UNIVERSITY OF CAPE COAST

NATIONAL HEALTH INSURANCE, WOMEN'S AUTONOMY AND MATERNAL HEALTHCARE UTILISATION IN GHANA

RICHARD AGBANYO

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BY

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature: …… Date: ……

Name: Richard Agbanyo

Supervisors' Declaration

We hereby declare that the preparation and presentation of this thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature: …… Date ……

Name: Prof. Isaac K. Acheampong

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ABSTRACT

The effectiveness of health insurance and women's autonomy in removing barriers to the utilisation of maternal healthcare in order to curb maternal mortality especially in developing countries is gaining ground. However, in assessing the effects of health insurance on choice of delivery facilities, studies either put all facility-based delivery services together and compare with home care or fail to address endogeneity problem. Moreover, the connections among health insurance, autonomy and maternal healthcare has not been established while the age of data used for such analysis in Ghana may not tell convincing stories. This study used pooled data from the 2014 and 2008 Ghana Demographic and Health Surveys. With a sample of 8,805 women, demand for national health insurance scheme (NHIS) before and after 2008 was analysed using multivariate logistic regression. The study also employed multinomial endogenous treatment effects model in Conditional Mixed Process framework to examine the effects of NHIS on the choice of facility-based delivery services relative to home care with a sample of 6,319 women. Finally, Structural Equation Modelling was employed to study the effects of women's autonomy on desired maternal healthcare and analysed the mediation. It was found that NHIS enrolment increased significantly after 2008. Moreover, the NHIS variable is endogenous, has varied effects on the use of facility-based delivery services relative to home care and it also mediates autonomy and maternal healthcare. It is recommended that means of registration at health facilities for expectant mothers be provided. Moreover, when assessing the effects of health insurance on maternal healthcare, researchers need to separate types of health facilities and consider the endogeneity of health insurance.

KEYWORDS

Conditional mixed process

Endogenous treatment effect

Maternal healthcare

National health insurance scheme

Women's autonomy

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DEDICATION

To the entire Agbanyo Family

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LIST OF ABBREVIATIONS AND ACRONYMS

ANC	Antenatal Care Service
AVE	Average variance extracted
DHS	Demographic and Health Surveys
DMH	Desired Maternal Healthcare
GDHS	Ghana Demographic and Health Survey
GHS	Ghana Health Service
GSS	Ghana Statistical Service
HIV	Human Immunodeficiency Virus
HTMT	Heterotrait-Monotrait ratio of correlations
ICPD	International Conference on Population and Development
IFSSA	Indiana Family and Social Services Administration
MDG	Millennium Development Goal
MGA	Multi-Group Analysis
MHO	Mutual Health Organisation
MMR	Maternal Mortality Ratio
MNL	Multinomial logit
MNP	Multinomial probit
MOH	Ministry of Health
NHIS	National Health Insurance Scheme
OLS	Ordinary least squares
PNC	Postnatal or postpartum care
SDT	Self-Determination Theory
SEM	Structural equation modelling
SRMR	Standardised root mean square residual

SSNIT	Social Security and National Insurance Trust
TBAs	Traditional Birth Attendants
UHC	Universal Health Coverage
UNICEF	United Nations Children's Fund
VIF	Variance Inflation Factors

CHAPTER ONE

INTRODUCTION

Background to the Study

The goal of a health sector is to ensure a healthy and productive population that reproduces itself safely (Ministry of Health, 2007). However, maternal mortality remains one of the most daunting public health problems across the word especially in resource limited countries. The statistics of maternal mortality underscore how societies have failed women, especially in developing countries for that matter Ghana. According to the World Health Organization [WHO] (2015a, 2016a), about 830 women died from pregnancy or childbirth related complications around the world every day and there were about 303, 000 of such deaths in the year 2015 alone. Also, almost all (99%) of these deaths occur in developing countries and more than half of these preventable deaths (66%) occur in Sub-Saharan Africa (WHO, 2015a, 2016a). The estimated lifetime risk for maternal mortality in high-income countries is 1 in 3,400 in comparison to low-income countries where the risk is 1 in 52 (WHO, 2014a) with the 2015 approximate global lifetime risk of a maternal death standing at 1 in 180 (WHO, 2016a).

Most maternal deaths are avoidable because healthcare solutions to prevent or manage complications related to pregnancy and birth are well known (Bullough et al., 2005). Given that maternal health conditions are the leading causes of maternal mortality and disability in developing countries (Ronsmans & Graham, 2006), it is often believed that the use of quality maternal healthcare in timely manner is a key solution to maternal mortality. According to Wado (2013), reducing levels of maternal mortality depends on increasing use of

maternal health services while the World Health Organization (2011) asserts that achieving development goals on maternal health requires providing high-quality maternal healthcare. Thus, these deaths can be prevented with the use of appropriate skilled maternal healthcare before, during and after childbirth and thereby save the lives of women and new born babies (WHO, 2014b).

The potency of maternal healthcare rests on the facts that antenatal care (ANC), for instance, helps to detect and effectively manage early signs of, or risk factors for, illness and death during pregnancy (Toan, 2012). Access to proper medical attention and hygienic conditions during delivery can also reduce the risk of complications and infections that may lead to death or serious illness for the mother and/or baby [Ghana Statistical Service (GSS), Ghana Health Service (GHS), & Inner City Fund International (ICFI), 2015]. Skilled birth attendants use several methods during delivery should complication such as breech presentation and 'cord around the neck' arise. Two of these critical methods are episiotomy and caesarean section (CS) which traditional birth attendants (TBAs) cannot practise. The fact is that "home deliveries often endanger the health of women, where complications are often referred to appropriate health facilities only when the condition has already deteriorated" (Nketiah-Amponsah & Arthur, 2013, p. 510). With Postnatal care (PNC) the mother is also monitored for bleeding, bowel and bladder function, as well as baby care. A leading cause of maternal mortality, accounting for 27 percent of deaths, is postpartum haemorrhage (excessive bleeding after birth) (Say et al., 2014; WHO, 2014c). Sepsis and infection claim another 11 percent of maternal deaths, virtually all during the postnatal period (WHO, 2014c). Since most of these deaths occur during the first 24 hours after childbirth (Bhandari, 2015;

WHO, 2014c, 2015b), they can be avoided with the use of professional delivery and postnatal care (PNC) services.

