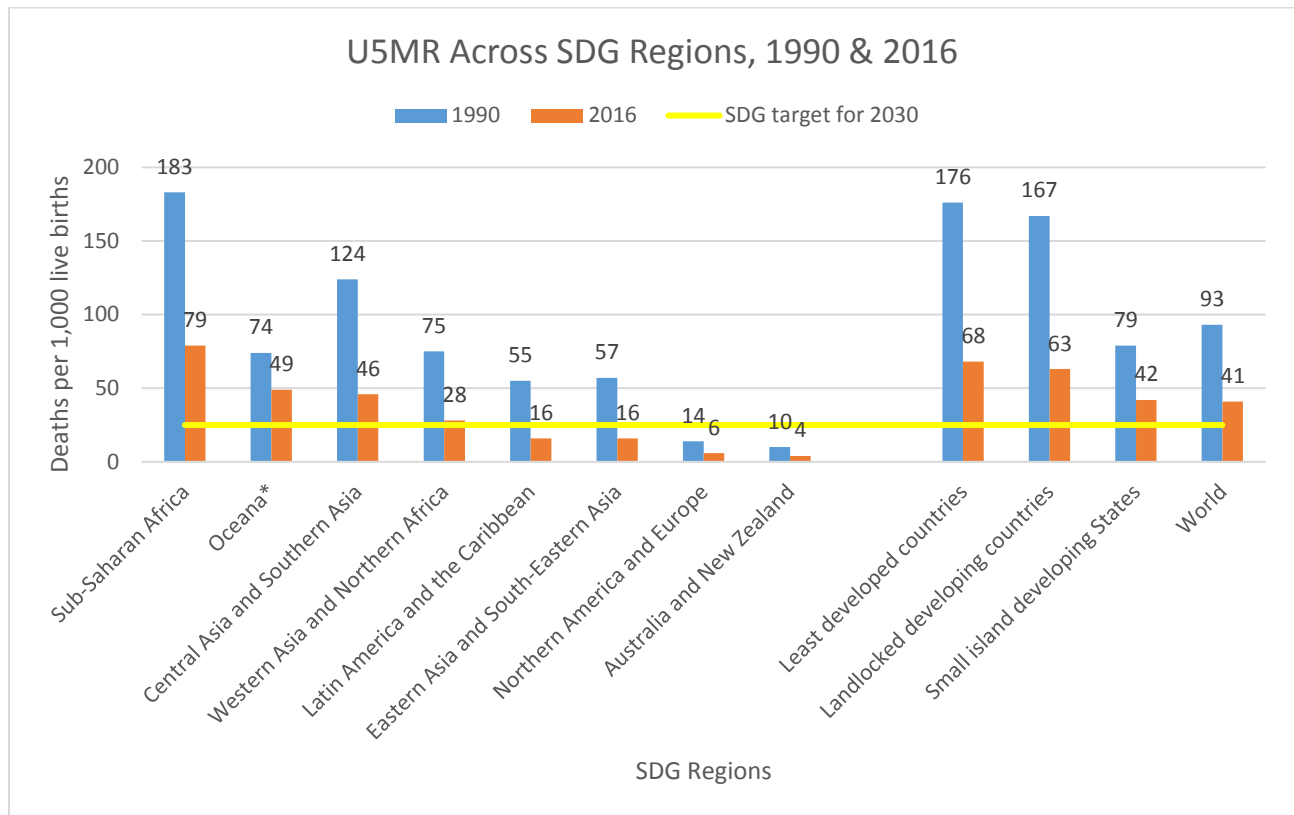
Source: The International Wealth Index (IWI), 2013

2.4 Levels and Trends in Global Under-Five Mortality

Every year, millions of children under 5 years of age die, mostly from preventable causes which are influenced by certain economic factors. As a result, childhood mortality in general are often used as broad indicators of social development or as specific indicators of health status. Child under-five mortality rates are also basic indicators of a country's socioeconomic status and quality of life (UNDP, 2007). Under-five mortality is a concept used to express the probability of dying between birth and exactly five years of age, expressed per 1,000 live births (UNICEF, 2016b). Childhood mortality rates are used to monitor a country's progress towards the Sustainable Development Goal 3, Target 3.2, which aims to reduce under-five mortality to at least as low as 25 per 1000 live births by the year 2030 (United Nations, 2016). Measures of under-five mortality in particular are often used as contributing factors to a better understanding of the progress of population and health programmes and policies (GDHS, 2014b).

Globally, the “under-five mortality rate dropped to 41 deaths per 1,000 live births in 2016 from 93 in 1990 – a 56 per cent decline” (UN IGME, 2017). According to the United Nations Inter-Agency Group for Child Mortality Estimation (UN IGME), the world has made substantial progress in reducing child mortality in the past several decades with the total number of under-five deaths dropping to 5.6 million in 2016 from 12.6 million in 1990. This, they reported, represents 15,000 under-five deaths every day compared with 35,000 in 1990. It is, however, generally agreed that many lives can be saved if the gaps in wealth across countries are closed (UNDP, 2016b).

Figure 2.2: Under-five mortality rate by Sustainable Development Goal region, 1990 and 2016



Source: Computed from UN IGME Database, 2017

2.5 Levels and Trends in Under Five Mortality: The Case of Ghana

Table 2.7 shows both the trends and levels of under-five mortality rate and under-five deaths in Ghana over the five-year interval period from 1990 to 2015 and the current figures in 2016 as extracted from the United Nations Inter-agency Group for Child Mortality Estimation (UN IGME) database. It can be observed that both indicators are reducing over time yet the under-five mortality rate and the number of children dying before their fifth birthday in Ghana is still intolerably high.

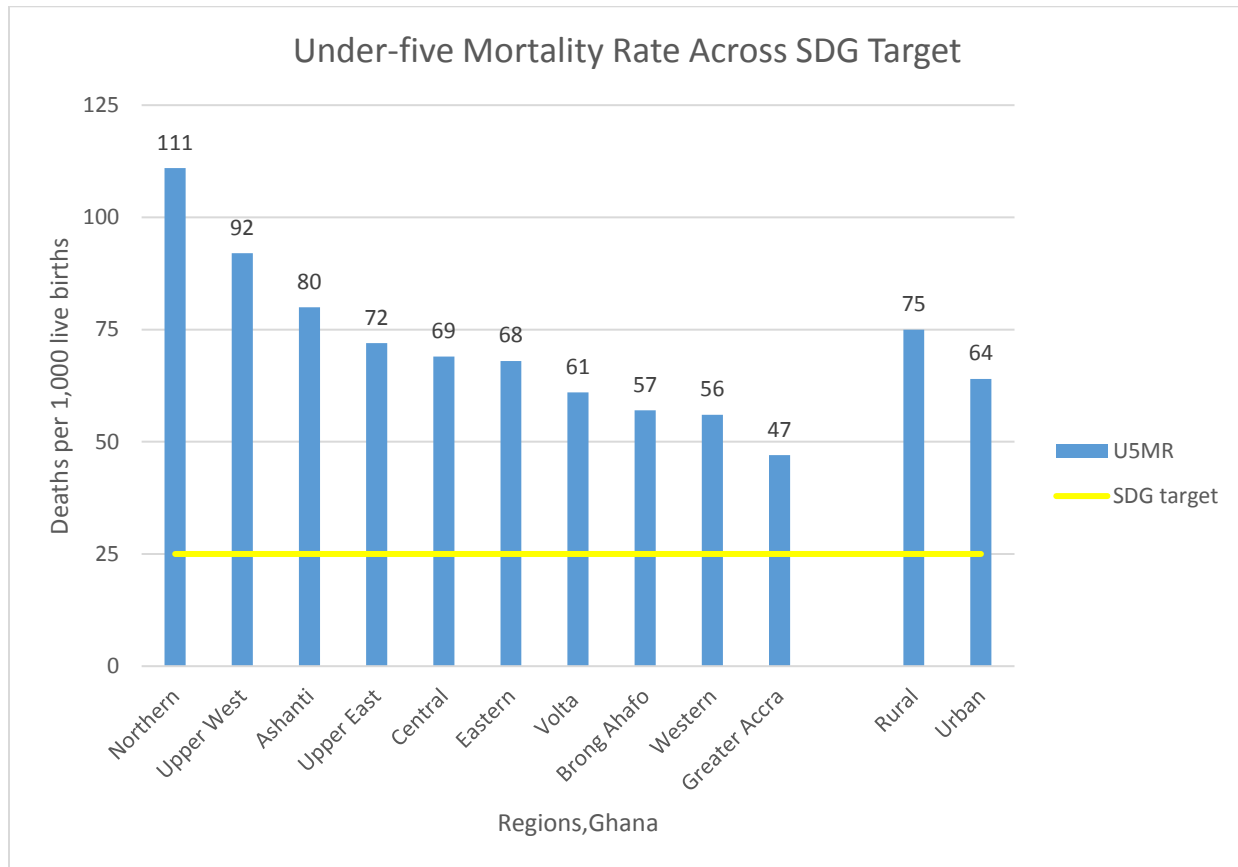
Table 2.1: Levels and Trends in Under-five Mortality rates and Under-five deaths in Ghana, 1990-2016

Year	Under-five mortality rate (per 1,000 live births)	Under-five deaths
1990	126.9	69,791
1995	112.6	67,488
2000	100.1	65,335
2005	86.9	61,907
2010	74.7	59,065
2015	61	52,107
2016	58.8	50,679

Source: UN IGME Database, 2017

As at 2016, the under-five mortality rate is more than twice the target set under the sustainable development goal of 25 deaths per 1,000 live births. From Table 2.7, this corresponds to 58.8 deaths per 1,000 live births and it translates to 50,679 deaths of children below age five. It is therefore expected that pragmatic government interventions are urgently needed to curtail this high mortality rates.

Figure 2.3: Regional Distribution of Under-five mortality rate for the 10-year period preceding the GDHS survey, Ghana 2014



Source: GDHS (2014), UN IGME (2017)

Despite the general decline in the under-five mortality rate in Ghana, there are developmental concerns in the disparities across regions. Figure 2.3 illustrates the geographical differences in under-five mortality in Ghana in terms of regions and household residence. The mortality rates in the figure above were computed for the 10-years preceding the 2014 GDHS survey. It shows that under-five mortality rates are higher in rural areas than in urban areas: 75 deaths per 1,000 live births in rural areas compared to 64 deaths per 1,000 live births in urban areas. It also shows that there are large differentials in under-five mortality by regional location, ranging from 47 deaths per 1,000 live births in the Greater Accra Region to 111 deaths per 1,000 live births in the Northern

Region. It is observed that, under-five mortality rate is highest in the Northern (111 deaths per 1,000), Upper West (92 deaths per 1,000) and Ashanti (80 deaths per 1,000) Regions. In essence, though there are general annual improvements over the past 10 years, the under-five mortality rates is still significantly high and far below the SDG target of 25 deaths per 1,000 live births.

2.6 Antenatal Care Visits (ANC)

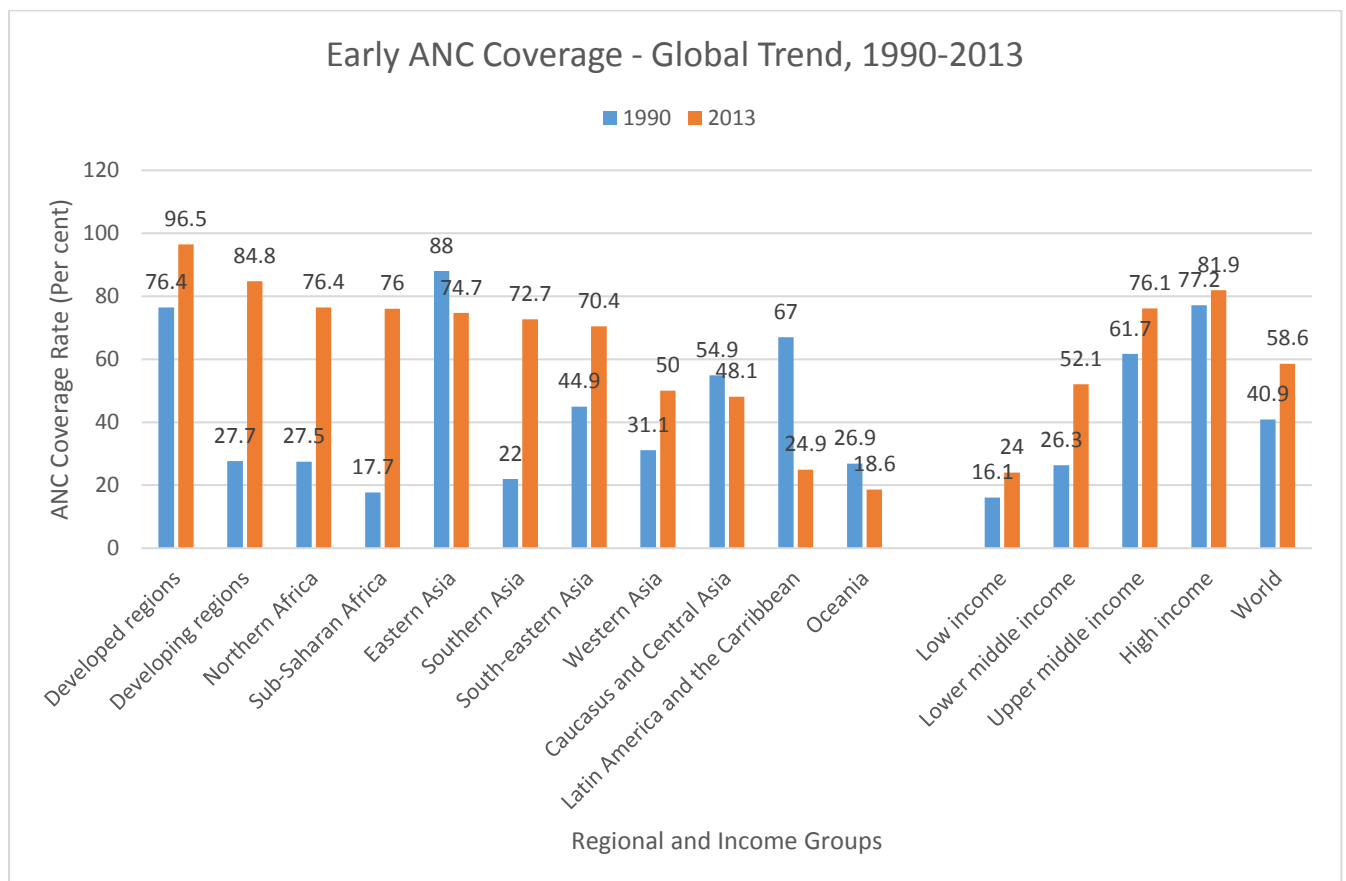
ANC is measured as the proportion of women who attended at least four visits during pregnancy and examined by trained health personnel for reasons related to their pregnancy. However, new WHO guidelines which was released in 2016 recommends a minimum of eight contacts between the pregnant woman and the healthcare providers (WHO, 2016c). According to Tunçalp et al. (2017), “the new guideline is intended to respond to the complex nature of the issues surrounding the practice, organization and delivery of ANC within the health systems, and to prioritise person-centred care and well-being – not only the prevention of death and morbidity”.

Antenatal care coverage is an indicator of access and utilization of healthcare provided to pregnant women between conception and the onset of labour (Moller et al., 2017). This is also one of the indicators for tracking progress in reducing maternal mortality. The SDG targets 3.1 and 3.2 on maternal and under-five mortality are supported by several global initiatives and strategies (UNDP, 2016b).

Many health complications during pregnancy can be diagnosed and treated during antenatal care visits with trained health workers. It is well “evidenced that by adopting timely and effective evidence-based practices, ANC can save lives. ANC also provides the opportunity to communicate with and support women, families and communities at a critical time in the course of a woman’s

life” (WHO, 2016b). The major objective of antenatal care is to identify and treat problems during pregnancy and as such the WHO recommended a minimum of four antenatal visits, comprising interventions such as “tetanus toxoid vaccination, screening and treatment for infections, and identification of warning signs during pregnancy – a package often called focused antenatal care” (GDHS, 2008; WHO-SEARO, 2015). With this notwithstanding, the new WHO recommendations on antenatal care models with a minimum of eight contacts is to reduce child mortality and improve women’s experience of care (Tunçalp et al., 2017; WHO, 2016a, 2016c).

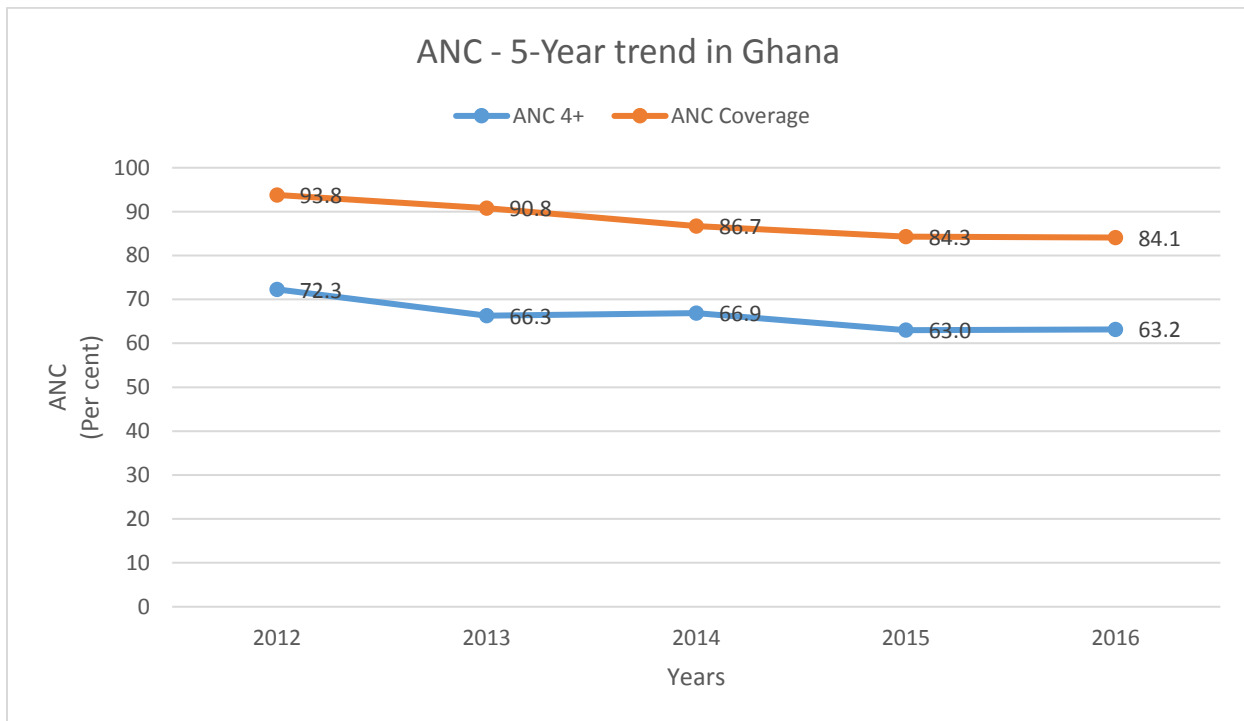
Figure 2.4: Early ANC Coverage across MDG Regions and World Bank Group Income Groups, 1990 - 2013



Source: (WHO, 2016c, Moller et al., 2017)

Figure 2.4 illustrates time trends for the coverage of early antenatal care visits for income groups based on nationally representative health surveys. In 2013, compared to those in high-income countries (81.9%), those in low-income countries recorded an estimated coverage of early antenatal care visits of 24.0 per cent. Also, the estimate for upper-middle-income countries was 76.1 per cent and for lower middle-income groups, it was 52.1 per cent.