Given this reliance on maternal healthcare, almost all developmental goals depend on their use to curb maternal mortality. This perception may follow Grossman (1972)'s theory of demand for health where the use of maternal healthcare is expected to restore or prevent the deterioration of the health of expectant mothers. The fifth Millennium Development Goal (MDG 5) depended on these services and induced a drive that saw significant improvement in maternal mortality however, the overall message is clear: hundreds of thousands of women are still dying due to complications of pregnancy and/or childbirth each year (WHO, 2016a). Now building on the momentum generated by MDG 5, the Sustainable Development Goals (SDGs) establish a transformative new agenda for maternal health towards ending preventable maternal mortality; target 3.1 of SDG 3 is to reduce the global maternal mortality ratio (MMR) to less than 70 per 100 000 live births by 2030 (WHO, 2016b). According to the WHO, achieving this target of the SDG will require reducing global MMR by an average of 7.5% each year between 2016 and 2030 and will also require more than three times the 2.3% annual rate of reduction observed globally between 1990 and 2015 (WHO, 2016b)

Though institutional maternal healthcare appears to be a critical solution to maternal mortality, its utilisation remains low in many developing countries especially in sub-Saharan Africa for that matter Ghana. The implication is that any factor that militates against the utilisation of institutional maternal care is a threat to maternal mortality. Factors that can influence healthcare utilisation has been grouped as need factors, enabling factors and predisposing factors

(Anderson, 1995). This study focuses on two of such enabling factors which are hypothesised to influence the use of maternal healthcare and may therefore have implications for maternal mortality. These are health insurance and women's autonomy while controlling for a host of other factors.

The National Health Insurance Scheme (NHIS) has been chosen because it is one of the recent healthcare financing strategies adopted in the country not only to improve access to general healthcare but also to enhance maternal health in order to achieve the MDG 5 as well as the target 3.1 of the SDG 3. Secondly the effect of the Ghana's National Health Insurance Scheme on maternal healthcare seems not to be fully examined in Ghana. Ghana passed the national health insurance scheme policy into law in 2003 and fully implemented it in late 2005 (National Health Insurance Authority (NHIA), 2010; Owusu-Sekyere & Chiaraah, 2014) and then introduced, into the scheme, a Free Maternal Care Programme (FMHCP) in July 2008 (NHIA, 2010) where pregnant women can access maternal healthcare, free of charge, if they register for the NHIS.

Different healthcare financing strategies evolved over time in Ghana prior to the NHIS. Before independence, the British colonial administration ran a health system that largely benefited a small élite group of colonials and their African associates (Arhin-Tenkorang, 2001; Nketiah-Amponsah & Arthur, 2013) where health care was provided primarily through hospitals in urban areas with direct payment at the point of service. The general public depended on healthcare from other care providers such as traditional healers and missionary health centres. After independence, health care was financed with a universal tax funded system characterized by the provision of free health care services for the citizens but by the early 1970s, Ghana's economy had stagnated, leading to

a downturn in tax revenue which could not support the free health care policy (Nketiah-Amponsah & Arthur, 2013). However, in 1985, health sector reforms were initiated as part of broader structural adjustment programmes, introducing cost recovery mechanisms through user fees and liberalizing health services to allow private sector participation. Even though the financial aims of the reform were achieved and shortages of essential medicines and some supplies improved, the successes came with inequities in financial access to basic and essential clinical services (Nketiah-Amponsah & Arthur, 2013).

An exemption policy was introduced in 1987 to provide a safety net for the vulnerable who could not afford the cost of healthcare. However, the purpose of this policy was not achieved due to delays in reimbursement of the health facilities by the government, abuse of the system and institutional bottlenecks. In 1992, the Community Based Healthcare schemes (CBHCs), was introduced which formed the first social risk-sharing schemes in the health sector of the country. Throughout the 1990s, several community health insurance schemes, popularly referred to as Mutual Health Organisations (MHO) developed in Ghana. Most of these MHOs focused on providing financial protection against the potentially catastrophic costs of a limited range of inpatient services. The NHIS was then introduced in 2003 to replace the out-of-pocket payments (‘cash and carry’) system and to remove financial barriers to the utilisation of healthcare.

Preceding the effective implementation of the NHIS in 2005, there was an exemption policy in 2003 for delivery fees for intra-partum care in public, private and mission facilities in the four most deprived regions of the country to improve maternal health (Nketiah-Amponsah & Arthur, 2013). The policy was

extended in the following year to the remaining six regions of the country. Following the 2003 policy, the government introduced a free maternal healthcare regime for expectant mothers in July 2008 with initial funding from the British government to quicken the attainment of MDGs 4 and 5. Under this programme, expectant mothers were to receive the full package of antenatal, prenatal and postnatal care (NHIA, 2010). However, the National Health Insurance Authority (NHIA) revised the implementation guidelines in 2010 to encourage pregnant women to register with the NHIS before accessing health care (NHIA, 2010; Nketiah-Amponsah & Arthur, 2013). The enrolment has increased over the years (NHIA, 2012) and scheme has since led to increased utilisation of health services in Ghana (Wang, Temsah, & Mallick, 2014, 2016). The high patronage of the NHIS demonstrates that Ghanaians have accepted the NHIS as the preferred healthcare financing strategy.

With health insurance on the rise in low- and middle-income countries, a growing body of literature documents the effect of health insurance on access and use of healthcare, financial protection, and health status in these countries (Dixon, Tenkorang, Luginaah, Kuuire, & Boateng, 2014; Escobar, Griffin, & Shaw, 2010; Mensah, Oppong, & Schmidt, 2010; Wang et al., 2014, 2016). While a few rigorous studies have evaluated the effect of health insurance on the use of general healthcare (Giedion, Alfonso, & Díaz, 2013), there is limited empirical evidence of its effect on the use of maternal healthcare (Wang et al., 2014) though maternal health services are typically covered in benefit packages of health insurance. In the context of global maternal and child health priorities, as echoed by the 1987 Safe Motherhood Initiative, 1994 International Conference on Population and Development, 1995 Fourth World Conference

for Women, and the MDG, as well as the SDG (AbouZahr, 2003), there is an increased need to evaluate whether health insurance has contributed to improved levels of use of maternal healthcare.

A woman's decision to enrol on the NHIS, either by "default" (when pregnant and upon registration) or deliberate and use maternal healthcare can be influenced by her ability to make her own decision and govern herself (autonomy). Dangal and Bhandari (2014) argue that women who have greater autonomy can manage their own healthcare independently. That is an autonomous woman may be more conscious of her own health and may easily make her own healthcare decisions (both insurance and use of healthcare) compared to her less autonomous counterpart. This seems to suggest that health insurance ownership can mediate women's autonomy and the use of maternal healthcare.

Women's autonomy is therefore explored in this study as a result of its potential effect on women's enrolment and uptake of maternal healthcare and its implication for maternal mortality. This study views autonomy as the ability to make decisions on one's own, to control one's own body, and to determine how resources will be used, without needing to consult with or ask permission from another person. Therefore, woman's autonomy is viewed as her control over her own lives and materials, having equal say with her husband or partner on matters affecting herself and her family. Similarly, it is defined as women's authority to make and execute independent decisions, freedom from constraint on physical mobility and the ability to forge equitable power relationships within families (Nigatu, Gebremariam, Abera, Setegn, & Deribe, 2014).

The power balance between men and women plays an important role in the treatment seeking behaviour of women (Acharya, Bell, Simkhada, van Teijlingen, & Regmi, 2010). Bhandari (2015) asserts that women's autonomy is one of the determinants of maternal healthcare services utilisation in developing countries. Similarly, Dangal and Bhandari (2014) argue that increasing women's autonomy is a strategy to maximise the utilisation of maternal healthcare in the developing countries. This is because gender-based power inequalities can restrict open communication between partners about reproductive health decisions as well as women's access to reproductive healthcare. This in turn can contribute to poor health outcomes (Acharya et al., 2010) especially, the eventual death of an expectant mother. Therefore, women's autonomy in health-care decision is a prerequisite for improvements in maternal health and it is an indicator of women's empowerment. According to Castro (2012), empowerment of women is essential for the achievement of sustainable development.

However, "in many parts of Africa, women's decision-making power regarding reproduction and sexuality is extremely limited" (Nigatu et al., 2014, p. 2). Decisions on maternal healthcare are often made by husbands or other family members, which negatively influences maternal and child healthcare utilisation (Nigatu et al., 2014).

The importance of women's autonomy and progress have been realised long ago. According to Haque, Islam, Tareque and Mostofa (2011), at the 2005 World Summit, governments of all nations agreed that "progress for women is progress for all". It is therefore not surprising that one of the Millennium Development Goals (MDG -3) and the Sustainable Development Goals 5 (SDG-

5) were fully devoted to promoting gender equality and empowerment of women and girls. By the SDG-5, countries set, among other things, to **e**nd all forms of discrimination against all women and girls everywhere; ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life; and ensure universal access to sexual and reproductive health and reproductive rights as agreed in accordance with the Programme of Action of the International Conference on Population and Development and the Beijing Platform for Action and the outcome documents of their review conferences.

It should be noted that health is pivotal for the achievement of the other developmental goals. This is because the growth and development of every economy depend heavily on healthy human resource (population) hence there is broad agreement that good health is a prerequisite for development (Sköld, 1998). Moreover, there is a considerable evidence that good health in general and maternal health, in particular, can play a major role in human development (Filippi et al., 2006). Therefore, any factor that militates against maternal health (such as limited women's autonomy and limited coverage of health insurance) calls for concern especially in Ghana in the sub-Saharan Africa, a region that appears to be "mothers' grave".

Statement of the Problem

Though Ghana made significant efforts and improved maternal health conditions since 1990, the efforts were insufficient to achieve the MDG5 and maternal mortality and morbidity remain public health issues in the country (WHO, 2015a). In 2015, Ghana recorded about 2,800 maternal deaths resulting in MMR of 319 per 100000 live births with lifetime risk of maternal death being

1 in 74 [United Nations International Children's Emergency Fund (UNICEF), 2017; WHO, 2015a]. The implication is that the reduction in maternal mortality has been too slow hence the fear of failure to achieve the Sustainable Development Goal three (SDG3) of MMR of 70 per 100,000 live births by 2030.

Ghana adopted several strategies to improve maternal health conditions since 1990. The country embarked upon decentralisation health policies and training of more doctors, midwives and other health personnel. The health system has also been expanded to get health facilities closer to the people. For instance, locating Community Health Planning and Service (CHPS) compounds in rural communities. Strategies of interest in this study are the National Health Insurance Scheme and policies to enhance women autonomy. Though the use of maternal healthcare has improved in Ghana since 1988, there is still room for improvement given that the World Health Organization envisions a world where "every pregnant woman and newborn receives quality care throughout the pregnancy, childbirth and the postnatal period" (WHO, 2016b, p. 1). From the perspective of demand theory, one may believe that the demand for maternal healthcare should be extremely high when the monetary cost of such services approach zero with heavy subsidies in terms of national health insurance. Currently, delivery by skilled birth attendants stands at 74 percent with health facility-based delivery at 73 percent and 78 percent of women receiving PNC check-ups in the first two days after birth while about 87 percent having four or more ANC visits (GSS et al., 2015).

Studies have documented determinants of health insurance subscription and its positive effects on the utilisation of maternal healthcare in different parts of the world, including Ghana (Dixon, 2014; Dixon et al., 2014; Frimpong et

al., 2014; Gomez et al., 2015; Nketiah-Amponsah & Arthur, 2013; Singh et al., 2015; Wang et al., 2014, 2016). However, the use of 2008 data sets in the previous studies (e.g. Mensah et al., 2010; Wang et al., 2014, 2016) to assess the enrolment and the effects of NHIS on maternal healthcare in Ghana might not tell convincing story about the phenomenon. This is because Ghana implemented the NHIS in the late 2005 (NHIA, 2010; Owusu-Sekyere & Chiaraah, 2014) and introduced the free maternal healthcare programme in July 2008. Under this programme, expectant mothers were to receive the full package of maternal healthcare (NHIA, 2010). However, due to some challenges of the scheme, the National Health Insurance Authority (NHIA) revised the implementation guidelines in 2010 to encourage pregnant women to register with the NHIS before accessing healthcare (Nketiah-Amponsah & Arthur, 2013). Moreover, given the level of education of the population in question and the fact that health insurance itself was a new concept, following the theory of status quo bias, the assessment of its enrolment and effect with the 2008 data might not reveal its full effect. There is therefore a need for a different assessment with a new data.

In addition, studies (Frimpong et al., 2014; Mensah et al., 2010; Wang et al., 2014, 2016) often lump health facilities together irrespective of their scale of production, technology used, price levels, ownership (private or public) and estimate one "demand function" for their products and compare with home care services. The argument is that given the diverse nature of health facilities, the NHIS may not have the same effect on the demand for their services hence the need to separate the facilities. Moreover, studies that tried to separate the health facilities and assessed the effect of the NHIS on delivery care from different

kinds of facilities (Nketiah-Amponsah & Arthur, 2013) could not address endogeneity problems. However, since the decision to enrol on NHIS is voluntary, the effect of being insured is potentially subject to selection bias which results in endogeneity and biased coefficient estimates. According to Jowett, Deolalikar and Maritinsson (2004), there may be unobservable factors influencing the decision to enrol on health insurance which also influence treatment-seeking behaviour resulting in unobserved heterogeneity. This manifest itself through the insurance coefficient not representing a pure insurance effect hence there is the need to account for endogeneity.