Figure 2.5: Five-year trend in antenatal care in Ghana, 2012 – 2016

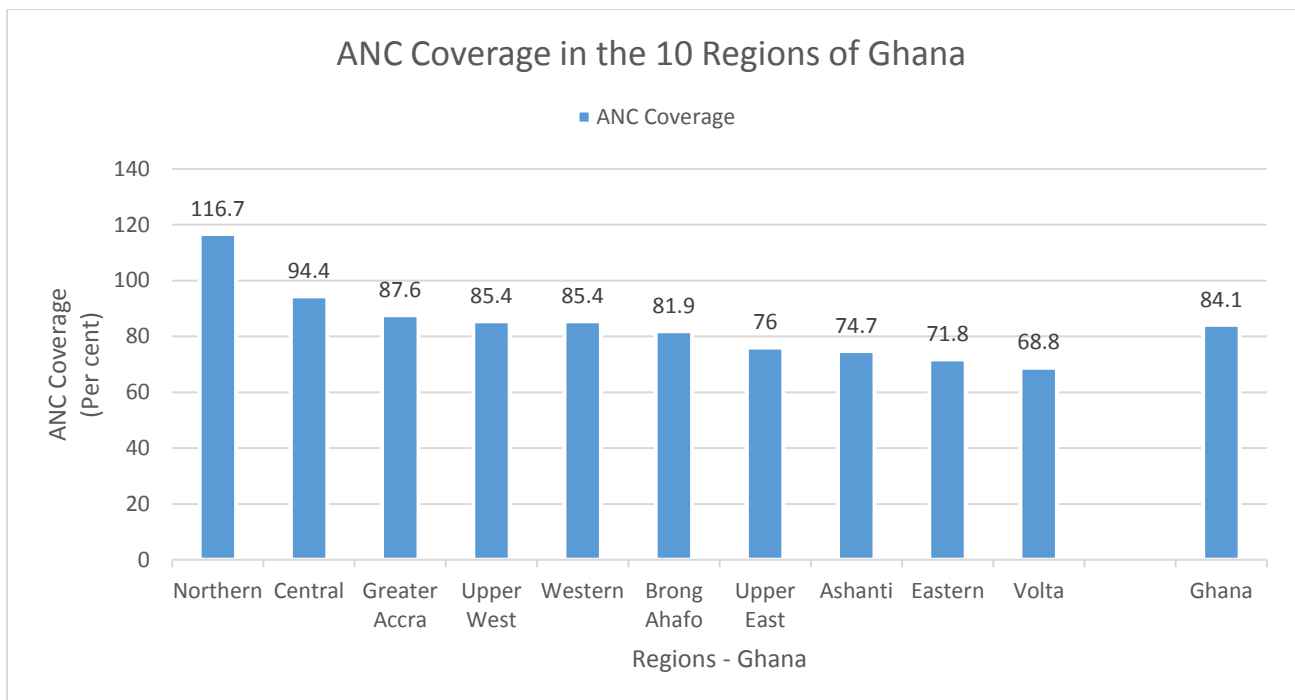


Source: (ISSER, 2016; MOH, 2016)

The objective of ANC is to identify and manage health conditions that a mother may have effectively and timely to prevent and or minimize catastrophes. This is to ensure better health outcomes for both mother and baby. Coverage data for this indicator has been declining marginally over the past five years (ISSER, 2016). Figure 2.5 shows both the overall average antenatal coverage and the proportion of women who have made at least their fourth contact with a health

personnel in Ghana. Both had virtually stagnated from 2015 to 2016 from 84.3 per cent to 84.1 per cent and 63.0 per cent to 63.2 per cent respectively. The average antenatal care coverage between 2012 and 2016 has decreased from 93.8 per cent to 84.1 per cent respectively. Similarly, the proportion of women making with at least four contacts with a health personnel has also decreased by 9.1 percentage points from 72.3 per cent in 2012 to 63.2 per cent in 2016. Again the relatively low ANC 4+ may also be as a result of coming into contact with most pregnant women late. Late contact means clients cannot do the stipulated minimum visits. It also implies health conditions may be detected late making management even more difficult.

Figure 2.6: Antenatal care coverage in the 10 regions of Ghana



Source: Ghana Health Service (GHS), 2016

Figure 2.6 illustrates the regional distribution of the average coverage of antenatal care in Ghana. It is observed that average ANC coverage is highest in the Northern (116.7 per cent) and lowest in the Volta Region (68.8 per cent) compared to the national average of 84.1 per cent. With increase

in the number and posting of midwives to the regions and subsequently to the districts, one would expect antenatal coverage to improve. However, appropriate distribution to areas where they are needed most has not been pursued with the urgency that it deserves (MOH, 2016). Low contact with pregnant women could impact directly on maternal mortality.

2.7 Contraceptive Use

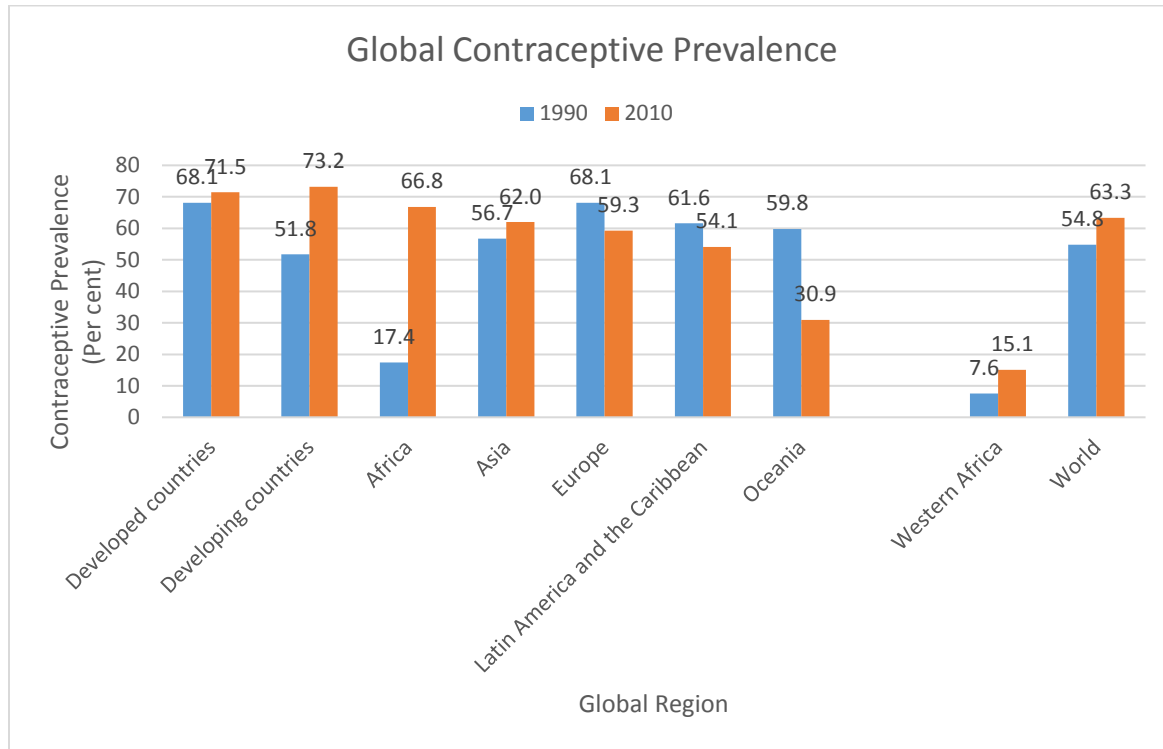
Ghana has long prioritized Family Planning (FP) as a key strategy for addressing the country's health, social and economic issues through the Ghana National Family Planning Programme (GNFPP) which was started in 1969 and later revised in 1994. The primary aim of the programme was to reduce the high population growth rate from the current rate of 2.5 per cent to 1.5 per cent in 2020 (NPC, 1994). This was to help facilitate sustainable socioeconomic development through systematic integration of population variables into development planning with renewed emphasis on fertility reduction (GHS, 2015). Though modern contraceptive usage appears to be increasing in Ghana, its rate of increase appears to be generally marginal and below the national target of 50 per cent by 2020 (NPC, 1994). An important goal of the revised policy was to reduce the total fertility rate (TFR) from 5.5 to 5.0 by the year 2000, later to 4.0 by 2010, and then to 3.0 by 2020 through increased modern contraceptive use (NPC, 1994). In this study, we use modern contraceptive as an indicator for family planning in addressing maternal reproductive health.

Access to modern contraceptive use constitutes the most important intervention to population management (Nketiah-Amponsah et al. 2012). Women's ability to control their fertility through family planning substantially increases the maternal reproductive health which helps to improve the health of infants. Contraception include both the modern and traditional methods. Modern

methods consists of female and male sterilization, oral hormonal pills, the intra-uterine device (IUD), the male condom, injectables, the implant (including Norplant), vaginal barrier methods, the female condom and emergency contraception. Traditional methods also include the rhythm, withdrawal (coitus interruptus), douching, lactational amenorrhea (LAM) and folk methods. However, traditional methods of contraception have been characterised by high failure rate resulting into unwanted pregnancies, unsafe abortions, maternal mortality and morbidity including lack of protection from sexually transmitted infections (STIs) such as AIDs and Syphilis (Ram et al. 2014).

According to the WHO (2018), 214 million women of reproductive age in developing countries who want to avoid pregnancy are not using a modern contraceptive method. The significantly high number for this unmet need for contraception is fueled by inequity in so many factors including increasing population growth and a shortage of family planning services. In Africa, this extends to more than 23 per cent of women of reproductive age (WHO, 2018a).

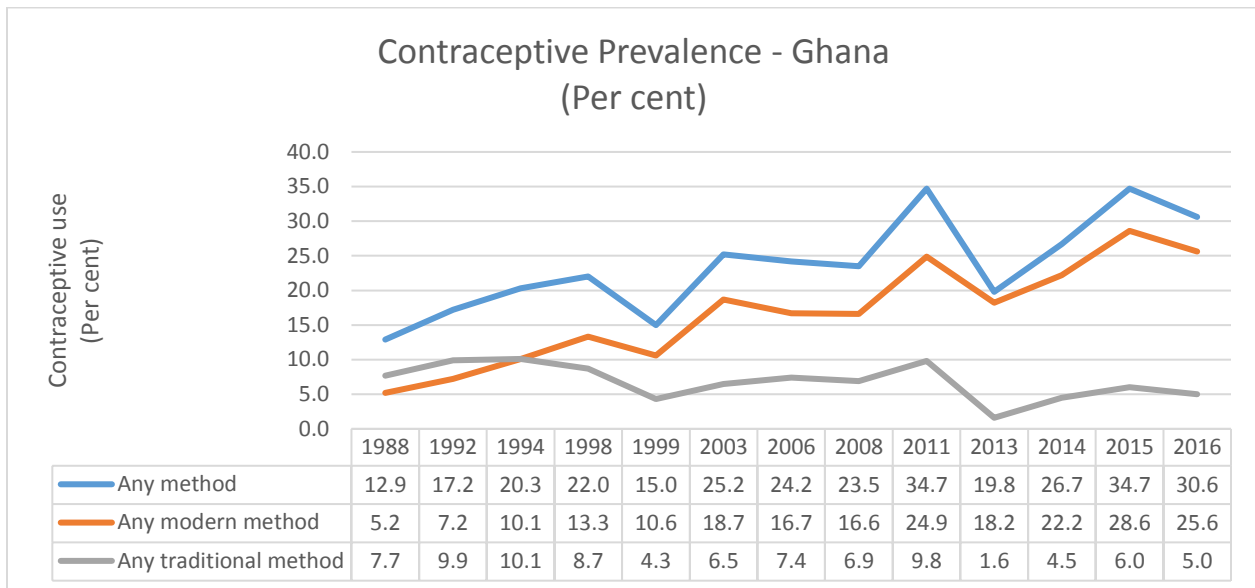
Figure 2.7: Estimates (Per cent) of global contraceptive prevalence (1990-2010)



Source: Alkema et al. (2013)

Globally, contraceptive prevalence and its usage has increased by 8.5 percentage points from 54.8 per cent in 1990 to 63.3 per cent in 2010 (Figure 2.8). However, Africa recorded the largest increase over the two decades from 1990 to 2010, increasing from 17.4 per cent to 66.8 per cent respectively. This may be due to the continuous awareness through increased education and general improvements in the socioeconomic structures of the region. This improvements was mildly translated in West Africa sub region which also saw an increase in the prevalence rate by double from 7.6 per cent to 15.1 per cent.

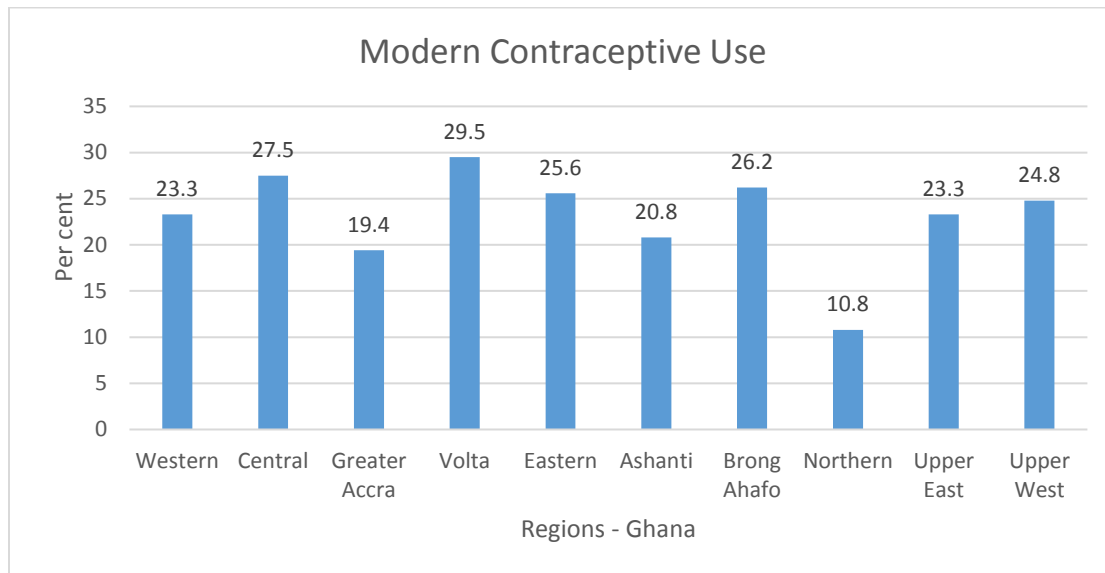
Figure 2.8: Trends and levels in contraceptive prevalence in Ghana



Source: Estimated from UNDP Database, 2017

From Figure 2.8, contraceptive prevalence in Ghana has generally been improving marginally over time. The prevalence rate has increased by more than a double from 12.9 per cent in 1988 to 30.6 per cent in 2016. Also, the rate for modern methods (% of women aged 15-49) in Ghana has quintupled from 5.2 per cent in 1988 to 25.60 per cent in 2016. However, this is a reduction of 3 percentage points from 2015. This figure is still low as compared to the national target for contraceptive prevalence of 50 per cent by 2020 (NPC, 1994). Its highest value for almost three decades was 28.60 per cent in 2015, while its lowest value was 5.20 per cent in 1988. Use of traditional methods has fluctuated since 1988, and has generally been less than 10 per cent on the average. In Ghana, there is still the campaign for more inclusive modern methods of contraception but there are challenges with respect to certain myths, religious beliefs, cultural practices etc.

Figure 2.9: Regional Distribution of Modern Contraceptive Use



Source: GDHS, 2014

Figure 2.9 shows the rate of modern contraceptive use in Ghana across the regions by currently married women age 15-49 years. It is observed that modern contraceptive use is highest in Volta Region (29.5%) and lowest in the Northern Region (10.8%). The prevalence rate therefore implies that the use of modern forms of contraceptives of family planning is below 30 per cent and hence below the national target of 50 per cent by 2020. This may call for more public education and sensitization on the need for family planning and population growth.

2.8 Household Wealth Differential and Selected Maternal and Child Health Indicators

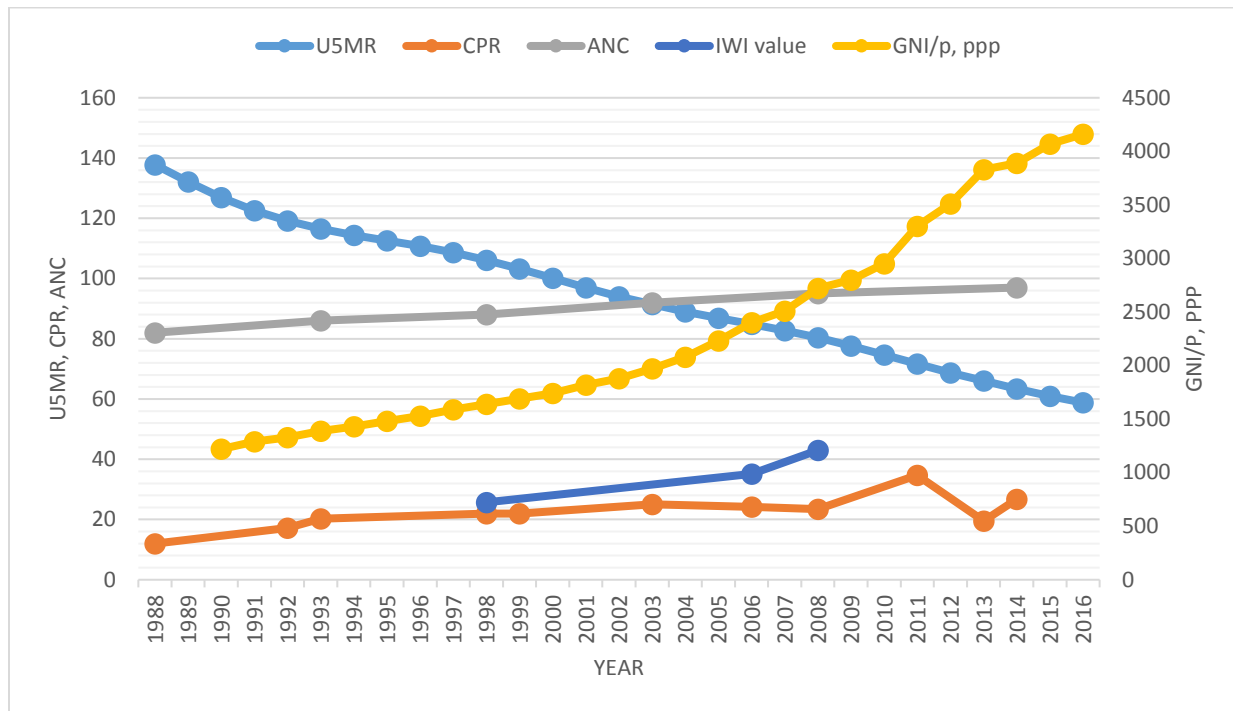
The wealth differentials between the north and the south is evident from the various literature. Ghana's northern regions is marked by a larger population who do not have proper healthcare, and those within lower household wealth status are not benefiting enough from Ghana's growth (UNICEF, 2011). Over the past years, Ghana has experienced improvements in health. There has

been consistent declines in the under-five mortality rates and relative increases in the general contraceptive use in the country resulting in increasing total life expectancies from 45.83 in 1960 to 62.41 in 2015. Although the country's reproductive, maternal and child mortality rates are below the SDG and GSGDA II targets, the health status of the economy are better than a decade ago.