Again, though positive effects of women's autonomy on the utilisation of maternal healthcare have been documented (Adhikari, 2016; Bhandari, 2015; Dangal & Bhandari, 2014; Haider, Qureshi, & Khan, 2017; Osamor & Grady, 2016; Thapa & Niehof, 2013; Urbaeva, 2015; Wado, 2013), the interrelatedness of women's autonomy, health insurance and the utilisation of maternal healthcare has not been explored. Such exploration will test how NHIS mediates women's autonomy and maternal healthcare and thereby reveal both direct effect and indirect effects of women's autonomy on the use of such services. Moreover, given that women's autonomy is multidimensional, its factors as well as its effects need to be analysed in the same model.

Finally, the question "whether health insurance and women's autonomy can help women utilise WHO's recommended maternal healthcare" has not been answered convincingly. This is because previous studies (Haider et al., 2017; Mensah et al., 2010; Wang et al., 2014) have concentrated on the specific aspects (dimensions) of maternal healthcare and the concept of "desired maternal healthcare" or "appropriate maternal healthcare" is missing. With a

view of strengthening systems for maternal health, this study seeks to analyse the effects of NHIS ownership and women's autonomy on the uptake of maternal healthcare in Ghana with a recent data, introduce the concept of "Desired Maternal Healthcare (DMH)" and test if NHIS mediates women's autonomy and DMH.

Objectives of the Study

The main objective of the study is to analyse the effects of NHIS ownership and women's autonomy on the uptake of maternal healthcare in Ghana, using a more recent data. The specific objectives are to:

1. Analyse the demand for national health insurance among expectant mothers before and after the year 2008 in Ghana;
2. Investigate the effects of NHIS on various kinds of facility-based delivery services relative to home delivery care and analyse such effect before and after the year 2008 in Ghana; and
3. Compose women's autonomy and "desired maternal healthcare", establish the effects of the former on the latter, and test whether NHIS mediates the two concepts in Ghana.

Hypotheses of the Study

To achieve the set objectives, this study hypothesised that:

1. Expectant mothers' enrolment or demand for national health insurance did not significantly increase after 2008;
2. The effects of NHIS on facility-based delivery services relative to home care do not vary across facilities in the health system of Ghana and did not change after 2008; and

3. Women's autonomy has no effect on desired maternal healthcare and NHIS does not mediate women's autonomy and DMH in Ghana.

Significance of the Study

The study can help inform health planners and program managers especially in developing countries to promote attitudes and practices that favour gender equality, in order to attain wider use of healthcare services among women. The outcome of this research would also inform decision makers in Ghana and international partners in their new policies geared towards the achievement of Sustainable Development Goal 3 by 2030. Efforts to improve maternal health in Ghana will not only contribute to achieving key components of the SDGs, but also secure the country in good light in the global community.

In addition to the tremendous loss of life among women at the peak of their productive lives, there are other social and economic consequences to maternal mortality. Maternal death is related to child death. As many as half of all motherless children under the age of five die (Chung, 2003). As a result, improvements made in maternal healthcare will also support survivability for their children. Family economic resources are also affected. According to Chung (2003), at least a quarter of male headed households rely on female earnings for more than half the total income and it is estimated that women are sole earners in up to a third of all families below the poverty line. The household roles lost because of a woman's death create a large burden on the rest of the family. Women are family stabilizers, educators of children, caretakers of young and old, labourers, and cultural keepers, according to Chung (2003).

Following the global assertion that "progress for women is progress for all", the issue of maternal mortality cannot be discussed in isolation of the level

of development of a nations. Maternal health has been identified as basic health indicator that reflects a nation's health status (Idowu & Allo, 2017). One of the major problems in maternal health outcomes facing these nations is the low level of development. Countries are ranked by various health and economic indicators to show how they fare compared with others. Key health indicators used for this raking are life expectancy, infant mortality rate, and maternal mortality. Sub-Saharan Africa is the region in the world where maternal mortality is considerably highest, not to mention the poorest region, lagging behind in development progress compared to other regions (Idowu & Allo, 2017). Consequently, addressing maternal health's line of attack in sub-Saharan Africa is not only significant for women's enablement, but also for women in development in Africa.

The study would also be a relevant source of literature for people in the academia, especially the behavioural scientists who are interested in maternal health. It is confirmed that there is limited empirical evidence on whether health insurance coverage has contributed to the improved use of maternal health services (Wang et al., 2014). The study is also unique due to the segregation of institutional health facilities according to their scale of production and ownership which differentiate these facilities in terms of level of technology used, quality of services, pricing and therefore affecting the pattern of demand for their services.

Scope of the Study

The study analysed the enrolment of expectant mothers on the NHIS and the effects of NHIS and women's autonomy on the uptake of maternal healthcare in Ghana. Secondary and country representative data from the fifth

(2008) and sixth (2014) rounds of the Demographic and Health Survey (DHS) was used with multivariate analyses. The study also relied on cross sectional analysis and involved women aged from 15 and 49 years. Key variables explored include enrolment on NHIS among expectant mothers, utilisation of maternal healthcare (antenatal care, delivery care and postnatal care), women's autonomy, education, birth order and household wealth quintile.

Organisation of the Study

This thesis is organised into eight chapters. The remaining chapters of the study are organised as follows: Chapter Two presents an overview of the Ghana's health system while chapter three contains review of related literature and a presentation of the theoretical and conceptual framework that underpin the study. The theories, concepts and models that underpin the study are explored as well as empirical studies conducted on the variables under investigation. Chapter Four concentrates on the research methodology and focuses on the research design, analytical framework, data description, and methods of estimation.

Chapters Five, Six and Seven present the three empirical studies. They focus on general description of research data, data analysis, interpretation and discussion of results. Specifically, chapter five presents demand analysis of national health insurance among expectant mothers with emphasis on time lag between the two (rounds V and VI) GDHS surveys. Chapter Six consists of the effects of NHIS on the utilisation of delivery care from different facilities compared to home care while chapter seven contains the effects of women's autonomy on desired maternal healthcare. Finally, the summary, conclusion and recommendations are presented in Chapter Eight.

Operational Definition of Terms

For the purpose of clarity, the key terms of this study have been given operational definitions as follows:

Home delivery: births at either the home of the expectant mother or the home of someone else which might have been supervised by relatives or TBAs.

Institutional delivery: is any delivery that occurred in a modern health facility and was assisted by medically trained professionals such as medical doctors, nurses and midwife/auxiliary midwife.

Maternal death: the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.

Maternal health: refers to the wellbeing of women during pregnancy, childbirth and the postpartum period (WHO, 2011).

Maternal healthcare: is defined as those goods and services provided to promote maternal health, or prevent, alleviate or eliminate ill-health among expectant mothers. They include antenatal care, delivery care and postnatal care provided at home or at a health facility.

Maternal Mortality Ratio (MMR): Number of maternal deaths during a given time period per 100,000 live births during the same time-period, usually a year.

Parturition: According to the Black's Medical Dictionary, the term parturition also known by the traditional terms, childbirth, delivery or labour, is the process by which the baby and subsequently the placenta are expelled from the mother's body.

Postnatal or postpartum: care is the goods and services (care) given to the mother and the new born baby after childbirth until about 6 weeks later.

Post-partum haemorrhage: refers to excessive bleeding after birth.

Skilled birth attendant: refers to a health professional such as a midwife, doctor or nurse, who is trained and competent in the skills needed to manage normal childbirth and the immediate postnatal period, and who can identify complications and, as necessary, provide emergency management and/or refer the case to a higher level of healthcare" (Toan, 2012, p. 4).

Women's autonomy: is women's authority to make and execute independent decisions, freedom from constraint on physical mobility and the ability to forge equitable power relationships within families. Operationalised by household and economic decision making as well as resistance to domestic violence.

CHAPTER TWO

OVERVIEW OF GHANA'S HEALTH SYSTEM

Introduction

This chapter presents an overview the health delivery system of Ghana. The chapter consists of three sections: the first section provides a brief overview of healthcare delivery in the country and the second section covers healthcare financing with emphasis on the NHIS in Ghana. The chapter concludes with a discussion of the trends of the study variables.

Brief Overview of Ghana

Policies and programmes operate within frameworks in every economy, it is therefore necessary to be aware of the settings in which policy variables are analysed (Agbanyo & Obeng, 2016). This section, in describing the health system of Ghana, touches on the framework within which the NHIS, women's autonomy and the delivery of maternal healthcare operate. Ghana, officially called the Republic of Ghana, is a sovereign multinational state, though the proportion of Africans among the Ghanaian population has never fallen below 99 percent (GSS, 2005). The country is centrally located along the Gulf of Guinea and Atlantic Ocean, in the sub region of West Africa (GSS et al., 2015).

The country is a constitutional democracy, divided into ten administrative regions and 216 local assemblies (GSS, 2014). Ghana is the world's 56th most inhabited nation (GSS, 2014) with an estimated population of 28,308,301 as of 2016 (GSS, 2016). Like most countries in Africa, Ghana is a multi-ethnic, multi-religious and multi-cultural society. It is also a vast mosaic of large and small ethnic groups with the major groups being the Akan, the Mole Dagbani, the

Ewe, the Ga Adangbe, the Guan, the Gurma, the Grusi and the Mande-Busanga (Asante & Gyimah-Boadi, 2004).

Healthcare Delivery in Ghana

Preceding colonialism, indigenous health practitioners were the only recognized and established health practitioners in the country. The modern and traditional healthcare systems in Ghana developed into the modern ages through different historical, political, economic and social stages (Baidoo, 2009). The birth of modern medicine is a contested claim given that scholars have passionately disagreed on the emergence of modern healthcare system in Ghana (Tonsuglo, Aglobitse, & Kuunibe, 2014). However, Senah (2001) provided a convincing account of the development of modern healthcare system in Ghana and categorized this development into three phases

Western medicine was first introduced into the Gold Coast by Christian missionaries and missionary societies in the nineteenth century and missionaries were almost the sole providers of modern medicine until after World War I (Kuunibe & Dary, 2012; Tonsuglo et al., 2014). However, around 1920 onwards, the orthodox form of healthcare was extended to some rural areas and both the colonial government and churches took an orchestrated stand against ethno-medicine (Senah, 2001).

Since Ghana's independence in 1957, the country tries to provide good healthcare services through an organised health system to the entire population. Just after independence, the government launched the "Accelerated Development Plan" and under the health component of this plan the health system was strengthened by putting up more healthcare centres and training of more health personnel (Kuunibe & Dary, 2012).

Ghana's health system has since gone through several health reforms including decentralisation and different healthcare financing strategies (for example the NHIS) to improve healthcare delivery in the country. Currently, the health system of Ghana is made up of Ministry of Health at the apex for making policies, Ghana Health Services for policy implementation, public hospitals (teaching, Referral, Regional, district, community) public clinics, private hospitals, private clinics, pharmacies, traditional medicine among others. To enhance health financing, in August 2003, the National Health Insurance Act (Act 650) was passed and the programme fully implemented in 2005. Accordingly, the Act aims at improving access to and provision of quality healthcare services in Ghana. Currently, the NHIS has a very large coverage across the country. Ghana's healthcare system is illustrated in Figure 1.

Maternal healthcare, like any other healthcare in Ghana, is provided across the health system. Traditionally, expectant mothers in Ghana are delivered at home with the assistance of traditional birth attendants (TBAs) or elderly women of the community (GSS, 2004). TBAs are often old women who provide expectant mothers with all forms of maternal healthcare services including delivery (Agbanyo, 2012). On the other hand, medically trained professional maternal care services are provided by doctors, midwives, nurses and other health personnel at all these facilities across the country.

In Ghana, with about 30 percent of births still occurring at home (GSS et al., 2015) suggests that TBAs are still playing significant roles in maternal healthcare delivery.