The increases in the population growth rate has relatively being accompanied by gross national increases in the wealth of households over time. According to Wagstaff (1986), increases in household wealth implies increases in health demand and consumption of quality health services. Therefore, as household wealth increases, all other things being equal, there would be improvements in household health status due to increases in quality health demand as shown in Figure 2.10.

The government's interventions through health policies and programmes is targeted at improving the wealth status of households either directly or indirectly. Examples include the Livelihood Empowerment Against Poverty (LEAP), free maternal healthcare delivery, National Health Insurance Scheme (NHIS) among others.

Figure 2.10: Household Wealth and Selected Maternal and Child Health Indicators



Source: Estimated from UN IGME (2017); Smits & Steendijk (2013); UNDP (2017)

According to Rutstein & Staveteig (2014a), there is a high positive correlation between the mean wealth index and the Gross National Income per capita at purchasing power parity (GNI/p, PPP) for most countries with DHS surveys, in accessing the monetary equivalents of the wealth index. From Figure 2.10, it is observed that, as household wealth (indicated by the IWI) increases, all things being equal, child under-five mortality tends to decrease. In addition, there are improvements in maternal health reflected by increasing ANC coverage. On the other hand, maternal reproductive health in terms of female contraceptive usage marginally increases in that regard. Though the general improvements cannot be wholly attributable to household wealth, its contribution towards demand for better and quality health status cannot be under estimated.

2.9 Conclusion

From the discussions above, although Ghana has generally made some improvements in both maternal and child health in the sub region, the country is still experiencing an intolerable high number of under-five mortality and relatively low ANC 4+ visits across the regional locations in the country. Contraceptive usage has marginally improved over time.

In terms of wealth, households are able to demand more quality health and gain access to improved health status as their wealth status improves, all things being equal. This study therefore seeks to find out how the household wealth distribution in the country affects their health output and health service utilisation. In the past few decades, this strand of research has grown and researchers and policy makers have begun to place emphasis on the socioeconomic dynamics of society – as opposed to static biomedical factors or disposition of individuals, in explaining differentials in population's health (Adamba, 2013).

CHAPTER THREE

3 LITERATURE REVIEW

3.1 Introduction

This chapter analyses the theoretical underpinnings in the area of health output and healthcare utilization. Literature is further reviewed on the effects of household wealth distribution in Ghana on the selected indicators for maternal healthcare utilization and child health outcome.

3.2 Theoretical Review

The theoretical review is based on the health production function Wagstaff (1986). This is a modified model of the demand-for-health by Grossman (1972). The health production function will be used as theoretical basis for under-five mortality. In addition, the study will also use the Anderson-Newman Behavioural Model of healthcare utilisation to understand the theory behind maternal health care utilization indicators for ANC and contraceptive use.

3.2.1 The Health Production Function

Prior to the contributions of Grossman and others in the field of health, medical care or health related care issues were considered to be in the domain of only medical practitioners. Grossman's theory of health production function was further modified by Wagstaff (1986) because of its mathematically sophisticated literature accessible to the non-economist whiles maintaining its economic relevance. "The theory develops a conceptual apparatus for analyzing the socioeconomic determinants of health and indicates how this can be used to shed light on a variety of topical policy issues" (Wagstaff, 1986).

Drawing from Grossman (1972), Wagstaff's theory of demand for health emphasizes the role economic factors play in determining health output. The theory of the 'health production function' assumes of an individual 'producing' health by combining 'health inputs'. The health input does not only comprise of medical care but also other socioeconomic variables. The health production function also links a household's health inputs to its health output which can be measured in terms of under-five mortality, maternal mortality, life expectancy, among others. This relationship of linking these inputs to produce the final output is known as the 'production function'

In this regard, the probability of a child under five years dying before his/her fifth birthday depends on other socioeconomic factors that influence a child's health. Since the wealth status of the household is just one socioeconomic example of a determinant of child health, it is useful to talk in terms of a 'bundle' of health inputs by combining other socioeconomic factors such as maternal education and employment status, geographical location etc. The 'health production function' links these inputs to the probability of a child's survival.

In light of this, more health output are produced as more health inputs are used. However, as successive additions to the quantity of the health inputs are employed, it results in successively smaller increments in health. This is a critical feature of the health production function known as the 'law of diminishing marginal product'. This phenomenon therefore assumes the relationship between the health inputs and output to be non-monotonic and non-linear. Additionally, the principle is highly exemplified in the differing experiences in health production of developing and developed countries. At low levels of health and health inputs, particularly in poorer households, marginal increases in the quantities of health inputs such as health financing modules results in a

relatively large increase in health output in terms of child survival. At the other hand, in the relatively richer households where there are higher levels of health and health inputs enjoyed by its children below five years, even quite large increases in health input resources results in small impacts on the quantity and quality of life, all things being equal.

3.2.2 Maternal Healthcare Service Utilisation

Various theories have been introduced to understand the use and access of healthcare services across the world. We shall consider the Anderson-Newman Behavioural Model of healthcare utilization. This theory postulates that an individual's access to and use of healthcare services is considered to be a function of three characteristics: Predisposing, Enabling and Need factors (Andersen, 1995; Andersen & Newman, 1973). An individual's Predisposing factors constitute the aggregate of sociocultural characteristics. For ANC and modern contraceptive use, sociocultural characteristics include demography (age, sex, marital status etc.), health beliefs (media exposure) and social structure (Education, occupation, religion, residential mobility).

The Enabling factors include but not limited to one's income. As a proxy for income in our study, household wealth status enables individuals to pay for healthcare services. Maternal healthcare utilization are derived demand. That is, they are not demanded on their own sake but to promote the health of the woman. ANC and the use of modern contraceptives are demanded at a cost. Hence, the wealth of the household will determine the demand for these services, all things being equal. It is expected that richer households will be able to demand more healthcare services to

produce better health. In other words, demand for health services by households of lower wealth status will decrease because of the cost involved in accessing these services.

According to Andersen, enabling factors also include geographical location, availability of health personnel and facilities (Andersen, 1995, 2008; Andersen & Newman, 1973). Availability of health personnel and facilities for ANC and the demand for modern contraceptives is associated with the cost of travel to access such services.

3.3 Empirical Literature Review

A number of studies have been concerned with the extent to which wealth and other socioeconomic characteristics of households complement other medical inputs to ensure maternal, child and reproductive health throughout the world.

At the household level, according to Anyanwu & Erhijakpor (2007), the main factors that determine the health status of individuals usually include: personal and socio-cultural factors (including household income and other personal characteristics of members of the household such as lifestyle, educational level, sexual practices, diet, among others), geographical (location or residence), and environmental factors (i.e. access to clean sanitation and water, environmental health hazards, and prevalence of communicable diseases) and health services (i.e. quality, availability, affordability and accessibility of preventive and curative health services). This section will therefore look at the few literature on the effects of wealth on the selected indicators of the health-related targets of the SDGs - ANC, under-five child deaths and contraceptive utilization.

3.3.1 Household Wealth Distribution

Wealth concentration between and within countries are increasing and as a result, the need for attention to be drawn in understanding the dynamics of wealth and its consequence for population health (Baum, 2005). According to Mishra & Dilip (2008), there is the universal agreement on the use of wealth quintile variables for describing a household's relative economic status while analyzing health outcomes and other health indicators. The index of economic status of households, called the wealth index, is based on household asset holdings and housing characteristics (GDHS, 2014b).

Wealth is used in DHS surveys primarily because of the absence of information on household incomes and expenditures. However, where necessary, wealth and income might be used interchangeably in this study. In addition, wealth is widely used across the world as a statistic which is consistent with the expenditure levels of households (Rutstein & Johnson, 2004). In this regard, the differentials in household wealth in a country has spillover effects in the outcomes of health and health service utilisation. Disparities in wealth also affects the health status of individuals within and among groups (Weeks et al., 2012). Marmot (2013), argues that, the health disadvantages are bigger among socioeconomically disadvantaged groups.

Though wealth play a significant role in the determination of health outcome, the literature relating health to wealth is gaining global attention (Arthur, 2012; Filmer L. Pritchett, 1999; Hunter & Richards, 2008; Lartey et al., 2016). Research in this area has been limited in the past partly due to the difficulty in collecting wealth data and the limited availability of surveys that collect both wealth and health information in most countries across the world including Ghana.

3.3.2 Wealth and Under-five Mortality

A study on child mortality by Lartey et al. (2016), used four waves of data from the Demographic and Health Surveys (DHS) of Ghana from 1993 to 2008 to assess the impact of household wealth on child survival in Ghana. They measured child survival by the rate of under-five mortality and infant mortality. The Weibull hazard model with gamma frailty was used to estimate wealth effect, as well as the trend of wealth effect on child's survival probability. The trend analysed, showed that, there was a significant relationship between household wealth status and child survival in Ghana. In effect, a child in a household of higher wealth status is more likely to survive than a child from a lower wealth status. By regional location, it was realized that, the risk of dying for children born in households located in the Southern belt, Ashanti-Brong and Eastern-Volta reduced by a multiplicative factor compared to those born within households in the Northern belt. Drawing from the output, Lartey et al. (2016) suggested that this may be due to poor income and geographical access, which directly affects the health of children. Thus, a child faces a high hazard of death when he/she is located in a household in the Northern Belt. It was also realized that, among other factors, birth spacing and parental education were found to be highly significant to increase a child's survival probability. However, the effects of postnatal care on child survival was not looked at.

A recent study by Chao et al. (2018) looked at the under-five mortality rate by economic status for low and middle-income countries. They observed that, between 1990 and 2016, by relative difference, children in the poorest quintile were twice as likely to die before their fifth birthday compared with those in the richest quintile. This was addressed earlier by Bado & Appunni (2015),

where across West Africa, it was realized that households in the poorest wealth quintile had the highest proportion of under-five deaths with Ghana recording the highest rate. Their study analysed data from the DHS surveys conducted in six countries in West Africa – Burkina Faso (2010), Benin (2006), Cote d’Ivoire (2011), Ghana (2008), Mali (2006), Nigeria (2008), and Niger (2012). The study looked at decomposing wealth-based inequalities in under-five mortality in West Africa by applying a Concentration Index (CI) and Generalised Linear Model (GLM) with logit link to access inequality. They also revealed that, over 30 per cent of deaths of children under-five are among the children of the poorest wealth quintile. In all the countries in their study, the results show that the value of the concentration index was negative and thus it showed that under-five mortality is concentrated among children from the poor households as compared to children from the wealthy households. As a result, in this study, with the introduction of policies such as the National Health Insurance Scheme (NHIS) and LEAP to increase household wealth status, we hypothesize that these variations in health outcome would not be found significant. Other demographic variables considered in the study such as mother’s age, parity and the birth order proved significant across all the countries. However, contrary to expectations, mother’s educational level and occupation were not significant in some countries.

3.3.3 Wealth and Antenatal Care (ANC) visits

Arthur (2012) used the 2008 GDHS by applying the logistic regression estimation to analyse the effect of wealth on antenatal care. The results show that despite the introduction of the maternal health care policy in 2008, wealth still had significant effect in antenatal care usage - women in higher wealth quintiles are more likely to make more ANC visits than women in the lowest wealth quintile. Arthur (2012) also found that education, residence and transportation to the health centre

had influence on the use of ANC. Regional variations in the use of ANC was observed as well as differential use between the rural and urban dwellers. In addition to using a more recent data – 2014 GDHS - this study will look out for the significance and comparison to the new WHO minimum requirement of eight visits among females of reproductive age. Other factors that they found to influence the use of ANC in Ghana were age of the expectant mother, number of living children and health insurance ownership.

Nketiah-Amponsah et al. (2013) used the 2008 GDHS by applying the negative binomial regression estimation technique to explore the determinants of ANC in Ghana. The estimates show that, among other contributing factors that influenced the utilisation of ANC in Ghana, “wealth status, in particular, was found to have a significant and positive effect on the utilization rate of ANC services”. Those in the top 60 per cent of the wealth quintile were more likely to intensify the use of ANC compared to the poorest. In terms of region of residence, it was found that, in the two poorest regions of Ghana –Upper East and Upper West – expecting women were significantly more likely to demand antenatal care services compared to their counterparts from the Greater Accra Region. However, the study couldn’t tell whether it could be as a result of public education through media exposure. Applying a more recent data, this study differs by looking at the effects of wealth distribution on ANC and also the regional variations in ANC access in the face of the new WHO guideline. The other factors in their work that influenced the intensity of ANC usage included ownership of health insurance (especially for rural women), educational attainment, birth order, and religion. Using most of the independent variables as outlined in Nketiah-Amponsah et al. (2013), the results by Dahiru & Oche (2015) was no different in Nigeria using the 2013 DHS by applying both univariate and multivariate logistic estimation techniques. However, their

unexpected findings was with the outcome from the geopolitical zone where pregnant women in North Central and North East were more likely than those of South West to have ANC. Though the odds ratio were not significant, the results in those geographical locations was unexpected since coverage of ANC in South West was one of the highest and also the relative socioeconomic advantage that the South West has over that of the North East and North West.

Dixon et al. (2014) also used the 2008 GDHS to assess the relationship between the National health Insurance scheme and antenatal care among women in Ghana applying both the Negative binomial and logit models of estimation. The results show that women who are wealthy were more likely to attend antenatal care than those from poorer households. Across residential location, it was observed that despite recent improvements, there are still marked differences in the availability of health services. The study assessed the intensity and timing of the first antenatal visit and visits beyond the first trimester (i.e. four months and beyond). Though important, the study is limited as the aggregation of the timing of visits into two time periods for the first trimester could partially tell the probability of maternal health outcome in terms of safe delivery. That is, the study did not analyse Ghanaian women who have received ANC visit beyond the first trimester and at least four times as recommended by the WHO. This study will therefore go further to analyse these variations in health care usage by women of reproductive age who have attended either four (4) ANC visits or more to those who have attended less than that. From the estimations, Dixon et al. (2014) realized that although more than half of Ghanaian women received ANC within their first 3 months of pregnancy, it was those with high socioeconomic characteristics, including the wealthy and employed, who benefited. However, their study did not find a woman's age to be a predictor of ANC utilization in Ghana.

3.3.4 Wealth and Contraceptive Use

From the literature, there has been mixed results on the effects of household wealth distribution on contraceptive use. A study by Nketiah-Amponsah et al. (2012) on the correlates of contraceptive usage among Ghanaian women of reproductive age (15-49 years) using the 2008 GDHS, show that women in the poorest to richer wealth quintile are less likely to use contraceptives relative to their counterparts in the richest wealth quintile. Their findings was supported by a similar study by Solanke (2017) which shows that the proportion of women using modern contraceptives increase consistently as household wealth status improves. Both papers applied empirical analysis using the logistic and multinomial logistic regressions. However, their results on the association between wealth distribution and contraceptive use was inconsistent with a study done by Okezie et al. (2010) in Nigeria which found a negative association between income and contraceptive use, albeit insignificant. In addition, both studies agree that, educational attainment is highly positive in explaining women's current use of contraceptives. With respect to region/residence of location, Nketiah-Amponsah et al. (2012) agreed to the variation in spatial location in affecting contraceptive use partly due to the unequal access to health services across the regions and different geographical area as cited in various literature (Amin et al., 2002; Clements & Madise, 2004; Gakidou & Vayena, 2007; Stephenson et al., 2007). Other variables which were controlled for, to have significant effect on contraceptive use in Ghana were religion, women autonomy, ownership of health insurance, and joint health decision making of both partners.

Similar study by Nyarko (2015) on the prevalence and correlates of contraceptive use among female adolescents in Ghana using the 2008 GDHS found no significant relationship between the

wealth of households and contraceptive use. This further supports the findings by Okezie et al. (2010) in Nigeria looking at the socioeconomic determinants of contraceptive use among rural women. However, they both found education, employment status and age of the woman to be significantly associated with contraceptive use. This could be that household wealth was attenuated by other covariates such as the education of the husband and the household size.

Adebowale, Adedini, Ibisomi, & Palamuleni (2014) looked at the differential effect of the wealth quintile on modern contraceptive use and fertility among Malawian women in their reproductive age. However, their analysis was limited because it only considered the poorest and richest wealth quintile bracket – bottom 20 per cent and top 20 per cent. This may signify some level of limitation as there could be variations in the middle 60 per cent quintile group. They used data from the Malawi DHS for 2010 while applying both chi-square and multinomial logistic regression on the outcome variable - contraceptive use. The results show that, among the sampled group, the use of modern contraceptives was lower among the women in the poorest quintile bracket as compared to the richest quintile bracket. Other factors that were significant to modern contraceptive use included age, education, region, children ever born, residence, age at first marriage and age at first birth.

The limitation in Adebowale, Adedini, Ibisomi, & Palamuleni (2014) in the omission of the middle quintile group was addressed in Juayire (2016) which analysed a similar study on the wealth differential on contraceptive use based on residence of location using the GDHS, 2014. However, the study was restricted to only rural dwellers. Both univariate and bivariate analysis including a

multinomial logistic regression estimation technique was used to assess this relationship. The results show that rural women in the middle category of the wealth quintile bracket had the highest percentage in terms of modern method of contraceptive usage. A similar study by Okezie et al. (2010) of a rural state in Nigeria showed contrasting results with wealth not playing any significant role. Though it is well evidenced in most literature that the higher wealth quintile brackets are found in urban areas (Baum, 2005; Carson, 2008; Kumi-Kyereme & Amo-Adjei, 2016), Juayire (2016) did not address the urban dimension of the spatial location though the estimations analysed showed that wealth status was significantly associated with contraceptive use even after controlling for other socio-demographic characteristics. In addition, control variables used in the study such as religion, highest educational achievement and knowledge of contraceptive use were found to be significantly not associated with contraceptive use.