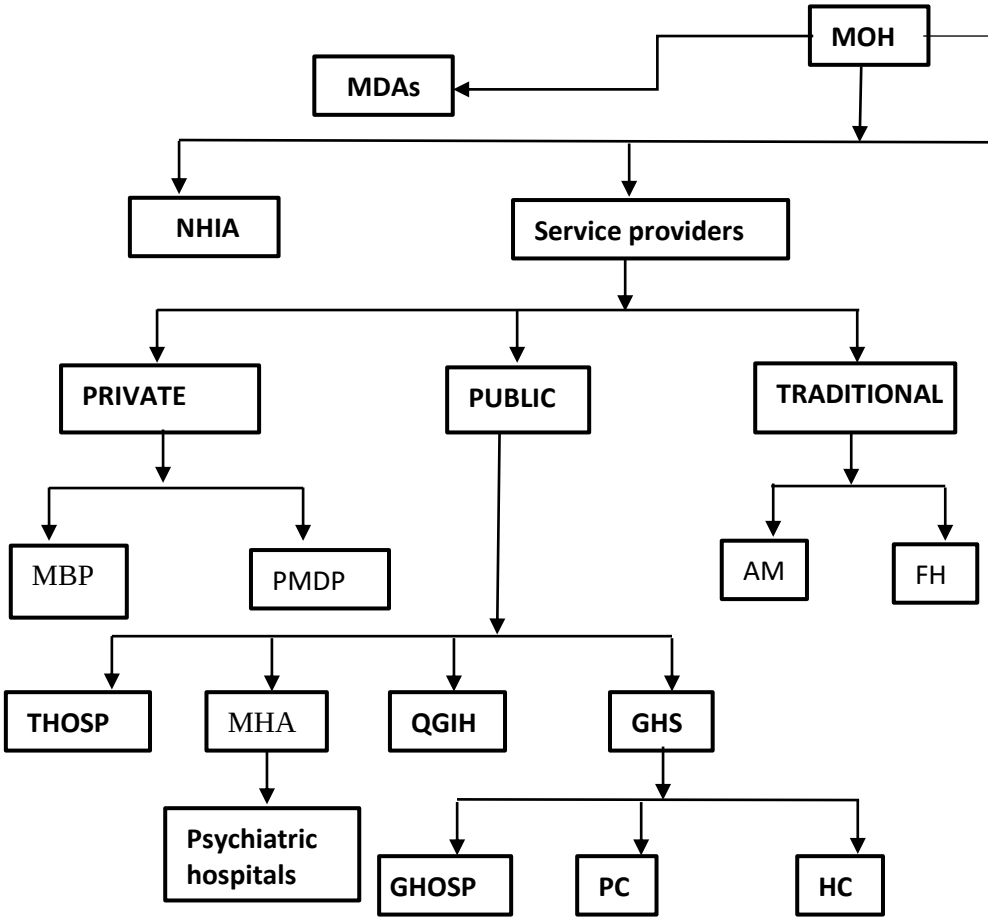

Figure 1: Ghana's healthcare system

Source: Adapted from Abor, Abekah-Nkrumah, Abor (2008)

LEGEND

AM – Alternative Medicine
DTAM – Department of Traditional Alternative Medicine
FDA – Food and Drugs Authority
FH – Faith Healers
GHOSP- Government Hospitals
GHS – Ghana Health Service
HC – Health Centres
MBP – Mission Based Providers
MDAs – Ministries Department and Agencies
MDC – Medical and Dental Council
MHA – Mental Health Authority
NMC – Nurses and Midwifery Council
PC – Poly-Clinics
PHMHB – Private Hospital and Maternity Home Boards
PMDP – Private Medical and Dental Practitioners
QGIH – Quasi Governmental Institutional Hospitals
THOSP – Teaching Hospitals

However, TBAs are not well integrated into the formal health delivery system in Ghana. Unfortunately, no assessment of their performance has been done before. Such performance assessment in Nigeria revealed that majority of the TBAs (60%) had no formal education and only (15.6%) of them were registered with the Local Government (Ofili & Okojie, 2005). Majority of the TBAs (62.2%) acquired their skills through apprenticeship with relation while 8.9% had no training at all. Ofili and Okojie (2005) also found that management of delivery complications cases by TBAs was poor as only 44.4% will refer cases of obstructed labour and 40% of them will refer cases of retained placenta to orthodox healthcare system. Only 33.3% will refer cases of severe bleeding to the hospital.

The National Health Insurance Scheme of Ghana

The National Health Insurance Scheme of Ghana was established in 2003 and fully implemented it in late 2005 with a goal of ensuring equitable access to healthcare services for all Ghanaians (Dixon, 2014; Frimpong et al., 2014; Owusu-Sekyere & Chiaraah, 2014; Witter & Garshong, 2009). The NHIS replaced an old system which is often referred to as 'cash and carry' system, where healthcare users were made to pay total cost of healthcare at the point of consumption. The cash and carry system was believed to severely restrict access to healthcare especially for the poor (Addae-Korankye, 2013; Frimpong et al., 2014).

The package of services covered is defined by the NHIA and aims to address 95% of the disease burden in Ghana (Frimpong et al., 2014). Therefore, the benefit package of the NHIS has been developed with the intention to cover basic healthcare services including outpatient consultations, essential drugs,

inpatient care and shared accommodation, maternity care (normal and caesarean delivery), eye care, dental care, and emergency care. Certain public health services historically provided for free, such as family planning and immunizations, are covered under the National Health Insurance Scheme.

However, NHIS does not cover some healthcare services such as rehabilitation other than physiotherapy, appliances and prostheses, cosmetic surgeries and aesthetic treatments, assisted reproduction and gynaecological hormone replacement therapy, echocardiography, photography, angiography, orthopaedics, dialysis for chronic renal failure, organ transplantation, all drugs that are not listed on the NHIS drugs list, heart and brain surgery and cancer treatment, mortuary services, diagnosis and treatment abroad, medical examinations for purposes other than treatment in accredited health facilities, VIP ward (Osei Adu, 2018).

The NHIS is financed by annual premiums paid by users and a value-added tax on goods and services (NHIA, 2011; Osei Adu, 2018). Formal sector employees are exempted from the payment of premium, however a fraction (2.5%) of their contribution to the Social Security and National Insurance Trust (SSNIT) is automatically transferred to the NHIS at the central level. This category of workers must also pay a one-time registration fee to begin accessing the benefits under the scheme. Informal sector employees on the other hand pay premiums to enable them access healthcare benefits of the scheme. The tax on goods and services (2.5%) is by far the largest source of NHIS revenue (70%), followed by SSNIT contributions (23%) while individual premium payments account for only about 5% of NHIS revenue (Frimpong et al., 2014; NHIA, 2011).

The overall implementation, operation and management of the NHIS rest on the National Health Insurance Authority (NHIA), established under the National Health Insurance Act 2003, Act 650. The NHIA functions under the Ministry of Health, but disjointedly from the service providers (see Figure 1). Under the NHIS, medicines are reimbursed by itemized fee for service, but providers are reimbursed for services based on the Ghana Diagnosis-Related Groups (GDRG); a provider payment mechanism established in April 2008 by an expert committee of clinicians and administrators. At the district level, the NHIA identifies healthcare providers (public, private and religious) for NHIS accreditation to deliver care to NHIS members. Therefore, NHIS members can access health services from accredited providers without co-payments.

The NHIS has also targeted payment exemption policies, designed to encourage enrolment and offer financial protection to the poor and vulnerable groups in society (Dixon, 2014; NHIA, 2012). Thus, a number of population groups are exempted from payments under the NHIS. The elderly (over 70 years), children (below 18 years), social security contributors and pensioners are all exempted from premium payments while the extreme poor and expectant mothers are exempt from premiums, card processing fees and renewal fees (Dixon, 2014; Frimpong et al., 2014; NHIA, 2010, 2012). An exemption of importance to the current study is a free maternal care programme which was introduced into the scheme since July 2008 (Dixon, 2014; Frimpong et al., 2014; NHIA, 2010). Under this exemption, if a pregnant woman is not already insured with the NHIS, she is entitled to be registered for free for 1 year (Frimpong et al., 2014).

Since the establishment of the scheme, enrolment rates and the utilisation of health services have increased in the country. Studies have evidenced that NHIS members in Ghana are more likely to use healthcare, and in a timely manner (Aboagye & Agyemang, 2013; Agbanyo, 2012; Dixon et al., 2014). Conceivably and more importantly, when the poor get enrolled in the NHIS they are more likely to utilise healthcare than their uninsured counterparts. Therefore, this suggests the NHIS is having a positive effect (Dixon, 2014; Saleh, 2012). There are some concerns following deeper analysis. Studies have found that despite all the pro-poor elements built into the scheme, getting the poor enrolled remains a key challenge of the NHIS (Dixon, 2014). The basic conclusion of these studies is that the rich are far more likely to enrol than the poor (Dixon, Tenkorang, & Luginaah, 2011; Jehu-Appiah et al., 2011; Witter & Garshong, 2009).

Trends in Study Variables

Since the implementation of the NHIS in 2005, enrolment onto the scheme keeps on increasing over time. There was a total of 1,348,160 members of the scheme in 2005 and this number has increased to 10,145,196 in 2013 (NHIA, 2013). Similarly, the Free Maternal Care (FMC) programme which was introduced in July 2008 also recorded steady increase in registration since then. Table 1 shows the active membership of the NHIS and new registrations under the FMC over time.

It should be noted that to improve the quality of data, an ICT platform was introduced in 2010 for the extraction of the number of new and renewing members hence "the *new* active membership figure of 8,163,714 for 2010 does

not necessarily represent a drop, as there is no comparative historic data based on the new methodology" (NHIA, 2010, p. 16).

Table 1: Trends in NHIS membership and FMC registration

Year	Active members	Methodology	FMC registration
2005	1,348,160	Old	N/A
2006	2,521,372	Old	N/A
2007	6,643,371	Old	N/A
2008	9,914,256	Old	N/A
2009	10,638,119	Old	383,216
2010	8,163,714	New	504,609
2011	8,227,823	New	485,460
2012	8,885,757	New	754,658
2013	10,145,196	New	774,009

Source: Compiled form NHIA Annual Reports (2010, 2011, 2012, 2013)

Regarding maternal healthcare, the focus is on the proportion of pregnant women that received antenatal care from skilled providers; the proportion of pregnant women that had their delivery in a health facility; and the proportion who received postnatal care after delivery from skilled providers. The trend of these components of maternal care between 1988 and 2014 generally depict an increasing trend across all six rounds of the GDHS (GSS, 2016). The proportion of pregnant women that received antenatal care from a skilled provider increased from 82 percent in 1988 to 97 percent in 2014. Similarly, pregnant women that made a delivery in a hospital also increased, from 40 percent in 1988 to 74 percent in 2014 (GSS, 2016; GSS et al., 2015).

With specific reference to ANC visits, the proportion of women who made no visit and one to three visits decreased from 12.6 to 2.6 percent, and 26.8 to 9.7 percent in 1993 and 2014 respectively. On the other hand, the proportion of women who achieved the recommended WHO requirement of at least four visits increased from 58.9 to 87.3 percent which seems to be good news for Ghana in achieving SDG3.

The use of postnatal care in Ghana also shows increasing trend. Women who received postnatal care within the first two days (48 hours) after delivery increased steeply from 4.3 percent in 1998 to 25.1, 68.3 and 81.1 percent in 2003, 2008 and 2014 respectively. In contrast, the proportion of mothers that had no postnatal check-up decreased from 49.3 percent in 1988 to 15 percent in 2014, though this proportion increased slightly between 1998 and 2003 (GSS, 2016). Similarly, the proportion of mothers who had postnatal care from the third to the forty-first day after delivery decreased over time from 45 percent to 3.5 percent between 1998 and 2014.

CHAPTER THREE

LITERATURE REVIEW

Introduction

This chapter covers the review of related literature pertaining to health insurance, women's autonomy and maternal healthcare utilisation. For healthcare utilisation, Theory of Human Capital, Grossman's theory of demand for health, and the Andersen's Behavioural Model of Health Services Utilisation guided the variables that were reviewed. Theories of health insurance and women's autonomy were explored followed by their effects on the utilisation of maternal healthcare. Theories that explain health insurance subscription include the Theory of Expected Utility, Theory of Expected pay-offs, and the Theory of Status Quo Bias while the Theory of Self-Determination was adopted to explain how women's autonomy as an innate psychological need enables them to make rational healthcare decisions. The empirical literature is centred around the effects of health insurance and women's autonomy on maternal healthcare utilisation. The chapter ends with a conceptual framework that guided the study.

Theoretical Literature Review

The main theories that underpin this study are the theories of human capital, Grossman' theory of demand for health, behavioural health services utilisation, expected utility, expected pay-offs, status quo bias, and the self-determination.

Human Capital Theory

The human capital theory which relates to the investment in people to increase their productive capacity is used in this study to explains the value of

health to the socio-economic development of individuals and nations at large. Human capital refers to the labour available to a nation, which are its education, skills, and health. In general terms, human capital represents the investment that people make in themselves to enhance their economic productivity. Human capital theory rests on the assumption that health and education are highly instrumental and even necessary to improve the productive capacity of a population.

The human capital theory, advocated by Gary Becker in 1964, stipulates that an increase in an individual's stock of knowledge or human capital leads to an increase in his productivity in the market sector of the economy where he produces money earnings, and in the non-market or household sector where he produces commodities that enter his utility function (Grossman, 1972, 2000). Becker (1964) identified health capital as a component of the human capital stock of nations. The identification of health capital as an essential component of human capital stock means that people demand good health in order to realise potential gains in productivity, according to Grossman (2000). The implication is that an increase in the stock of health which is an increase in human capital stock would lead to increase in wage. Therefore, the decision to invest in health is synonymous with the decision to invest in human capital (Agbanyo, 2012; Osoro, 2004).

Most economists agree that it is human resources of a nation (but not its physical and financial capital or its material resources) that ultimately determine the character and pace of its economic and social development (Psacharopoulos & Woodhall, 1997). Psacharopoulos and Woodhall (1997; p. 102) assert that human resources constitute the ultimate basis of wealth of nations. Capital and

natural resources are passive factors of production, human beings are the active agencies who accumulate capital, exploit natural resources, build social, economic and political organisation, and carry forward national development.

This assertion implies that without human resources, other forms of resources would not be meaningful to human kind. The human capital theory, therefore, provides a basic justification for large public expenditure on health both in developing and developed nations. It also suggests that, if the quality of a population is to be improved, governments must come out with public programmes that mandate quality health. For instance, governments can support the provision of public health insurance to the citizens which will reduce the burden of health cost. This conviction must be based upon the presumed economic return of investment in health both at the macro and micro levels.