Not all studies have however alluded to the positive relationship between wealth and contraceptive use even across residential locations. A study by Ejembi et al. (2015) in Nigeria found that poverty and rural residence had no significant effect on use of modern contraceptives. They used a multilevel modelling on data from the Nigerian 2013 DHS among women aged 15-49 in understanding the contextual factors influencing the use of modern contraceptives in the country. In addition, the federal states were decomposed into six geopolitical zones – North West, North East, North Central, South East, South West and South zones. Their study also found that, compared with the South West zone, all the other zones of the country except the South zone had significant lower odds of contraceptive use. This alludes to the hypothesis of this study that there exists spatial variations in the health output of households. Other factors found to influence

contraceptive usage included community level predictors such as female autonomy, female education, and access to health facility within the community.

3.3.5 Wealth Differentials Across Location and Health

According to the Ghana Poverty and Inequality Analysis (GPIA) report, large pockets of people in often rural, northern areas have seen significantly less benefit from Ghana's development, while some other groups have benefited disproportionately more (Cooke et al., 2016). The distribution of wealth in Ghana clearly depicts the disparity between the north and the south.

Probst, Moore, Glover, & Samuels (2004) asserts that the availability of health care services varies across geographic location, and that, there is normally less medical care available in low socioeconomic areas. According to Jewell (2009), the availability of these health care services measure the variations in the transportation cost component of the total price and variations in price associated with supply adjustments of health.

A study by Kumi-Kyereme & Amo-Adjei (2013) analysed the effect of wealth on healthcare service utilization. They used the binary logistic estimation technique coupled with descriptive statistics on the 2008 GDHS to assess health care demand through the purchase of insurance among Ghanaian women. Their results, show that, by wealth status, the likelihood of accessing health was significantly higher among residents from the middle, richer and richest households compared to the poorest (reference category) and these differences widened more profoundly in the Northern areas of the country. The study couldn't tell whether this could be attributed to the distance to the health facility or media. Also, employment status which determines the economic status of women to use more health services was not factored in their model. They further observed that, among

women at the bottom of household wealth (poorer and poorest), there were no statistically significant differences between them in all areas.

According to Hunter & Richards (2008), wealth is an influential drive between the striking health disparities within and among groups. The case is not too different for Ghana where this is characterized by rural-urban drift transcending from the regional wealth disparities in household behaviours and health outcomes (GDHS, 2014b). Although, in Ghana, the incidence of health outcome and the use of healthcare services may be varied across the various geographical location, these differences are subject to the population within each group. That is, higher-income groups have better health than members of their groups with less income. Wealth is generally highly significant within urban centres than rural areas and this is typically shown in the gap between the north (especially, the three northern regions) and the south of the country. In Ghana, more than 7 out of 10 of residents in Northern and Upper East regions and 6 out of 10 residents in Upper West region are in the lowest wealth quintile (GDHS, 2014b).

However, in Ghana, there still exists a gap in the literature on the effects of household wealth distribution on maternal, child and reproductive health especially given the prospects of the new development goals under the SDG targets. In essence, we want to find out the extent of effectiveness of government's policy in improving health access and household wealth. Also, little is known in the literature on the role a partner/husband's educational level play in the rural location on maternal healthcare utilization for ANC and modern contraceptive use. In addition to the under-five mortality, this study seeks to further contribute to literature by looking at health care services such as Antenatal care (ANC) and Contraceptive use across the wealth quintiles in Ghana. A

special comparative analysis will also be discussed on the new WHO minimum requirement of eight ANC visits as against the four visits. This analysis is to find out the contributing factors that could propel Ghana to adopt and sustain this new guideline to improve upon the maternal and child health in the country.

3.3.6 Other Socioeconomic Variables and Health

As cited in Adler et al. (1994), socioeconomic status is “a composite measure that typically incorporates economic status, measured by income (in our case wealth); social status, measured by education; and work status, measured by occupation”. This study will therefore incorporate these other two indicators as other independent variables in explaining child, maternal and reproductive health. The literature relating health to socioeconomic status (SES) has a long history (Deaton, 1997, 2001; Robert & House, 1996; Woolf et al., 2015). As early as the twelfth century, it was recognized that people at the lowest socioeconomic levels in the community have higher mortality and morbidity (Kaplan, Haan, Syme, Minkler, & Winkleby, n.d.).

Often researchers use one or a combination of either of the indicators as a measure of SES. For example, a study by Desai & Alva (1998), using the first round of Demographic and Health Surveys for 22 developing countries used education as a proxy for the socioeconomic status of the family and geographic area of residence. However, the impact of maternal education on child mortality and nutrition was attenuated as they introduced other control variables for husband’s education, access to pipe-borne water and toilet. Also, although Okezie et al. (2010) did not consider the effects of employment status, the empirical results from Nketiah-Amponsah et al.

(2012) show that, in addition to wealth, women who are engaged in employment of some sort were consistently associated with a higher probability of healthcare service utilisation.

According to Adler et al. (1994), “the components of SES – income, education and occupation, shapes one’s life course and are entangled in key domains of life, including (a) the physical environment in which one lives and works and exposure to other environmental hazards; (b) the social environment as well as access to social resources and supports; (c) socialization and experiences that influence psychological development; and (d) health behaviours”.

Adler & Ostrove (1999), also opined that education and employment are important to health not only for those in poverty, but at all levels of SES. In this regard, on average, the more advantaged individuals are, the better their health. In the context of spatial variation in health, they indicated that one pathway from socioeconomic status to health is through exposure to different environments and adaptations to these environments. This is in line with the argument on environmental and geographical factors affecting health by Adler et al. (1994).

3.3.7 Partner’s Education and Maternal Healthcare Service Utilisation

The effect of partner’s education on women’s health in developing countries has received relatively little attention to date (Adjiwanou et al. 2018). The study by Adjiwanou et al. (2018) used multilevel logistic regression on couples data from 37 DHS surveys fielded in SSA and Asian countries to assess the effect of partner’s schooling on women’s modern contraceptive use, frequency of antenatal care visits and skilled birth attendance. Their results show that partner’s

schooling has strong effects on their spouses' maternal healthcare service utilisation. The study further observed the interaction of partner's with female education and found it to be statistically significant with maternal health. However, this study goes further to interact residential location with paternal education to address locational differences in the use of healthcare services by women.

Another study by Afful-Mensah et al. (2014), analysed the rural-urban differences in maternal health care (antenatal care and delivery care) service utilization in Ghana. Their study used logistic regression using the 2008 GDHS on these maternal health indicators. The results of their study show that the individual covariates of women's and partners' educational level showed statistical significance to the use of healthcare services. However, after interacting both husband and woman's educational levels, although their results was positive, it showed no statistical significance to the use of healthcare services.

Also, Barasa et al. (2015) analysed the factors associated with antenatal care attendance and non-utilisation in Nairobi County by employing questionnaires to collect data from 306 mothers. They applied logistic regression to their model and found out that among other covariates such as age, employment status and parity, both maternal and husband's educational level beyond secondary education was a significant determinant of antenatal care service utilization in Nairobi County. They argued that husband's educational level can affect a woman's ANC visits because, in some cases, husbands are the ones who provide money in order for the mother to access maternal health care services. However, Nairobi County is observed as an urban city hence the results are expected

with high levels of education in the city. This study will therefore want to go further and find out whether the partner/husband's educational level in rural Ghana still has an effect on maternal healthcare service utilization for ANC and contraceptive use.

In essence, it is therefore realized that partner/husband's educational level may also have an effect on maternal healthcare service utilization. Hence, this study fills in the gap in the literature by addressing husband's educational level and residential location as most studies have either looked at joint couple educational effect or independent partner educational level effect on a woman's utilization of healthcare services. We therefore employ an interactive effect to determine the main and joint effects of husband's educational level in rural areas of Ghana for maternal healthcare service utilisation for ANC and modern contraceptive use in Ghana.

3.4 Conclusion

The effects of household wealth on under-five mortality is underpinned by the theory of 'demand for health' by Grossman (1972) which was modified by Wagstaff (1986). Also, maternal healthcare utilization is consistent with 'Andersen-Newman Framework' on the socioeconomic and demographic characteristics of individuals that determine their healthcare service utilization Andersen (1995). To date, both theories have necessitated several research work on child health outcome and healthcare service utilization. Most of the studies frequently include other variables such as educational attainment and employment status. Others have included proxies for cost and access to healthcare service, age, religion, birth order and the number of children currently living. Furthermore, there are recent evidences to suggest that partner/husband's education level play a

role in the determination of healthcare services. Given the rural-urban differences, we want to find out whether the husband's educational level will play a role in the rural areas of Ghana in terms of ANC and modern contraceptive use. Also, from the literature, it is realized that there exists wealth differentials between the north and the south. Various interventions have been introduced by the government to bridge the north – south wealth gap in the face of the SDGs. In addition to wealth, this study adds to literature by looking at the variation of these selected maternal and child health indicators of the SDGs and the characteristic contextual factors that affects health in Ghana to determine the extent and level of effectiveness of government's policies on health to improve household wealth and maternal health. It is therefore expedient to look at the variation in health output due to the differences in wealth status and also assess the variations across the regional location while observing other socioeconomic determinants to health. This study is initiated to bridge these gaps in the literature.

CHAPTER FOUR

4 METHODOLOGY AND DATA SOURCES

4.1 Introduction

The primary aim of this study is to explore the relationship between household wealth and maternal and child health in Ghana. Various methodologies have been used in the literature to investigate this relationship. Also, quite a significant number have adopted a logistic regression technique. This chapter details the methodology and data that is used in this study. This discussion initially highlights the theoretical framework from which the estimated model in this study is derived. It also focuses on the estimation technique used for the model. In addition, diagnostic checks are conducted on the variables to ensure that the results are efficient, consistent, reliable and unbiased. The chapter further discusses the reasons underlining the choice of the variables that are used in the study and the sources of data.

4.2 Theoretical Model Specifications

4.2.1 Theoretical Model for Under-five Child deaths

The theoretical model on under-five deaths is founded on the theory of ‘demand for health’ promulgated by Grossman (1972) which was later modified by Wagstaff (1986). The model used in this study is based on the health production function concept of the theory of ‘demand for health’ which postulates that individuals/households produce health by utilising socioeconomic variables. For under-five child deaths, the health outcome of a child is therefore determined by socioeconomic factors that may influence the child’s survival. Mathematically, this is written as:

$U5D = f(\text{socioeconomic variables})$

Where U5D represents under-five child death.

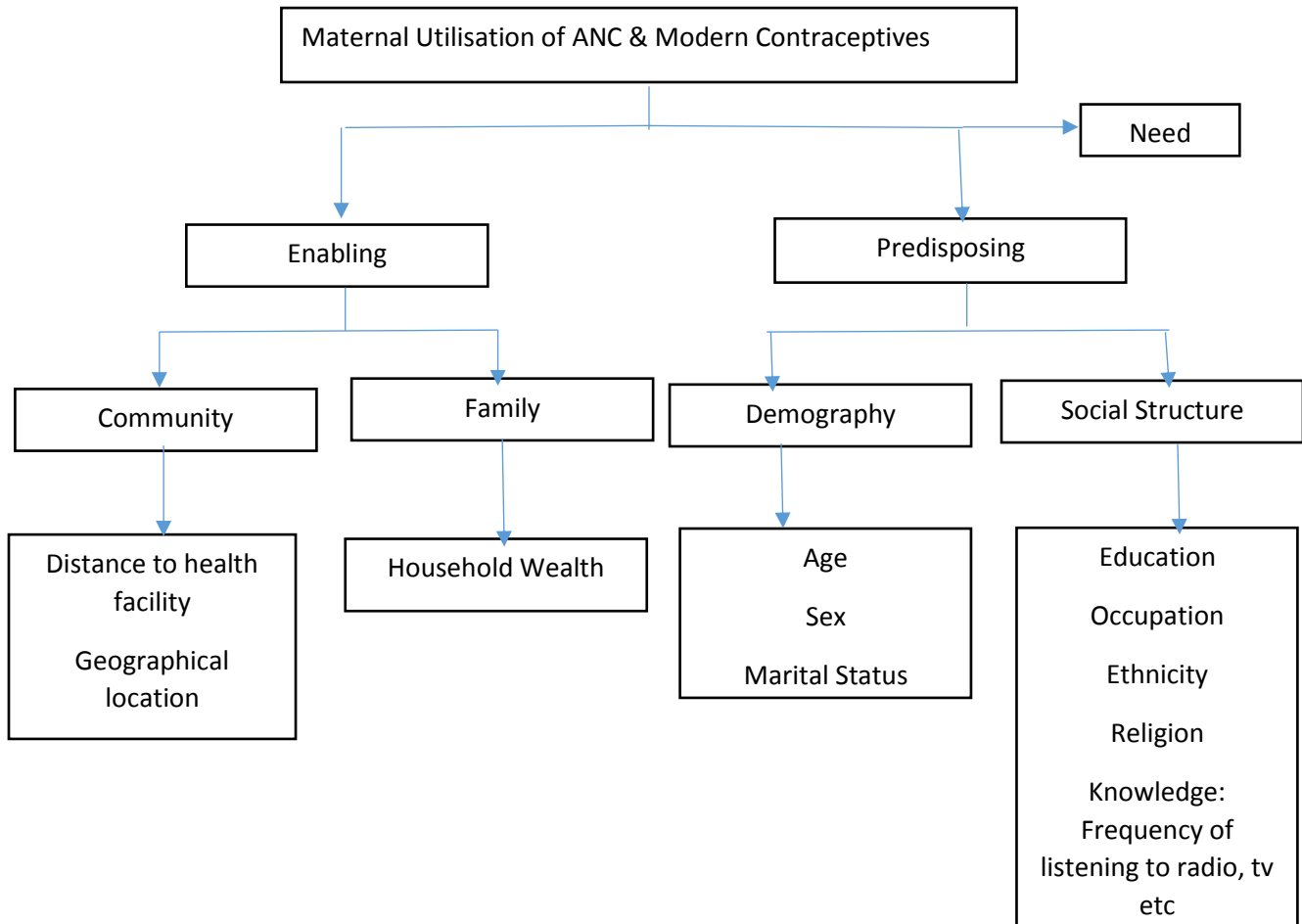
According to Wagstaff (1986), these socioeconomic determinants influences the health production of an individual. Therefore the probability of a child's survival or otherwise will highly be influenced by these socioeconomic inputs of health such as household wealth and maternal education. The health production function is underpinned by the 'law of diminishing marginal returns'. These details have been discussed in the previous chapter².

4.2.2 Theoretical Framework for Maternal Healthcare Utilisation

The theoretical framework for ANC and modern contraceptive use in this study is based on Anderson-Newman framework on healthcare utilization. The framework was developed as a behavioural model that provides access and use of health services. It shows that an individual's use of healthcare services is based on three characteristics – predisposing, enabling and need factors. Our focus is on the predisposing and enabling characteristics that determine healthcare service utilization.

² Details have been discussed in section 3.2.1

Figure 4.1: Model for Maternal Health service Utilisation



Source: Adapted from Andersen (1995) with modifications

The framework therefore suggests that, a woman’s use of ANC and modern contraceptives is determined by socioeconomic as well as other demographic factors. From Figure 4.1, it is observed that household wealth, geographical location, distance to health facility, age, sex, marital status, education, occupation, ethnicity, religion and media exposure are among those factors that determine the use of maternal healthcare services. These variables make up the set of covariates for healthcare service utilization for economic models of human behavior.

Individual characteristics determine how two individuals will use health care services. People with certain characteristics are more likely to use healthcare services than others. A woman's marital status is an important factor that determines the use of ANC and contraceptive use. There is evidence to suggest that married women are more likely to attend ANC and also use modern contraceptives to control child birth.

There is also empirical evidence to show that more education is connected to the tendency to use ANC and contraceptive. Education is associated with wealth such that, the more educated a person is, the more wealth they acquire, all things being equal.

Geographical location has also been identified to affect health service use. Individuals who are located in a more conservative area tend to use less of contraceptives. Also, areas where health facilities are located farther from the people may be a disincentive to attend ANC.

Considering all these elements that influence the use of ANC and contraceptives, there are other elements that serve as a bridge between the factors mentioned above and maternal health care utilization. Andersen (1995) referred to these factors as enabling factors. Enabling factors can be measured by family/household resources such as wealth. Household wealth tends to influence the use and non-use of health services even if the person is covered by insurance. Empirical studies shows that wealth is positively associated with the use of formal health services including antenatal care and contraceptive use.

4.3 Empirical Estimation

Since the current study is much interested in the effects of household wealth differential on maternal healthcare service utilization and child health outcome, the estimation equation from the discussion above is specified as:

$$\text{Health} = f(\text{socioeconomic variables}) \quad (1)$$

The mathematical equation therefore becomes

$$HEZ = f(We, Rg, Re, Ed, Em, Z) \quad (2)$$

Where

HEZ is the selected indicator for maternal and child health, We is the household wealth index, Rg is the regional location of households, Re is the residential location, Ed is the female educational level, Em is the employment status of the woman and Z is the vector of other control variables including demography

In order to investigate the effect of wealth status on maternal and child health, the study starts with a health model specified in a cross-section form as follows:

$$Y_i = \alpha_i + X_i\beta_i + u_i, \quad i = 1, 2, \dots, n \quad (3)$$

Where Y_i is a vector of the dependent variables,

α_i is the intercept which represents the household/individual specific effect

X_i is the vector of independent variables,

β_i is the vector coefficients of the independent variables and

u_i is the error term which is assumed to be normally distributed.

The treatment variables from equation (2) are substituted into equation (3) to give equation (4) below;

$$HEZ_i = \alpha_i + \beta_1 We_i + \beta_2 Rg_i + \beta_3 Re_i + \beta_4 Ed_i + \beta_5 Em_i + \beta_6 Z_i + u_i \quad (4)$$

The main control variables from the literature are the other socioeconomic parameters such as maternal occupational status, education, employment status and regional location. Given that the main aim of the study is to assess the effect of household wealth on maternal healthcare utilization and under-five child deaths in Ghana, equation (4) does not contain all the explanatory variables that might affect the health output. The study includes a set of other control variables that have been identified in the literature as determinants of under-five child deaths, antenatal care use and modern contraceptive use. However, it is noted that the selected health indicator is determined by different factors for health care service utilization and child mortality hence we specify separate estimation equations for each. In addition, the ANC model will capture for both ANC4+ and ANC8+.

The other variables include maternal age, religious affiliation, number of children currently living, media exposure, ethnicity and distance to health facility – which captures physical access as an indirect cost to health.

Adding these set of control variables into equation (4), we have;

$$ANC_i = \alpha_i + \beta_1 We_i + \beta_2 Rg_i + \beta_3 Re_i + \beta_4 Ed_i + \beta_5 Em_i + \beta_6 Ag_i + \beta_7 Pe_i + \beta_8 Me_i + \beta_9 Bo_i + \beta_{10} Dh_i + \beta_{11} Rl_i + \beta_{12} Eth_i + u_i \quad (5)$$

$$CU_i = \alpha_i + \beta_1 We_i + \beta_2 Rg_i + \beta_3 Re_i + \beta_4 Ed_i + \beta_5 Em_i + \beta_6 Ag_i + \beta_7 Pe_i + \beta_8 Me_i + \beta_9 Ch_i + \beta_{10} Dh_i + \beta_{11} Rl_i + \beta_{12} Eth_i + u_i \quad (6)$$

$$U5D_i = \alpha_i + \beta_1 We_i + \beta_2 Rg_i + \beta_3 Re_i + \beta_4 Ed_i + \beta_5 Em_i + \beta_6 Ag_i + \beta_7 Ch_i + \beta_8 Dh_i + \beta_9 Pn_i + u_i \quad (7)$$

In addition, we envisage that paternal characteristics may also influence the health decision of the woman's healthcare utilisation especially for rural areas where use of health services is relatively low. Hence we will employ a two-way factorial to explore the interaction of paternal educational level with residential location of the woman. Equation 5 and 6 therefore becomes

$$ANC_i = \alpha_i + \beta_1 We_i + \beta_2 Rg_i + \beta_3 Re_i + \beta_4 Ed_i + \beta_5 Em_i + \beta_6 Ag_i + \beta_7 Pe_i + \beta_8 Me_i + \beta_9 Bo_i + \beta_{10} Dh_i + \beta_{11} Rl_i + \beta_{12} Eth_i + \beta_{13} Res * Pe_i + u_i \quad (5a)$$

$$CU_i = \alpha_i + \beta_1 We_i + \beta_2 Rg_i + \beta_3 Re_i + \beta_4 Ed_i + \beta_5 Em_i + \beta_6 Ag_i + \beta_7 Pe_i + \beta_8 Me_i + \beta_9 Ch_i + \beta_{10} Dh_i + \beta_{11} Rl_i + \beta_{12} Eth_i + \beta_{13} Res * Pe_i + u_i \quad (6a)$$

Where We, Rg, Re, Ed, and Em are as previously defined. ANC is number of antenatal care visits for ANC4+ and ANC8+ whereas CU and U5D is modern contraceptive use and under-five child deaths respectively. Ag is the age of the woman, Pe is the partner/husband's education level, Me is media exposure, Bo is the birth order of the child, Ch is the number of living children born to the mother, Dh is the distance to health facility whiles Rl and Eth is the religious affiliation and the ethnicity of the woman. Res*Pe is the interactive effect to explore possible heterogeneity in healthcare service utilization for ANC and modern contraceptive use.

4.4 Description of Variables, Measurement Issues and Expected Signs

The dependent and independent variables in the study have been selected in accordance with the literature reviewed earlier and the objectives of this study. The a priori expectations of the signs of the independent variables are based on the theoretical literature and the findings from previous studies. All variables are extracted from the Ghana Demographic and Household Surveys (GDHS) for 2014.

4.4.1 Dependent Variables

The dependent variables are chosen as indicators for maternal healthcare service utilization and under-five mortality. Antenatal care has been identified as an important determinant for maternal health. Frequent visits by the expectant mothers reduces the risk of maternal and child death. Also, the use of modern contraceptives is to enable effective family planning and control population growth. Health issues form a significant portion of the SDGs as they are interconnected with other goals of the SDG. These indicators include:

- 1. Antenatal Care Visits:** The WHO has recommended at least four visits to a health facility by expectant mothers prior to their child birth as a measure of guarding against maternal deaths across the countries. However, the distribution of the number of visits are not the same throughout the country. Furthermore, the study briefly looks at a comparative analysis between the four and new minimum of eight ANC visits adopted by the WHO. This new guideline seeks to improve maternal and child survival as well as propel countries to achieve the health-related SDG targets on maternal and child health (WHO, 2016b). According to Tunçalp et al. (2017), “evidence suggests that an increase in the number of

antenatal care contacts with a health provider/personnel irrespective of the resource setting, seems to be associated with an increase in maternal satisfaction compared with fewer ANC contacts”. This study therefore derives two measures of the number of ANC visits as a dichotomous variable (1 = if woman attended at least four or eight antenatal care visits during pregnancy, and 0 = if she attended less than the four or eight visits as recommended)

2. **Under-five Child death:** The under-five child death is also captured as a dichotomous outcome variable. It is measured as 1 if a child died before his/her fifth birthday in the household and 0 if otherwise. Child mortality rate estimate has been a global concern prior to the SDGs. This is because, in effect, it also measures the future stock of human capital necessary for economic growth and development.
3. **Modern Contraceptive Use:** Finally, the use of contraceptives within households will be considered as an indicator to measure access to sexual and reproductive health-care services. It is expected to improve household and national health. This is because, the control of population growth rates ensures the equitable distribution of wealth needed for sustained economic growth. In this study, we considered the use of modern method of contraception as against non-use by women of reproductive age 15 - 49 years. The traditional method has been marred with health risks such as STIs, unwanted pregnancies, high failure rate, maternal morbidity and mortality (Hoskins, 1973; Ram et al., 2014). Therefore, the dichotomy of ‘use’ versus ‘non-use’ outcome variable will be captured as whether ‘one uses modern contraception’ = 1 or ‘none’ = 0.

4.4.2 Independent Variables

The main independent variable is the wealth index of households. The other independent variables are maternal education, employment, regional location, residential location, maternal age, media exposure, distance to health facility, number of children, religious affiliation and ethnicity. These variables are guided by the existing literature in this area and also, the underlying objectives of this study.

1. ***The wealth quintile distribution:*** With the introduction of the national health insurance policy, the high cost of health care was expected to be partially subsumed by it (Arthur, 2012). Moreover, at the end of the MDG era, Ghana was known as one of the countries to have halved poverty ahead of time (UNDP, 2015). In the face of the free maternal delivery and government welfare/support schemes such as LEAP and the northern zone development policies by successive governments, our hypothesis was that, wealth would not play any major role in maternal and child health. The 2014 GDHS wealth index, as a measure of socioeconomic status of households, has been used to measure inequalities in household characteristics, in the use of health services, and in health outcomes (GDHS, 2014b). According to the GDHS report, it is an indicator which is consistent with expenditure and income measurement among households. The index was constructed from household asset data using principal component analysis. These assets or consumer items consist of a television, bicycle, or car, as well as dwelling characteristics, such as a source of drinking water, sanitation facilities, and type of flooring material. The computed index helped to draw out national-level wealth quintiles (from lowest to highest) which is then divided into five equal categories, each comprising 20 per cent of the population. The 2014 GDHS provides an opportunity to examine the distribution of Ghana's population by

household wealth status. Economic theory predicts a positive nexus between wealth and improved maternal and child health (McGuire et al. 2005). This implies that the higher the wealth of the household, the better the health status of the individual, all things being equal.

2. **Regional location:** The choice of the regional location is based on the differences in the wealth scores as well as poverty incidence across the ten regions in Ghana. Various national level reports, from the computations of the Gini coefficients, have alluded to the wealth differentials in the country especially between the north and the south (Cooke et al., 2016; GSS, 2015; NDPC, 2014). In these national reports, one thing runs through – the three northern regions still remain the poorest in the country both in terms of poverty depth and incidence. The 2015 annual report of the Ghana Shared Growth and Development Agenda (GSGDA II) asserts to the health output and the use of healthcare service variations in terms of access to health facilities due to the differences in wealth distribution across the regions, with the south benefitting more than the north (NDPC, 2016).

The regional location variable is assessed by looking at the health variations in the ten administrative regions in Ghana. In this regard, all things being equal, regions that have higher wealth status within the wealth quintile are expected to produce better health output and their tendency to use more of health services available than regions with lower wealth status.

3. **Residential location:** Residential location involves both the rural and urban residences in the country. According to the Ghana Statistical Service, residential location with a population size of 5,000 and more are classified as urban and rural if otherwise (Coulombe,

2005). Rural areas are generally characterized by low socioeconomic status. Consequently, mothers in urban areas easily get access to medical care and healthcare facilities (for their children) than their counterparts living in rural areas who have to commute long distances to access less-equipped medical centres. From the 2014 GDHS dataset, about 51 per cent of the sampled population from the women data file live in rural areas with the rest living in urban locations. Households in the urban areas are generally characterized by easy access to health care facilities, hygienic conditions and use of healthcare services. This leads to better health outcomes. It is categorized as a dummy (Urban=1, Rural=2)

4. ***Maternal Educational Level:*** Another crucial socioeconomic determinant of health output and healthcare service utilization is the level of educational attainment of the mother which has been identified in various literature as a key factor to producing more health at a minimal cost. This is because, women with higher educational status are better informed and have knowledge on their health demand. According to Grossman (1999), an increase in the level of education of an individual would shift his or her marginal efficiency of health production to the right leading to increasing marginal product of health and labour income. In Sub-Saharan Africa (SSA), women play a major role in family health. The impact of educational attainment of a mother is translated in the overall health improvement of children (i.e. under-fives) and the mothers themselves. It is therefore expected that mothers with higher levels of educational attainment would demand better healthcare services (i.e. more ANC visits and control of child birth) as well as improvement in child health. Maternal education is categorized into four (3); no education, primary education, middle secondary education and beyond. No education is selected as the reference category.

5. **Occupational Status:** This is the other socioeconomic factor that has also been found to influence maternal healthcare utilization and child health outcomes because it indicates the ability of the mother to seek better health for herself and the child. Though there are varied views in the literature on the effect of maternal employment status on maternal and child health, it is expected in this study that, mothers with high paid occupations would produce better health than those with low paid occupations or mothers who are just housewives or are not working. It is coded as 0 = 'Not working' and 1 = 'working'.
6. **Distance:** Proximity of and availability of health centres reduces both time and financial cost associated with health. The cost of transportation to health centres and other indirect cost of diseases that are not covered by the national health insurance and social schemes limits the healthcare usage of the poorer households. In the GDHS dataset, respondents were asked whether distance to health facility was a big problem or not. Distance in this study is coded as 1= 'Big problem' and 2 = 'Not a big problem'.
7. **Age Cohort:** Age and the demand for health has a mixed views from the literature. According to Grossman (1972) individuals invest in their health to maintain their health stock. Hence, when increases in age, it is expected that his/her stock will depreciate hence the person will spend a larger proportion of his/her income on health. On the other hand, others argue that if one invests in his health by checking his/her diet and avoiding all forms of health risk behaviours such as smoking and alcohol consumption, he/she would not need to spend more on health as he/she grows older. The age group has been categorized into

the five-year group based on the reproductive ages of women. This is from 15-19 year (reference category) to 44-49 years.

- 8. *Media Exposure:*** The media acts as a platform to disseminate information. An individual who is better informed can demand better health services as well as engage in less risky health behaviours to the detriment of his/her health. Media in ANC represents shows an index for the frequency of listening to radio, tv and reading newspaper as there was not a specific variable for exposure to media on ANC. In addition, for contraceptive use, the media exposure shows an index of whether the respondent has heard of family planning on tv, radio or through the newspaper in the last few months before the interview. In each case, the index is coded as a binary - 0 for 'Not Exposed' and 1 for 'Exposed'.
- 9. *Postnatal:*** According to the WHO (2013), the early weeks of child birth are critical for maternal and child birth. The WHO therefore recommends at least a period of six weeks of postnatal by maternal mothers not only for their own health but to prevent early childhood diseases. The DHS questionnaire interviewed women who responded to whether they attended child postnatal within two months of child birth. It is coded as 0 for 'no' and 1 for 'yes'.
- 10. *Birth Order:*** The birth order of the mother proxies the mother's experience with ANC services. The expectant mother's use of ANC may be influenced by her previous birth experiences. This may be positive (a pleasant experience), increasing the use of ANC or negative (an unpleasant experience) thereby reducing her use of ANC. The birth order is coded as: 0= 1st child, 1=2nd – 4th child and 2= 5 or more children.

- 11. *Number of Living Children:*** The number of living children of the mother is used as a determinant of modern contraceptive use and under-five child deaths. An increasing household size will necessitate the use of modern contraceptives to control child birth, all things being equal. Also, for under-five child deaths, previous birth experiences by the expectant mother is likely to affect the survival or otherwise of the child. This is coded as a continuous variable.
- 12. *Religion:*** The religious affiliation of the woman is used to determine the motivation for ANC attendance and modern contraceptive use. It is coded as: 1= Orthodox Christian (Catholic, Presby, Methodist), 2=Pentecost/Charismatic, 3=Islam, 4=Traditional/Spiritualist, 5= Others.
- 13. *Partner/Husband Education:*** The number of ANC visits and modern contraceptive use is also influenced by the decisions of the husband. According to Rempel & Rempel (2004), there is evidence to show that male partners influence the health behaviours of women. The partner/husband education level is coded as: 0=No Education, 1=Primary, and 2= Secondary and above.
- 14. *Ethnicity:*** The ethnic background of the mother has been identified to influence the use of ANC and modern contraceptives. This is coded as: 1=Akan, 2=Ga/Dangbe, 3=Ewe, 4=Mole-Dagbani, 5=others.

For each output of the dependent variable, the study focuses on only two possible outcomes – whether it occurred or not. Hence, given the binary nature of the dependent variable, a value of 1 is assigned if the probability of the outcome occurred and a value of 0 if otherwise.

The effect of household wealth on ANC, Contraceptive use and under-five child deaths is investigated using the odds ratio. In the logit model, coefficients of the explanatory variables are represented by a measure of the change in the log-odds of the dependent variable due to a unit change in the independent variables. However, the effect of the explanatory variables can be measured in relative terms using the odds ratio of the logit relation.

4.5 Diagnostic Checks

To ensure reliability of the results, the estimates must be unbiased, efficient, consistent and reliable among others. Therefore, an estimation equation must be modelled to make sure the correlates are not linearly dependent with each other.

4.5.1 Multicollinearity Test

One challenge of a regression output is the ability to ensure that there are no perfect linear relationship among the explanatory variables. Multicollinearity leads to imprecise estimation; that is, the standard errors tend to be large in relation to the estimated coefficients thereby rendering one or more such coefficients statistically insignificant on the basis of the conventional t test.

Multicollinearity is therefore largely characterized by insignificant t values but a high overall R^2 (and a significant F value). In the case of the binary dependent estimations, this will be translated in the Z and the likelihood ratio (LR) statistic respectively.

According to Gujarati (2004), since “multicollinearity is essentially a sample phenomenon, arising out of the largely nonexperimental data collected in the social sciences, we do not have one unique method of detecting or measuring it”. “What we have are rules of thumb”. This study will adopt the Variance Inflation Factor (VIF) to test for the presence of multicollinearity in the model. The study will specifically use the ‘VIF, uncentered’ because of the categorical nature of the variables. This test is easy and widely used in detecting the presence of multicollinearity. VIF shows how the variance of an estimator is inflated by the presence of multicollinearity. As a rule of thumb, if the VIF of a variable exceeds 10 then that variable is said to be highly collinear (Kleinbaum et al. 2008).

4.6 Estimation Techniques

Logit model is employed in this study. The study draws a qualitative response model from our estimation equation above hence we will adapt a probability model instead of a linear model. Given a binary outcome, a dichotomous response regression model will be used. According to Gujarati (2004), three approaches are used to develop a probability model for a binary response variable: The linear probability model (LPM), the logit model and the probit/normit model.

In this study, we will use the logit model because of its comparative mathematical simplicity. This model draws from the background of the linear probability model (LPM) (Gujarati, 2004).

Let us consider the following regression model:

$$Y_i = \beta_1 + \beta_2 X_i + u_i \quad (1)$$

Where X_i = independent variables and $Y = 1$ (if (i) a child died five years preceding the survey, (ii) the expectant mother attended a minimum of four or eight ANC visits (iii) the woman uses modern contraceptives) and 0 if otherwise. Model (1) is a linear probability model because the regressand is binary or dichotomous. This is because the conditional expectation of Y_i given X_i , $E(Y_i | X_i)$, can be interpreted as the conditional probability that the event will occur given X_i , that is, $\Pr(Y_i = 1 | X_i)$. Assuming $E(u_i) = 0$, (to obtain unbiased estimators), we obtain

$$E(Y_i | X_i) = \beta_1 + \beta_2 X_i \quad (2)$$

Now, if P_i = probability that $Y_i = 1$ (that, the event occurs), and $(1 - P_i)$ = probability that $Y_i = 0$ (that is, that the event will not occur).

That is, Y_i follows the Bernoulli probability distribution.

Now by the definition of mathematical expectation, we obtain:

$$E(Y_i) = 0(1 - P_i) + 1(P_i) = P_i \quad (3)$$

Comparing equation 2 and 3, we can equate

$$E(Y_i | X_i) = \beta_1 + \beta_2 X_i = P_i \quad (4)$$

That is, the conditional expectation of the model of equation 1 can, in fact, be interpreted as the conditional probability of Y_i . In general, the expectation of a Bernoulli random variable is the probability that the random variable equals 1.

Since the probability P_i must lie between 0 and 1, we have the restriction

$$0 \leq E(Y_i | X_i) \leq 1 \quad (5)$$

That is, the conditional expectation (or conditional probability) must lie between 0 and 1.

From equation 4, we explain the logit model by considering the following representation of the maternal and child health output regressands (i.e. under-five mortality, ANC visits and contraceptive use):

$$P_i = E(Y_i | X_i) = \frac{1}{1+e^{-(\beta_1 + \beta_2 X_i)}} \quad (6)$$

For ease of exposition, we write equation (6) as

$$P_i = E(Y_i = 1 | X_i) = \frac{1}{1+e^{-Z_i}} = \frac{e^Z}{1+e^Z} \quad (7)$$

Where $Z_i = \beta_1 + \beta_2 X_i$

Equation (7) represents the (cumulative) logistic distribution function.

For our study, if P_i , the probability of the child outcome and maternal healthcare utilization, is given by equation (7), then $1 - P_i$, the probability of the reverse, is

$$1 - P_i = \frac{1}{1+e^{Z_i}} \quad (8)$$

Therefore, we can write

$$\frac{P_i}{1-P_i} = \frac{1+e^{Z_i}}{1+e^{-Z_i}} = e^{Z_i} \quad (9)$$

$P_i / 1 - P_i$ is simply the odds ratio in favour of whether a child under five years died, a mother attended at least four ANC visits and uses modern contraceptive – the ratio of the probability of the event occurring to the probability of the event not occurring. Further, taking the natural log of equation (9), we obtain

$$L_i = \ln\left(\frac{P_i}{1-P_i}\right) = Z_i = \beta_1 + \beta_2 X_i \quad (10)$$

From equation (10), L_i is the log of the odds ratio, called the logit, and hence the name logit model. Therefore, we will apply the maximum likelihood (ML) method, instead of the OLS, to estimate the parameters. To assess the joint effects of household wealth and spatial location on maternal healthcare utilization and child health outcome, the study like many other health economics studies that employ micro level data, uses the logit model. The logistic regression predicts the probability of an event occurring (Greene, 2003). For our estimation, we write equation (10) as follows:

$$L_i = \ln\left(\frac{P_i}{1-P_i}\right) = \beta_1 + \beta_2 X_i + u_i \quad (11)$$

where u_i is the stochastic error term.

The logit (natural logs) regression expresses the odds of the unknown binomial variable as linearly dependent on the explanatory variable and this linear relationship is derived from the logistic

Cumulative Density Function (CDF). To suite our estimation equation on the effects of wealth, we have

$$\frac{P_i}{1-P_i} = e^{(\beta_1 + \sum \beta_{2i} X_{2i} + \sum \beta_{3i} X_{3i} + \sum \beta_{4i} X_{4i})} = e^{\beta_1} e^{\beta_2 X_2} \dots e^{\beta_i X_i} \quad (12)$$

$\sum X_{2i}$ = vector of the effect of household wealth

$\sum X_{3i}$ = vector of other socioeconomic factors (mother's education, employment status)

$\sum X_{4i}$ = vector of demographic and other independent variables

Then e raised to the power β_i is the factor by which the odds ratio changes when the i^{th} independent variable increases by one unit. If β_i is positive, this factor will be greater than 1, which means that the odds ratio is increased. If β_i is negative, the factor will be less than 1, which means that the odds ratio is decreased. When β_i is 0, the factor equals 1, which leaves it unchanged (Radkar & Mulay, 1997).

The effect of household wealth on under-five mortality, ANC visits and contraceptive usage is investigated by using the odds ratio. In the logit model, coefficients of explanatory variables measure the change in log-odds due to a unit change in the independent variable. However, the effect of the explanatory variables can also be measured in relative terms using the odds ratio of

the logit relation. These estimates will predict the effect of household wealth on maternal, child and female reproductive health.

4.7 Data

This study uses the 2014 Ghana Demographic and Health Survey (GDHS) – the most recent survey – for its analysis. This is a nationally representative survey of 9,396 women age 15-49 and 4,388 men age 15-59 from 11,835 interviewed households. The primary purpose of the GDHS was to generate recent and reliable information on fertility, family planning, infant and child mortality, maternal and child health, and nutrition. In addition, the survey collected information on malaria treatment, prevention, and prevalence among children age 6-59 months; blood pressure among adults; anaemia among women and children; and HIV prevalence among adults. This information is essential for making informed policy decisions and for planning, monitoring, and evaluating programmes related to health in general, and reproductive health in particular, at both the national and regional levels (GDHS, 2014b).

The 2014 GDHS is the sixth in a series of population and health surveys conducted in Ghana as part of the global Demographic and Health Surveys (DHS) Program. The earlier rounds of the surveys were conducted in 1988, 1993, 1998, 2003 and 2008. The survey was implemented by the Ghana Statistical Service (GSS), the Ghana Health Service (GHS), and the National Public Health Reference Laboratory (NPHRL) of the GHS using three types of questionnaires, namely; Household Questionnaire, Women’s Questionnaire and Men’s Questionnaire. These questionnaires were adapted to reflect the population and health issues relevant to Ghana.

The sampling frame used for the 2014 GDHS is an updated frame from the 2010 Ghana Population and Housing Census provided by the Ghana Statistical Service. The 2014 GDHS followed a two-stage sample design and was intended to allow estimates of key indicators at the national level as well as for urban and rural areas and each of Ghana's 10 administrative regions. The first stage involved selecting sample points (clusters) consisting of enumeration areas (EAs) delineated for the 2010 PHC. A total of 427 clusters were selected, 216 in urban areas and 211 in rural areas.

The second stage involved the systematic sampling of households in which about 30 households were selected from each cluster to constitute the total sample size of 12,831 households, out of which 12,010 were occupied and 11, 835 were successfully interviewed, yielding a response rate of 99 percent. Because of the approximately equal sample sizes in each region, the sample was not self-weighting at the national level, and weighting factors were added to the data file so that the results will be proportional at the national level. All women aged 15-49 who were either permanent residents of the selected households or visitors who stayed in the household the night before the survey were eligible to be interviewed and have their blood pressure measured.

4.8 Conclusion

The chapter commenced by discussing the theoretical framework underpinning this study and subsequently develops the models that will be used for the estimations in the study. The methodology used in arriving at the estimated results including the diagnostic checks employed was also defined. In addition, all variables that affect child and maternal health in the model were outlined including the statistical software package to be used for the estimations. The last part of the chapter looked at the data to be used which includes the sample size and the sample period. The next chapter discusses the results.

CHAPTER FIVE

5 PRESENTATION AND DISCUSSION OF RESULTS

5.1 Introduction

This chapter discusses the findings from the estimation using the dataset from the 2014 GDHS. The descriptive analysis of all the variables used in this study are also shown and it further draws out the diagnostic checks discussed in the previous chapter. The results of the estimations are thereafter discussed taking into cognizance previous studies. All estimations are carried out using STATA version 13 (StataCorp, 2013).

5.2 Descriptive Analysis

The summary statistics of the selected indicators for maternal and child health and some of the variables that influence them are discussed in this section. The 2014 GDHS asked women who had given birth within the five year prior to the survey questions pertaining to maternal and child health. The data obtained which are relevant to this study are summarized in Tables 5.1, 5.2, 5.3 and 5.4. Table 5.1 looks at the descriptive statistics for the dependent variables whiles Tables 5.2 and 5.3 looks at the socioeconomic and demographic characteristics of the independent variables, including the chi-square test. The chi-square test is used to determine whether there exists some association between the dependent and independent variables.

Table 5.1: Descriptive Statistics for the Selected Indicators of Maternal and Child Health

Individual Variables	Frequency	%	Cumulative Frequency
ANC4+			
Less than 4 visits	577	13.51	13.51
4 visits or more	3695	86.49	100.00
ANC8+			
Less than 8 visits	3040	71.16	71.16
8 visits or more	1232	28.84	100.00
Contraceptive Use			
No method	7314	80.83	80.83
Modern method	1735	19.17	100.00
Under-five Mortality Prevalence			
No	5595	95.09	95.09
Yes	289	4.91	100.00

Source: Author's computation from the 2014 GDHS

From Table 5.1, more than 13 per cent of women did not make the current recommended number of visits. The proportion of mothers who attended at least four ANC visits during pregnancy was 86.49 per cent compared to 28.84 per cent of those who attended at least eight ANC visits. In terms of current use of modern contraceptives, the results show that 19.17 per cent of females interviewed use contraceptives while 80.83 per cent do not use any method of contraception. Again, the proportion of mothers who experienced under-five mortality within the five year period prior to the survey was 4.91 per cent while 95.09 per cent did not lose any child below five years.

Table 5.2: Descriptive Statistics for ANC

Individual Variables	ANC 4+		ANC 8+		Pearson's Chi-square
	Less than 4 visits (%)	4 visits and more (%)	Less than 8 visits (%)	8 visits and more (%)	
Wealth					56.49***
Poorest	20.99	79.01	86.41	13.59	
Poorer	17.25	82.75	76.09	23.91	
Middle	12.52	87.48	68.53	31.47	
Richer	4.69	95.31	57.39	42.61	
Richest	1.98	98.02	47.84	52.16	
Region					90.13***
Western	9.05	90.95	51.74	48.26	
Central	10.14	89.86	62.67	37.33	
Greater Accra	8.50	91.5	58.07	41.93	
Volta	22.32	77.68	71.88	28.12	
Eastern	22.78	77.22	81.77	18.23	
Ashanti	5.07	94.93	60.63	39.37	
Brong Ahafo	9.24	90.76	70.23	29.77	
Northern	27.79	72.21	90.31	9.69	
Upper East	6.05	93.95	70.93	29.07	
Upper West	9.07	90.93	85.71	14.29	
Residence					22.51***
Urban	7.67	92.33	61.63	38.37	
Rural	17.64	82.36	77.92	22.08	
Education					78.69***
No Education	19.74	80.26	83.03	16.97	
Primary	16.09	83.91	71.64	28.36	
Secondary and above	8.00	92	62.60	37.4	
Partner/Husband Education					188.14***
No Education	20.36	79.64	84.58	15.42	
Primary	15.40	84.60	75.05	24.95	
Secondary	8.77	91.23	62.62	37.38	
Employment Status					0.04
Not Working	17.48	82.52	73.91	26.09	
Working	12.68	87.32	70.59	29.41	
Age (years)					12.51
15 – 19	20.77	79.23	78.14	21.86	
20 – 24	15.76	84.24	77.17	22.83	
25 – 29	12.08	87.92	69.65	30.35	
30 – 34	12.33	87.67	66.42	33.58	
35 – 39	11.69	88.31	69.12	30.88	
40 – 44	14.64	85.36	73.95	26.05	
45 – 49	17.69	82.31	77.55	22.45	
Distance to Health Facility					19.17***

A big Problem	19.21	80.79	78.43	21.57	
Not a big Problem	10.98	89.02	67.93	32.07	
Birth Order					24.69***
1 Child	11.46	88.54	68.42	31.58	
2 – 4 Children	11.42	88.58	67.95	32.05	
5 or more Children	18.96	81.04	79.25	20.75	
Media Exposure					86.32***
Not exposed	29.59	70.41	86.65	13.35	
Exposed	11.29	88.71	69.03	30.97	
Religion					87.49***
Orthodox Christian	12.56	87.44	69.87	30.13	
Pentecost/Charismatic	12.77	87.23	66.60	33.4	
Islam	9.64	90.36	76.64	23.36	
Traditional/Spiritualist	35.10	64.9	94.70	5.3	
Others	28.99	71.01	84.62	15.38	
Ethnicity					71.63***
Akan	9.42	90.58	62.81	37.19	
Ga/Dangbe	18.78	81.22	70.05	29.95	
Ewe	17.09	82.91	67.09	32.91	
Mole/Dagbani	9.43	90.57	78.08	21.92	
Others	24.02	75.98	80.73	19.27	

ANC4+ - At least 4 ANC visits ANC8+ - At least 8 ANC visits (new WHO minimum requirement)

Source: Author's computation from the 2014 GDHS

Table 5.2 shows descriptive statistics of the independent variables for ANC 4+ and ANC 8+. The chi-square values were obtained independently to determine the association between ANC and each of the independent variables. The results of the chi-square test show that there is some level of association except for age and employment.

The results from Table 5.2 also show that the proportion of women who attend ANC for each of the characteristic independent variables reduces as the number of ANC visits increase from at least four to eight. It is observed that the higher wealth quintile groups attend more ANC visits than the lower quintile groups. However, moving from a minimum of four visits to eight visits shows that the proportion of ANC visits by each wealth quintile group decreases. For example, 98.02 per cent of households in the richest quintile compared to 52.16 per cent of the same category attended at least four and eight ANC visits respectively. In terms of regional location, the average proportion of those who attended at least four visits in all the regions is 86.99 per cent compared to 29.61 per cent for at least eight visits. In both categories, utilisation of ANC is seen to be higher in urban areas than in rural areas.

Table 5.3: Descriptive Statistics for Modern Contraceptive Use and Under-five Child Deaths

Individual Variables	Modern Contraceptive Use		Pearson's Chi-Square	Under-five Child Deaths		Pearson's Chi-Square
	No method (%)	Modern method (%)		No (%)	Yes (%)	
Wealth			17.26***			1.37
Poorest	82.37	17.63		94.86	5.14	
Poorer	78.70	21.3		94.71	5.29	
Middle	79.10	20.9		95.38	4.62	
Richer	80.71	19.29		95.36	4.64	
Richest	83.11	16.89		95.60	4.40	
Region			108.04***			26.73***
Western	77.87	22.13		96.91	3.09	
Central	78.48	21.52		94.86	5.14	
Greater Accra	82.99	17.01		97.17	2.83	
Volta	77.13	22.87		95.43	4.57	
Eastern	81.17	18.83		94.31	5.69	
Ashanti	83.98	16.02		93.49	6.51	
Brong Ahafo	74.90	25.1		96.17	3.83	
Northern	90.27	9.73		93.35	6.65	
Upper East	80.57	19.43		96.91	3.09	
Upper West	78.80	21.2		93.50	6.50	

Residence			11.83***			0.019
Urban	82.30	17.7		95.14	4.86	
Rural	79.45	20.55		95.06	4.94	
Education			5.96			6.06
No Education	82.45	17.55		94.17	5.83	
Primary	79.53	20.47		95.62	4.38	
Secondary and above	80.54	19.46		95.56	4.44	
Employment Status			83.66***			0.25
Not Working	87.36	12.64		95.40	4.60	
Working	78.66	21.34		95.03	4.97	
Age(years)			262.36***			9.82
15 – 19	93.38	6.62		97.10	2.90	
20 – 24	77.05	22.95		95.04	4.96	
25 – 29	74.75	25.25		96.12	3.88	
30 – 34	75.87	24.13		94.89	5.11	
35 – 39	78.65	21.35		94.16	5.84	
40 – 44	78.97	21.03		94.71	5.29	
45 – 49	85.41	14.59		92.57	7.43	
Distance to Health Facility			9.52***			10.65***
A big Problem	82.83	17.17		93.75	6.25	
Not a big Problem	80.02	19.98		95.72	4.28	
Birth Order			17.07***			11.07***
1 Child	80.69	19.31		94.91	5.09	
2 – 4 Children	74.82	25.18		95.90	4.10	
5 or more Children	76.54	23.46		93.67	6.33	
Postnatal Check						60.88***
No				93.91	6.09	
Yes				98.36	1.64	
Husband/Partner Education			33.05***			
No education	81.71	18.29				
Primary	72.37	27.63				
Secondary&above	75.94	24.06				
Religion			34.49***			
Orthodox Christian	79.88	20.12				
Pentecost/Charismatic	79.46	20.54				
Islam	84.55	15.45				
Traditional/Spiritualist	90.18	9.82				
Others	80.74	19.26				
Ethnicity			16.02***			
Akan	79.12	20.88				
Ga/Dangbe	82.69	17.31				
Ewe	79.83	20.17				
Mole/Dagbani	82.84	17.16				

Others	82.02	17.98	
Heard of Family Planning on media			27.99***
No	83.56	16.44	
Yes	79.08	20.92	

Source: Author's computation from the 2014 GDHS

The chi-square results from Table 5.3 shows that there is some association between modern contraceptive use and the various independent variables except for maternal education. For under-five mortality, associations are observed for regional location, distance to health facility, birth order of the children and postnatal attendance.

In terms of wealth, Table 5.3 further shows us that the highest proportion of those who use modern contraceptives are the poor (21.3%) and the least use of contraceptives is recorded by households in the richest quintile (16.89%). The data further shows that less than 10 per cent of women in the Northern Region of Ghana use modern contraceptives compared by 21.2 per cent in the Upper West Region. Rural dwellers using modern contraceptives is 20.55 per cent while those in urban areas is 17.7 per cent. For employment, 21.34 per cent of women who are employed use modern contraceptives compared to 12.64 per cent of those not working. It also shows that more than 20 per cent of women between the age groups of 20-24 to 40-44 years use modern contraceptives. Similarly, more than 20 per cent of both Orthodox Christians and Pentecost/Charismatics use contraceptives compared to Islam (15.45%) and Traditionalists/Spiritualists (9.82%). It is observed that 81.71 per cent of women whose partners/husbands had no education do not use any form of contraception while 24.06 per cent use modern contraception.

For under-five mortality, Table 5.3 shows households in the Poorer (5.29%) and Poorest (5.14%) wealth quintile experienced the highest under-five deaths compared to the Richer (4.64%) and the Richest (4.40%) group. For regional location, it was observed that the Northern Region recorded the highest under-five deaths (6.65%) while Greater Accra recorded the least (2.83%). Under-five deaths were more than 5 per cent for women in the age groups from 30-34 to 45-49 years. In addition, the number of under-five deaths for women who attended postnatal check after delivery is 1.64 per cent compared to 6.09 per cent of those who did not attend postnatal.

5.3 Diagnostic Tests

The study conducts some diagnostic tests for multicollinearity to check for the appropriateness of the variables in estimating the model used in this study. This is to help determine whether the estimates are consistent, reliable, and unbiased. The results of the multicollinearity test are presented in Table 5.4.

Table 5.4: VIF Test for Multicollinearity

Individual Variables	ANC 4+	ANC 8+	Modern Contraceptive Use	Under-five Mortality
Wealth (ref: Poorest)				
Poorer	2.26	2.26	2.30	2.21
Middle	2.65	2.65	2.92	2.58
Richer	3.18	3.18	3.47	3.00
Richest	3.62	3.62	4.06	3.31
Regional Location (Ref: Greater Accra)				
Western	2.39	2.39	2.36	2.18
Central	2.45	2.45	2.29	2.19
Volta	2.55	2.55	2.66	1.92
Eastern	2.15	2.15	2.08	2.09
Ashanti	2.29	2.29	2.22	2.03
Brong Ahafo	2.65	2.65	2.38	2.31
Northern	4.28	4.28	3.59	2.76
Upper East	3.43	3.43	3.23	2.40
Upper West	3.08	3.08	2.82	2.02
Residential Location (Ref:				

Urban)				
Rural	4.49	4.49	4.05	4.11
Education (Ref: No education)				
Primary	1.95	1.95	1.92	1.86
Secondary and above	4.43	4.43	4.31	3.99
Employment (Ref: Not working)				
Working	6.72	6.72	8.23	6.05
Age (Ref: 15-19 years)				
20 – 24 years	5.14	5.14	4.00	4.01
25 – 29 years	9.01	9.01	6.55	6.07
30 – 34 years	9.34	9.34	7.06	6.34
35 – 39 years	8.40	8.40	7.35	6.06
40 – 44 years	5.05	5.05	6.77	4.18
45 – 49 years	2.47	2.47	5.96	2.24
Distance to Health Facility (Ref: Big Problem)				
Not a big Problem	3.68	3.68	3.78	3.68
Birth Order (Ref: 1 child)				
2 – 4 Children	5.15	5.15	-	-
5 or more Children	5.36	5.36	-	-
Media (Ref: Not Exposed)				
Exposed	9.04	9.04	-	-
Religion (Ref: Orthodox Christian)				
Pentecost/Charismatic	3.14	3.14	2.84	-
Islam	2.41	2.41	2.16	-
Traditional/Spiritualist	1.27	1.27	1.17	-
Others	1.22	1.22	1.14	-
Ethnicity (Ref: Akan)				
Ga/Dangbe	1.28	1.28	1.28	-
Ewe	2.13	2.13	2.22	-
Mole/Dagbani	4.56	4.56	3.95	-
Others	2.87	2.87	2.36	-
Partner/Husband Educational Level (Ref: No Education)				
Primary Education	1.54	1.54	1.48	-
Secondary and above	5.27	5.27	5.28	-
Number of Children	-	-	6.26	8.60
Media Exposure to FP (Ref: No)				
Yes	-	-	3.19	-
Postnatal check (Ref: No)				
Yes	-	-	-	4.17
Mean VIF	3.86	3.86	3.64	3.46

Source: Author's computation from the 2014 GDHS

Table 5.4 indicates the variance inflation factor (VIF) after the regression for all the categorical variables. This is to test for multicollinearity of the independent variables used in predicting ANC, Contraceptive use and Under-five mortality in Ghana. Using the Kleinbaum et al., (2008) rule of thumb, it could be established from the table that, the VIF for each of the independent variables is less than 10 and thus there is no linear relationship between the variables that might affect the output of the analysis. The implication of this is that the independent variables are fit to be used to predict the outcome variables.

5.4 Empirical Results and Discussions

This study seeks to investigate the effects of wealth on maternal healthcare utilization and child under-five mortality. Other determinants of these indicators are also discussed briefly. Drawing from the study's objectives, separate estimations have been carried out for each of the selected maternal and child health indicators for Ghana and the results have been presented in Tables 5.5, and 5.6. In addition to the logit coefficients, the odds ratio is also presented to measure the odds of the predicted probabilities.

Effects of Wealth on Antenatal Care Visits (ANC4+ and ANC8+)

Given the new WHO's recommendation of at least eight antenatal visits from the previous minimum of four visits, estimations were carried out to compare and assess the variation in wealth and other socioeconomic factors that affect ANC attendance in Ghana. The new directive was initiated to increase the survival rate of both mother and child (Tunçalp et al., 2017; WHO, 2016b).

Table 5.5: Estimation of Results for the Effects of Wealth on ANC

VARIABLES	ANC4+		ANC8+	
	logit coefficient	odds ratio	logit coefficient	odds ratio
Wealth (ref: Poorest)				
Poorer	0.0167 (0.153)	1.017 (0.156)	0.331** (0.139)	1.393** (0.194)
Middle	0.273 (0.195)	1.314 (0.256)	0.562*** (0.154)	1.754*** (0.271)
Richer	1.333*** (0.290)	3.791*** (1.099)	1.005*** (0.174)	2.732*** (0.475)
Richest	2.297*** (0.435)	9.949*** (4.330)	1.330*** (0.204)	3.780*** (0.772)
Regional Location (Ref: Greater Accra)				
Western	0.863*** (0.329)	2.371*** (0.779)	0.858*** (0.180)	2.358*** (0.423)
Central	0.832** (0.326)	2.299** (0.750)	0.453** (0.179)	1.573** (0.281)
Volta	0.298 (0.314)	1.347 (0.423)	-0.0224 (0.217)	0.978 (0.212)
Eastern	0.0282 (0.286)	1.029 (0.295)	-0.505*** (0.192)	0.603*** (0.116)
Ashanti	1.074*** (0.357)	2.926*** (1.045)	0.275 (0.174)	1.317 (0.230)
Brong Ahafo	1.080*** (0.327)	2.944*** (0.962)	0.399** (0.182)	1.491** (0.271)
Northern	0.363 (0.331)	1.438 (0.476)	-0.598*** (0.230)	0.550*** (0.127)
Upper East	1.879*** (0.387)	6.546*** (2.536)	0.587*** (0.217)	1.799*** (0.390)
Upper West	1.430*** (0.376)	4.178*** (1.572)	-0.354 (0.242)	0.702 (0.170)
Residential Location (Ref:				

Urban)				
Rural	-0.349 (0.234)	0.706 (0.165)	-0.313 (0.193)	0.731 (0.141)
Husband/Partner Education (Ref: No education)				
Primary	-0.255 (0.369)	0.775 (0.286)	0.0241 (0.249)	1.024 (0.255)
Secondary and above	-0.0993 (0.269)	0.905 (0.243)	0.0597 (0.174)	1.061 (0.185)
(Interaction of Residence & Husband/Partner Education level)				
Ref: Rural#No education	0 (0)	1 (0)	0 (0)	1 (0)
Rural#Primary education	0.482 (0.406)	1.620 (0.657)	0.254 (0.301)	1.289 (0.389)
Rural#Secondary education & above	0.588** (0.287)	1.800** (0.517)	0.338 (0.211)	1.402 (0.296)
Education (Ref: No education)				
Primary	0.112 (0.152)	1.118 (0.170)	0.195 (0.122)	1.215 (0.148)
Secondary and above	0.446*** (0.165)	1.563*** (0.258)	0.151 (0.121)	1.163 (0.141)
Employment (Ref: Not working)				
Working	0.579*** (0.138)	1.785*** (0.246)	0.208* (0.110)	1.231* (0.136)
Age (Ref: 15-19 years)				
20 – 24 years	0.298 (0.315)	1.347 (0.425)	-0.170 (0.276)	0.844 (0.233)
25 – 29 years	0.484 (0.324)	1.622 (0.526)	0.0958 (0.274)	1.101 (0.301)
30 – 34 years	0.647* (0.336)	1.910* (0.643)	0.322 (0.282)	1.380 (0.389)
35 – 39 years	0.759** (0.350)	2.135** (0.748)	0.317 (0.290)	1.373 (0.398)
40 – 44 years	0.780** (0.373)	2.182** (0.814)	0.310 (0.310)	1.363 (0.422)
45 – 49 years	0.870** (0.414)	2.386** (0.987)	0.543 (0.355)	1.721 (0.611)
Distance to Health Facility (Ref: Big Problem)				
Not a big Problem	0.0495 (0.113)	1.051 (0.119)	-0.0212 (0.0926)	0.979 (0.0907)
Birth Order (Ref: 1 child)				
2 – 4 Children	-0.319* (0.186)	0.727* (0.135)	-0.106 (0.115)	0.899 (0.103)
5 or more Children	-0.704*** (0.232)	0.494*** (0.115)	-0.425*** (0.160)	0.654*** (0.104)

Media (Ref: Not Exposed)				
Exposed	0.528*** (0.131)	1.696*** (0.222)	0.141 (0.152)	1.151 (0.175)
Religion (Ref: Orthodox Christian)				
Pentecost/Charismatic	0.221 (0.137)	1.248 (0.170)	0.0873 (0.0964)	1.091 (0.105)
Islam	0.655*** (0.186)	1.926*** (0.358)	0.0106 (0.134)	1.011 (0.135)
Traditional/Spiritualist	-0.288 (0.228)	0.750 (0.171)	-1.068*** (0.407)	0.344*** (0.140)
Others	-0.0472 (0.225)	0.954 (0.214)	-0.268 (0.253)	0.765 (0.193)
Ethnicity (Ref: Akan)				
Ga/Dangbe	-0.378 (0.267)	0.686 (0.183)	-0.0669 (0.200)	0.935 (0.187)
Ewe	-0.143 (0.218)	0.867 (0.189)	0.178 (0.165)	1.195 (0.197)
Mole/Dagbani	0.217 (0.235)	1.243 (0.292)	0.0908 (0.152)	1.095 (0.166)
Others	-0.288 (0.210)	0.750 (0.158)	0.0476 (0.144)	1.049 (0.151)
Constant	-0.484 (0.522)	0.616 (0.321)	-2.092*** (0.395)	0.123*** (0.0488)
Observations	3,899	3,899	3,899	3,899

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

ANC4+: At least 4 ANC visits ANC8+: At least 8 ANC visits (new WHO minimum requirement)

Source: Author's computation from the 2014 GDHS

The empirical results in Table 5.5 show that wealth status has a positive and highly significant effect on the utilization of ANC services in Ghana though not for all the wealth quintiles for ANC4+. This is consistent with the study by Arthur (2012) which found wealth to be still significant despite the introduction of the free maternal health care service. For ANC4+, the significance level was recorded at 1 per cent for the upper 40 per cent of the wealth quintile groups. However, for ANC 8+, the significance level was recorded at 1 per cent for all wealth quintiles except for poorer households which showed statistical significance of 5 per cent. Evidently, this shows that household wealth will continue to play a very important role in the determination of

the number of ANC visits in Ghana if the new WHO minimum requirement is adopted by government.

For women who attended at least four ANC visits, there were no statistically significant differences between the poorer and the middle with reference to the poorest (base category) wealth quintile. However, higher wealth quintiles show statistically significant increases in ANC attendance. For ANC 4+, our results show that, the odds of attending a minimum of four ANC visits during pregnancy is about 4 times greater for women in the richer category than the poorest category. Women in richest wealth quintile are 10 times more likely to attend ANC4+ than the women in the poorest quintile. Comparing this to ANC8+, it is observed that the odds of women attending ANC for the poorer, middle, richer and richest is once, twice, thrice and four times more than women in the poorest category. The results thus suggest that wealth status could be an important catalyst for antenatal care utilization in Ghana in the bid to achieve the SDGs on reducing maternal mortality rates to 25 deaths per 100,000 live births by 2030. It is therefore apparent that, even though maternal health care services are rendered free in Ghana in addition to other health and social reform programmes such as the NHIS, construction of CHPS zones and LEAP, the wealth of households which signifies their economic status is still a challenge for the relatively poor, and therefore, expectant mothers may not adequately use the services as recommended by the WHO to increase the survival rate of both the mother and the unborn child. It may be that the use of ANC comes with other direct and indirect costs to the woman such as the cost of transportation, distance to the health facility, infrastructural deficiencies, the availability and quality of health personnel or it could be more of low public education.

Dixon et al., (2014), further argued that by removing the financial burdens to maternal care in Ghana, more women will partake. In addition to this, they agreed that while there may be multiple factors affecting the use of ANC in most developing countries, direct financial burdens are found to be a primary reason, and this can be addressed properly through the efficient implementation of the NHIS in the country. There is, therefore, the need to go beyond free delivery to providing alternative means of health support.

With this, policies should be targeted in alleviating poverty in households who fall within the lower wealth quintiles. In this regard, government should broaden the base of beneficiaries of the LEAP cash transfer and increase the minimum amount per household including finding ways of relaxing the inclusion criteria. More CHIPS zones should be created and operated by adequate and qualified health professionals to reduce the indirect costs to health care.

In terms of regional location, there are significant differences for both antenatal categories. Six regions were significant for both ANC4+ and ANC8+. In addition to Western, Central, Brong Ahafo, and Upper East Regions which were common to both, Ashanti and Upper West Regions was peculiar to ANC4+ whiles Eastern and Northern Regions were peculiar for ANC8+. Variations in the attendance of ANC between the North and the South can be observed. The large population of the poor are located in the north compared to their counterparts in the south of the country (Cooke et al., 2016). For ANC4+, in the Upper East and Upper West regions of the country, the odds of attending ANC is 7 and 4 times greater than women in the Greater Accra Region. According to Nketiah-Amponsah et al., (2013), this may be due to the influx of gender

and health-related NGOs in these deprived regions of the country. However, in comparison to ANC 4+, when ANC is observed for a minimum of eight visits, there was a reduction in the odds of attendance across all the regions. For example, those in the Northern and Eastern regions were significantly less likely to attend ANC8+ compared to women in the Greater Accra Region. This could be due to the extra financial cost burden on the woman as the minimum number of ANC visits increases. In addition, this could also be attributable to the disparity in the availability of equally good health facilities and personnel as most of them are located in the south of the country especially Greater Accra. As argued by Jewell (2009), as no direct cost of antenatal care exists in the DHS, availability of these services vary over geographic location with the less deprived areas accessing less medical care services.

For education, women who have attained at least a minimum of secondary education for ANC4+ were significantly more likely to attend ANC compared with their counterparts with no education. Relative to those with no education, women who had a minimum of secondary education and above were about twice more likely to attend at least four ANC visits. In Ghana, the positive relationship between the frequency of antenatal care visits and education may be accounted for by the employment opportunities largely available for the educated than the uneducated. Better educated women are more likely to be engaged in a relatively high income generating sector hence they are able to afford or overcome other indirect costs associated with the free maternal healthcare in Ghana.

This study sought to also explore the role of paternal characteristics on the utilization of antenatal care services in Ghana. It is realized that, though residential location and paternal educational

level showed to be independently and statistically insignificant in the determination of ANC, the results of their factorial interactions provide a rather intuitive implication. The results show that women in the rural area whose partners/husbands have attained a minimum of secondary level of education are 1.8 times more likely to attend a minimum of four ANC visits than rural women whose partners/husbands do not have any education. The implication of this further supports the role paternal influences play in the health decision making of the woman in ensuring the overall maternal health (Danforth et al., 2009; Rempel & Rempel, 2004; Tohotoa et al., 2009). According to Kumi-Kyereme & Amo-Adjei (2013), this points to the class dimension in the utilisation of healthcare services. Women whose partners are better educated and relatively wealthier are more likely to influence the utilisation of ANC compared to the less educated and poorer Ghanaians.

In addition, it can be observed that employment status was significant at 1 per cent for those who attended at least four ANC visits. For ANC8+, the woman's employment status was statistically insignificant at 5 per cent. For women who were working, the odds ratio show that they are 79 per cent and 23 per cent more likely to attend ANC4+ and ANC8+ respectively compared to their counterparts who are not working. The reason could be that employed women may have the means to afford better antenatal care services compared to the unemployed. The results are however inconsistent with Dixon et al. (2014) who argued that employment had no statistically significant relationship with the number of times women attended ANC.

In addition, age also influences ANC with level of significance observed for ANC4+. The estimates show that ANC4+ attendance increases significantly with higher age groups with the

exception of the 20-24 and 25-29 year group. This may be because they exhibit similar characteristics as young adults with those in the 15-19 year group, hence statistical significance may not be expected. However, the results imply that, as the woman grows older, she is more likely to attend more ANC visits, all other things being equal. This is consistent with previous studies including Nketiah-Amponsah et al. (2013) and also in line with the Grossman theory which postulates that the health stock of an individual deteriorates overtime, hence, more medical services will be demanded as one grows older to minimize birth complications and health risks at an older age (Grossman, 1972). This is very evident in the age category of 40-44 and 45-49 years who were twice more likely to attend ANC4+ and ANC8+ relative to their counterparts in the 15-19 year age bracket.

It is, however, very interesting to observe that the birth order of the child influences the number of antenatal care visits. Higher birth orders, especially for women who have had at least their fifth child, was negatively associated with the number of ANC visits by expectant mothers and was statistically significant at 1 per cent for both categories. This may be because of the past birth experiences and therefore a woman who has given birth to more children may rely on her past birth experiences and knowledge on pregnancy complications to reduce physical contacts with the health personnel before child birth. It could also be that past unpleasant experiences may render the woman to perceive ANC as unnecessary or simply lack of knowledge (Dahiru & Oche, 2015).

Furthermore, women who are exposed to the media were more likely to attend ANC. However, statistical significance of 1 per cent was observed for ANC4+. The odds of attending at least four

ANC visits were approximately twice for women who are exposed to the media compared to the odds of their counterparts who are not exposed to any form of media. This may suggest that, enough public education through the various media outlets is needed in attending ANC. The results is consistent with Afful-Mensah et al., (2014) who argue that informal education through the media influences the use of healthcare services. The National Commission for Civic Education (NCCE) in conjunction with the media, as well as all stakeholders involved are therefore essential in educating the public especially maternal mothers on the need for prenatal care. This is to reduce maternal mortality because of inadequate contact hours with health personnel during pregnancy.

Effects of Wealth on Modern Contraceptive Use and Child Under-five Deaths

Table 5.6: Estimation Results for the Effect of Wealth on Modern Contraceptive Use and Under-five Child Deaths

VARIABLES	Modern Contraceptive Use		Under-five	
	logit coefficient	odds ratio	logit coefficient	odds ratio
Wealth (Ref: Poorest)				
Poorer	0.011 (0.109)	1.011 (0.110)	0.361 (0.312)	1.435 (0.447)
Middle	0.017 (0.123)	1.017 (0.125)	-0.058 (0.362)	0.943 (0.341)
Richer	0.084 (0.145)	1.088 (0.157)	-0.518 (0.440)	0.596 (0.262)
Richest	-0.019 (0.172)	0.981 (0.169)	-0.900* (0.524)	0.407* (0.213)
Regional Location (Ref: Greater Accra)				
Western	0.035 (0.156)	1.035 (0.162)	1.248** (0.602)	3.482** (2.095)
Central	0.102 (0.157)	1.107 (0.174)	1.385** (0.602)	3.994** (2.404)
Volta	0.292 (0.180)	1.339 (0.241)	1.119* (0.659)	3.061* (2.016)
Eastern	0.060 (0.154)	1.062 (0.164)	0.251 (0.638)	1.285 (0.820)

Ashanti	-0.201 (0.158)	0.818 (0.129)	1.574*** (0.581)	4.824*** (2.805)
Brong Ahafo	0.269* (0.158)	1.308* (0.207)	1.103* (0.600)	3.014* (1.807)
Northern	-0.701*** (0.195)	0.496*** (0.097)	1.843*** (0.614)	6.317*** (3.879)
Upper East	0.152 (0.186)	1.165 (0.216)	1.605** (0.660)	4.980** (3.289)
Upper West	0.329* (0.193)	1.389* (0.268)	1.296* (0.666)	3.656* (2.433)
Residential Location (Ref: Urban)				
Rural	0.003 (0.157)	1.003 (0.157)	-0.306 (0.260)	0.736 (0.191)
Education (Ref: No education)				
Primary	0.302*** (0.099)	1.353*** (0.134)	-0.272 (0.321)	0.762 (0.244)
Secondary and above	0.412*** (0.099)	1.510*** (0.149)	-0.031 (0.273)	0.969 (0.265)
Employment (Ref: Not working)				
Working	0.311*** (0.101)	1.364*** (0.138)	0.169 (0.267)	1.185 (0.316)
Age (Ref: 15-19 years)				
20 – 24 years	0.534** (0.255)	1.705** (0.434)	0.597 (0.564)	1.816 (1.025)
25 – 29 years	0.303 (0.253)	1.354 (0.342)	1.027* (0.570)	2.793* (1.593)
30 – 34 years	-0.072 (0.258)	0.931 (0.240)	1.585*** (0.595)	4.878*** (2.900)
35 – 39 years	-0.404 (0.264)	0.667 (0.176)	2.824*** (0.597)	16.850*** (10.062)
40 – 44 years	-0.578** (0.272)	0.561** (0.152)	3.676*** (0.661)	39.473*** (26.077)
45 – 49 years	-1.018*** (0.280)	0.361*** (0.101)	4.846*** (0.714)	127.266*** (90.924)
Distance to Health Facility (Ref: Big Problem)				
Not a big Problem	0.160** (0.075)	1.174** (0.088)	-0.212 (0.225)	0.809 (0.182)
Number of Children				
	0.245*** (0.022)	1.278*** (0.028)	-0.912*** (0.092)	0.402*** (0.037)
Postnatal (Ref: No)				
Yes	-	-	-1.698*** (0.218)	0.183*** (0.040)
Media Exposure to FP (Ref: No)				
Yes	0.179**	1.196**		

	(0.072)	(0.086)		
Husband/Partner Education				
(Ref: No education)				
Primary	0.305	1.356		
	(0.208)	(0.282)		
Secondary and above	0.048	1.049		
	(0.148)	(0.155)		
(Residence##Husband/Partner Education level)				
Ref: Rural#No education	0.000	1.000		
	(0.000)	(0.000)		
Rural#Primary education	-0.114	0.892		
	(0.245)	(0.219)		
Rural#Secondary education & above	0.156	1.169		
	(0.173)	(0.202)		
Religion (Ref: Orthodox Christian)				
Pentecost/Charismatic	0.101	1.106		
	(0.079)	(0.087)		
Islam	-0.277**	0.758**		
	(0.112)	(0.085)		
Traditional/Spiritualist	-0.798***	0.450***		
	(0.250)	(0.113)		
Others	-0.123	0.884		
	(0.182)	(0.161)		
	(0.098)	(0.089)		
Ethnicity (Ref: Akan)				
Ga/Dangbe	-0.121	0.886		
	(0.163)	(0.144)		
Ewe	-0.106	0.899		
	(0.138)	(0.124)		
Mole/Dagbani	0.133	1.142		
	(0.131)	(0.149)		
Others	0.247**	1.280**		
	(0.119)	(0.152)		
Constant	-2.789***	0.061***	-2.894***	0.055***
	(0.343)	(0.021)	(0.852)	(0.047)
Observations	6,137	6,137	4,284	4,284

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Author's computation from the 2014 GDHS

Modern Contraceptive Use

Table 5.6 shows the estimates for both modern contraceptive use among women and probability of child under-five deaths in Ghana. For modern contraceptive use, it can be observed that household wealth is statistically insignificant in determining the use of modern contraceptives among women of reproductive age in Ghana. This result are inconsistent with the study by Nketiah-Amponsah et. al. (2012). However, our results are consistent with the studies by Okezie et al. (2010) which found no statistically significant differences in the relationship between income and contraceptive use in Nigeria and also Nyarko (2015), which found no significant relationship between wealth and contraceptive use in Ghana. Though the non-robustness of the wealth index variable may be unexpected, it is probable that in a bivariate analysis, wealth proves important in explaining contraceptive use but in multivariate analysis, the robustness may be attenuated by covariates such as woman's employment status and educational attainment. Despite this, we can therefore, infer that household wealth may not be enough in determining the use of modern contraceptives among women of reproductive age in Ghana. This could be due to other attributable and more contextual factors such as distance, media exposure to family planning education, geographic location and religious affiliations (Stephenson et. al. (2007).

By regional location, statistically significant differences were observed for women who live in the Northern and Upper West Regions. However, between these two, women in the Northern region of the country were less likely to use modern contraceptives relative to those in the Greater Accra Region. This further goes to show the spatial variations in the use of contraceptives as evidenced in the literature (Amin et. al., 2002; Crissman et. al., 2012). In contrast, odds of using modern contraceptives was 1.4 times greater for women in the Upper West than their counterparts in the

Greater Accra region. Though the Upper West Region is one of the poorest in the country, Nketiah-Amponsah et. al. (2012) argued that the activities of NGOs, public subsidization and in some cases, the distribution of free contraceptives could be the reason for the positive relationship of contraceptive use. Our results for regional location are however, in contrast with the findings of Juayire (2016), which saw no statistical significance for all the 10 regions in terms of contraceptive use. This could be due to the fact that Juayire (2016) concentrated on only the rural women in Ghana.

From the results also, obtaining a minimum level of primary education is significant at 1 per cent and positively associated in determining the use of modern contraceptives. The odds of modern contraceptive use for women who have attained primary and at least secondary education are 1.4 and 1.5 times higher than the odds of their counterparts who have no education. This evidence is backed by several literature (Ejembi et al., 2015; Nketiah-Amponsah et al., 2012; Stephenson et al., 2007). Female education is seen to be an effective tool for family planning and gender equity. It is also linked to women's empowerment as it determines to an extent, the ability of the woman to negotiate sex in relationships (Crissman et al., 2012). According to Ameyaw et al. (2017), women who are educated are more likely to engage in highly paid jobs which will boost their income to enhance their ability to purchase contraceptives.

Furthermore, relative to the odds of those not working, our estimations show that the odds of women who are working are 36.4 percent more likely to use modern contraceptives. According to Nyarko (2015), females who are working are more reluctant to have more babies in order to keep

their jobs and moreover, because they earn some level of income, they can comparatively afford contraceptives compared to their counterparts who are not working.

For age, it is observed that relatively younger women in the age categories of 20-24 years were more likely to use modern contraceptives relative to their adolescent counterparts (15-19 years). The odds of modern contraceptive use for young women between the ages of 20-24 years is 1.7 times higher than the odds of their counterparts who are 15-19 years. In contrast, older women especially those in the 45-49 year age group were less likely to use modern contraceptives. This may be because the young adults who are sexually active may be motivated to use contraceptives as a protective mechanism to avoid unintended pregnancies. However, for older women, Ameyaw et al. (2017) argue that societal expectations and premium placed on women to give birth may propel women in their late reproductive age to likely forgo contraceptive use in order to bear children.

Furthermore, Nketiah-Amponsah et. al. (2012) could not tell whether the differences in the use of modern contraceptives is linked to access to care, contraceptive awareness, myths or misconceptions as these were not considered in their analysis. Partly addressing this, the results show that contextual factors such as distance to a health facility (as an indicator of access to healthcare) and media exposure on family planning methods (contraceptive awareness) are significant determinants of modern contraceptive use among women of reproductive age in Ghana. In our analysis, relative to the odds of women who considered distance to be a big problem to a

health facility, the odds of women who considered distance not to be a big problem were 1.17 times higher to likely use modern contraceptives.

In addition to this, relative to the odds of women who have not heard of family planning in either radio, tv or through newspaper, the odds of women who have heard of family planning in the media are 19.6 per cent more likely to use modern contraceptives. This is consistent with studies by Ejembi et al. (2015) and Stephenson et al. (2007) who argued that women who reported being exposed to the media information on family planning were more likely to use modern contraception.

Albeit insignificant, we can observe that, there could be paternal characteristics that can also influence the use of modern contraceptives by women of reproductive age in Ghana. It could be possible that women in rural areas whose partners/husbands have had at least a minimum of secondary education, would be more likely to use modern contraceptives. According to Kumi-Kyereme & Amo-Adjei (2013), this may signify the umpire roles men play in women's health decision.

Number of living children also has a positive and significant association with modern contraceptive use in Ghana. This is consistent with Nketiah-Amponsah et al. (2012). It is observed that, if the number of surviving children were to increase by one, we expect the odds of modern contraceptive use to increase by 27.8 per cent. This could be that, with the increase in medical

knowledge and the desire for educational attainment, women tend to use more contraceptives when they attain their ideal family size, all other things being equal.

According to Crissman et al. (2012), in the northern regions, it is significantly more difficult to assess contraceptives than in other rural areas which could potentially be as a result of variations in religious perception and use of contraception due to geographic location. Our results show that Muslims and Traditionalists/Spiritualists were less likely to use modern contraceptives compared to orthodox Christians. For Muslims, this may be due to the fact that, they have a more conservative culture and by geographic location, they are far from the country's main cities and most developed infrastructure (Gyimah et al. 2008). Traditionalists, on the other hand, are less susceptible to modern developments as they may usually seek medical care from other sources beyond medical care. According to Ejembi et al. (2015), their religion may be acting in synergy with other areal factors to negatively influence the use and uptake of modern contraceptives.

Under-five Child Deaths

Table 5.6 also shows estimates for determinants of under-five deaths in Ghana. According to the UN (2015), this indicator is regarded as one of the most strongly and universally supported development goals under the SDGs. Our results found that wealth, regional location, age, number of children alive, and postnatal attendance have a statistically significant relationship with under-five child deaths in Ghana.

In terms of household wealth differentials, it is observed that higher wealth status is likely to reduce under-five deaths, all things being equal. In Ghana, there are significant differences between the rich and the poor and this is geographically captured in the north-south gap. For statistical significance, the results from the table clearly show that the odds of women in the upper 20 per cent of the wealth quintile (richest category) were less likely to have their children dying below five years compared to the odds of their counterparts in the bottom 20 per cent (poorest category). Whereas the rich are able to afford basic needs of the household such as food, water, safe environment, paying for medical bills etc. to ensure child survival, the poor are not able to meet these needs. As a result, children from the poor/poorest households are highly susceptible to more health shocks. Our results are consistent with a recent panel study by Lartey et al. (2016) which argues that a child under five years is less likely to die when the child is from a household of high wealth status and that Ghana's high under-five deaths experienced over the years have its sources rooted in the circumstances of the poorest/poor households. According to the UN (2015), under-five mortality levels are influenced by poverty, accessibility, and quality health services among others. These factors could further be attributed to poor household's inability to pay for extra medical bills aside what the NHIS provides, low human and material resources in facilities that serve the poor, the lack of technical quality that serve the poor and the universality nature of programmes and policies (such as the LEAP) that should alleviate poverty.

In effect, Ghana's lower middle income status makes her generally susceptible to child mortality compared to higher income countries. Within the country, however, it can be observed that the mortality rates are relatively higher in the northern part of the country compared to the other parts of the country especially the greater Accra Region where most of the quality health facilities and

infrastructure are located. This is due to the wealth disparity that exists between the north and the south of the country (Cooke et al. 2016). As a result, by regional location, in addition to the three northern regions, Western, Central, Volta, Ashanti, and Brong Ahafo Regions statistically show a positive likelihood of under-five deaths compared to the Greater Accra Region. Our empirical estimates show that the odds of women experiencing child under-five deaths in the Northern, Upper East and Upper West Regions were 6.3, 5 and 3.7 times higher than the odds of their counterparts in the Greater Accra Region. These further shows the risks of child death associated with these lower income groups in the country.

Also, relative to those in the age group of 15-19 years, the maternal age of the woman has been depicted to be statistically significant to child under-five deaths at all age groups with the exception of those in the 20-24 year group. The magnitude of the odds of the influence of age increases with higher age groups. For example, the odds of under-five deaths experienced by women in the age group of 45-49 years is 127.27 times higher relative to the odds of the reference category (15-19 years). This is consistent with Grossman's postulation that, as the age of the woman increases, her health stock deteriorates and if investment in health is not done, she is subject to more medical risks which could include pregnancy-related cases leading to child death or her inability to properly take care of the child when the baby is born (Grossman, 1972). However, our results were inconsistent with Lartey et al. (2016) which identified no statistically significant relationship between maternal age and under-five mortality.

In addition, our results show that as the number of living children by a woman increases by one, it reduces the odds of a child under five years dying. This is consistent with the study by Otupiri et al. (2010) in the Builsa District in the Upper East Region which found out that, the more children a mother had alive, the less likely her children were to die below five years. This could be due to past birth experiences of the mother in taking care of the young ones. Also, it could be due to the health education gained from previous visits to health facilities in taking care of children.

Another significant contributor to reducing under-five deaths was the attendance of postnatal care services by the woman after child delivery. This has been argued as an important contributor of maternal and child survival. Postnatal is to help curb risk factors that could cause early child death. The WHO has argued that although this period – receiving care for six weeks after child birth - is critical for both maternal and child survival, yet, it is the most neglected period for the provision of quality care (WHO, 2013). From our empirical estimates, relative to the odds of women who did not attend postnatal, the odds of females who received postnatal check within two months after birth were less likely to experience child under-five deaths by 0.18. This is consistent with the arguments by Kayode et al. (2016) which asserts that postnatal services help to manage childhood illnesses and promote community and family childcare practices.

5.5 Conclusion

This chapter has analysed the effect of household wealth and other contributing factors on maternal healthcare service utilization and child health. The results from our estimations indicate that wealth is significantly important in the attendance of ANC, given the new WHO minimum requirement

of at least eight visits by expectant mothers. It also had a significant effect in reducing child under-five deaths in the country. However, statistical significance was not observed for the relationship between wealth and modern contraceptive use in Ghana. It was also realized that the Northern part of the country are relatively lagging behind and this could hinder the nation's cumulative effort to achieving the health targets under the SDG in ensuring maternal and child health. The results, therefore, mean that, in order for the country to ensure maternal and child health, among other things, effective policies and programmes must be drawn to improve household wealth which targets the poor especially those in the three northern regions. Our analysis further highlights the important role paternal characteristics such as education may play in maternal healthcare decisions especially in rural areas. The next chapter will, therefore, look at some suggested policy recommendations.

CHAPTER SIX

6 CONCLUSION, RECOMMENDATIONS AND LIMITATION

6.1 Introduction

This chapter summarises and concludes the study. The first section will look at the summary of the findings on the various selected indicators for maternal and child health as well as the conclusions. The second section will present policy implications and recommendations that will inform policy makers. The limitations of the study are finally discussed which will provide good grounds for further research.

6.2 Summary and Conclusion

Maternal antenatal care visits (ANC) and contraceptive use have been known to promote the health of the woman thereby reducing maternal mortality. Towards the beginning of the SDGs in 2016, Ghana was identified as one of the countries that was able to achieve the target of halving extreme poverty (UNDP, 2015). This meant that on the average there was an increase in household wealth. It was however, reported that slow progress was made on reducing maternal, child and under-five mortality. Government subsequently introduced and implemented health-related policies such as NHIS, free maternal care and LEAP as health and social welfare schemes to reduce the financial costs associated with maternal and child health as well as bridge the north-south gap. We, therefore, hypothesize that with the implementation of these interventions, wealth would not have any significant effect on these indicators for maternal healthcare utilization and child health, all things being equal.

The new global development framework – SDGs – has therefore incorporated maternal and child health targets as continuous effort are being made to curb their mortality rates. This study therefore focuses on the maternal healthcare utilization in terms of the number of ANC visits and modern contraceptive use. Child under-five mortality is also used as an indicator of child health.

One variable that has been identified as very crucial for maternal and child health is household wealth. Though several studies have been undertaken to identify the relationship between wealth and health in Ghana, this study will try to look at the effects household wealth has on these selected indicators for maternal healthcare utilization and under-five child deaths despite the country reducing extreme poverty by half ahead of time and the subsequent health related policies by government to increase household wealth and reduce financial costs associated with health.

The objectives of the study were therefore to assess the effects of household wealth on under-five child deaths, the number of ANC visits by expectant mothers and female modern contraceptive use. In addition, we explore heterogeneity effect of paternal characteristics on these selected health indicators. ANC and Modern Contraceptive Use were proxied to reduce MMR and improve maternal reproductive health respectively. These three indicators were selected in relation to the health-related SDG targets 3.1, 3.2 and 3.7. In addition, comparative assessment was made on the new WHO guideline on the minimum number of ANC visits by expectant mothers which has been increased from four to eight. According to the WHO (2016), this new guideline was to ensure higher probability of maternal and child survival. Our comparative analysis was to find the

contributing factors that beyond ANC4+ that would help shape policy as Ghana prepares to adapt this new guideline.

The study also analysed the trend in household wealth in Ghana relative to the global trends. Trends were also assessed for the indicators under this study. The study used the logit estimation technique to estimate the relationship between wealth and the outcome variables - ANC, modern contraceptive use and under-five child deaths. However, after correcting for multicollinearity in the regression, the final estimates of the model were discussed.

Using available data from the 2014 GDHS, the study identified that household wealth has a significant positive relationship with ANC4+ and ANC8+ and under-five child deaths but an insignificant relationship with modern contraceptive use in Ghana. For ANC, the level of significance increased from ANC4+ to ANC8+ and across higher wealth quintiles. However, the level of significance for child under-five deaths was observed for the richest household wealth quintile. The study further found out that, beyond wealth, other socioeconomic variables such as regional location, age, and number of children alive were significant factors for all these three indicators of maternal and child health. Female education, employment status, media exposure and religious affiliation were statistically significant for ANC and modern contraceptive use. In addition, distance to the health facility was significant for modern contraceptive use and under-five mortality. Postnatal attendance was uniquely significant to under-five child deaths.

The contribution of the current study to the existing literature is in two folds. First, this study is the first to provide a comparison of ANC4+ and ANC8+ in Ghana. This will serve as a basis for future studies on antenatal care. As Ghana prepares to adopt the new minimum requirement of at least eight visits by expectant mothers, the results from our estimations show that some more effective targeted policies and programmes towards poverty alleviation will be needed to meet the new WHO guideline in order to reduce the high rates of MMR and U5MR in the country.

Second, although there have been other studies on the effect of household wealth and other socioeconomic variables on health in Ghana, a few have considered the heterogeneity effect of paternal characteristics on mother's health in their models. Most of the literature have only looked at individual partner/husband characteristics on women's health and where there has been an interaction, none have looked at residential location and paternal education in Ghana. As an addition to knowledge, our study goes further to explore an interactive effect of paternal education and the woman's residential location on the utilization of maternal healthcare services in terms of ANC and modern contraceptive use especially for rural women in Ghana. It was realized that, though residential location and paternal educational level independently showed to be statistically insignificant in the determination of ANC, the results of the interaction of these variables provided a rather intuitive implication. Women in the rural areas whose partners or husbands have attained a minimum of secondary level of education are more likely to attend a minimum of four ANC visits than rural women whose partners or husbands do not have any education. This may be because educated men in rural areas are likely to be employed to cater for other indirect health costs and also, they may have knowledge about maternal health. This observation demonstrates the weight of partner's influences and further underscores the importance of appealing to partner's

in rural areas where male autonomy is high. This provides further grounds for a holistic policy direction in the educational programmes especially for the rural areas where educational attainment is low.

6.3 Policy Implications

The empirical results lead to the following policy implications and suggested recommendations. In general, these recommendations are aimed at improving maternal and child health as well as forming the basis for the implementation of the health-related SDG targets in Ghana.

From the findings of the study, it is important for governments to increase household wealth in order to meet the new WHO minimum requirement of the number of ANC visits by expectant mothers. Women from poor households would have to be empowered through education and alternative means of livelihood to improve upon their welfare which will facilitate health care utilization including antenatal care visits.

Also, government should improve accessibility to health by creating more CHPS zones. In addition, strengthening and effectively resourcing the NHIS will encourage more people to enroll to reduce the financial burden. Furthermore, there should be an increase in the LEAP cash transfer especially for those in the north of the country as well as broaden the number of beneficiaries to increase household wealth.

Though this study provides justification for the increase in household wealth in Ghana to close the gap between the north and the south, it is important to add that this may not be a sufficient condition in achieving or addressing the lapses in the indicators for maternal and child health. In the face of contextual factors and cultural differences, increases in wealth alone may not have the desired effect on health in Ghana.

Rural education programmes should also be designed for partners in settings that allow for high male tendencies in health decision making. Community leaders, opinion leaders and stakeholders in the rural residential location should factor in programmes that educates partner/husband on the effective health of the women.

Investment in human capital through higher forms of education should also be considered by government. As female education has been seen to be an important determinant in ANC and contraceptive use, more females should be encouraged to attain higher levels of education beyond the secondary level to enhance women empowerment and control of their health. Specifically, more female educational opportunities should be targeted towards the north.

Moreover, more public education and sensitisation should be encouraged on the need for maternal and reproductive health. From our findings, females who have heard of family planning in the media or are generally exposed to the media are more likely to demand better health. Government through the NCCE should increase sensitization on the need for ANC as well as control and timing of child birth to ensure children born are desired.

Finally, maternal mothers should be encouraged to effectively attend postnatal health care services. Postnatal care facilitates family and group support for the woman as well as provides an avenue to discuss and educate the woman on proper child care and development including breastfeeding, sleeping under treated mosquito net, keeping a healthy home environment amongst others. The global estimates of 5.6 million children who died as a result of preventable diseases before reaching their fifth birthday (representing 15,000 under-five deaths per day) is alarming (WHO, 2018b). Postnatal check will therefore help to curb this intolerable large number of preventable child deaths.

6.4 Study Limitations

It is highly noted that equally important determinants of maternal healthcare utilization and child mortality were omitted from the list of independent variables due to data availability or limited number of observations. Also, the problems associated with cross-sectional data such as misreporting or recall bias and underreporting may be imminent. Notwithstanding these limitations which could be the basis for further research, the results of the current study are still valid and could be used as the basis for policy formulation.

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