In brief, the human capital theorists argue that a healthy population is a productive population hence a strong positive link between health and economic development. The human capital theory is important to this study because it explains the value of health to the socio-economic development of individuals and nations at large. In addition, it provides justification for huge government health expenditure including national health insurance scheme (NHIS). The human capital theory has become an important framework for the study of healthcare demand.

Grossman's Theory of Demand for Health

The theory of human capital has given rise to the concepts of health and healthcare. In the framework of this theory, Grossman (1972) modelled demand for health and viewed healthcare as both investment and consumption goods. According to the theory of demand for health, health stock depreciates over time

but can be replenished by spending money or time on health investments (e.g. purchasing health insurance or healthcare) or further depleted through disinvestments (Courtemanche, Tchernis, & Ukert, 2018; Grossman, 1972). That is, unlike other goods or services, health has a unique nature since individuals cannot purchase it directly. Individuals therefore buy healthcare in hopes of gaining health. As a result, health is modelled as a production function with medical care services as inputs and health as the output. In other words, the demand for medical care services is derived from the demand for health (Grossman, 1972). Mwabu (2007) also argues that healthcare demand is distinct from the demand for other commodities given that illness incidence, the reason for medical care, is irregular and unpredictable.

The Grossman model, in examining individual investment and consumption decisions to use healthcare to gain health, identified several factors influencing such demand. These factors include income, education and information, financial and distance barriers, and social and cultural barriers (Grossman, 1972, 2000). The model predicts a positive relationship between wages and health. Grossman also argued that when wages increase, the total cost of healthcare also increases since the opportunity costs involved with the time spent seeking treatment is also more valuable when wages increase. The implication is that the price of healthcare includes time spent in waiting to receive the desired health service or treatment. Consequently, the importance of the costs of time needs to be considered when modelling demand for healthcare.

Following Grossman's view on the use of healthcare to replenish health stock, it could be argued that the utilisation of maternal healthcare can either restore or prevent the deterioration of maternal health. It is prudent to explore

maternal health and maternal healthcare and show how the latter can replenish the former.

Concepts of Maternal Health and Maternal Healthcare

Maternal Health

Maternal health is defined as the health condition of women during pregnancy, delivery and the postnatal period (WHO, 2014a). Though health, in general, is very essential in the economic development of all nations granted its critical role in the formation of human capital, maternal health in particular is deemed crucial because of its roles in the development of a persons from the conception to death of the individual (Agbanyo, 2012). However, while motherhood is often a positive and fulfilling experience, for too many women it is associated with suffering, ill-health and even death (Agbanyo, 2012; Bhandari, 2015; WHO, 2014a).

According to WHO (2014c), maternal death or mortality refers to the death of a woman while pregnant or within 42 days of the termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental causes. Maternal mortality is measured by ratio, rate and life time risk of maternal death. Maternal mortality ratio is the most common indicator for assessing the maternal health status which shows the risk associated with pregnancy and its related causes. Similarly, the life time risk describes the possibility of being pregnant and the risk of death due to pregnancy and its related causes of a reproductive age women (WHO, 2014a; Bhandari, 2015). According to WHO (2015b), there were about 303, 000 maternal deaths globally

in 2015, yielding an overall maternal mortality rate of 216 maternal deaths per 100 000 live births. The global lifetime risk of maternal mortality was approximately 1 in 180 for the same year. Just like general health status, maternal health is enhanced by the use of maternal healthcare. Ghana recorded about 2,800 maternal deaths in the year 2015 resulting in MMR of 319 with lifetime risk of maternal death being 1 in 74 (WHO, 2015a; UNICEF, 2017).

Maternal Healthcare

Culyer (2005, p. 149) defined healthcare as "goods and services provided to promote health, or prevent, alleviate or eliminate ill-health". It stands to see maternal healthcare as those goods and services provided to promote maternal health, or prevent, alleviate or eliminate ill-health among expectant mothers. The addition of the reproductive health target to the SDGs reflects a long process linking reproductive health issues to development, whose landmark event was the International Conference on Population and Development (ICPD) held in Cairo in 1994. That is to say that the importance of maternal healthcare services in reducing maternal and infant morbidity and mortality has received increasing recognition since the ICPD in Cairo. According to the ICPD programme of action, maternal health services should include education on safe motherhood; effective and focused prenatal care; maternal nutrition programs; adequate delivery assistance that avoids excessive recourse to caesarean sections and provides for obstetric emergency; referral services for pregnancy, childbirth and abortion complications; post-natal care and family planning (Agbanyo, 2012). Generally, maternal healthcare is classified as antenatal care, delivery care and postnatal care.

Antenatal or Prenatal Care

Antenatal care, also known as prenatal care**,** refers to medical examination during pregnancy. It is a type of preventive healthcare, with the goal of providing regular check-ups that allow doctors or midwives to treat and prevent potential health problems throughout the course of the pregnancy while promoting healthy lifestyles that benefit both mother and child (National Library of Medicine, 2017). That is, antenatal care services are required to impart preventive services, diagnose and manage complications during pregnancy and provides information to promote skilled care at normal birth as well as emergency obstetric care (Bhandari, 2015). Additionally, ANC which serves as entry point to maternal healthcare services provides birth preparedness and readiness for emergency obstetric care as well as maximises the utilisation of other components of maternal healthcare services (Bhandari, 2015). Thus, by focusing on positive pregnancy experience ANC helps to ensure not only a healthy pregnancy for mother and baby, but also an effective transition to positive labour and childbirth and ultimately to a positive experience of motherhood (WHO, 2016b).

Antenatal care is a crucial step in the entire maternal healthcare services which can offer good opportunities to further care during delivery and postnatal period (Simkhada, Porter & van Teijlingen, 2010). Though the relative contribution of ANC may be difficult to assess precisely, studying preventable factors for each major cause of maternal death, experts have estimated that maternal deaths can be reduced by at least 50% when recommended antenatal care services are provided in appropriate times and numbers (Bhandari, 2015). Agbanyo (2012) also ascertained the fact that several empirical studies have

shown the existence of association between the use of antenatal care and positive maternal health outcomes.

Natal or Delivery care

Delivery care as a measure to curb maternal mortality and morbidity is viewed in two ways. Delivery is considered safe when it is attended by a skilled healthcare provider but preferably in the health facility. One critical strategy for reducing maternal morbidity and mortality is ensuring that every baby is delivered with the assistance of a skilled birth attendant which generally includes a medical doctor, nurse or midwife (UNICEF, 2017). Unlike the use of antenatal care, the place of delivery, if adequate facilities are provided effectively, has consistently been found to be associated to reduce maternal mortality (Agbanyo, 2012). Experts agree that the risk of stillbirth or death due to intrapartum–related complications can be reduced by about 20 percent with the presence of a skilled birth attendant (UNICEF, 2017). Showing its importance in reducing maternal morbidity and mortality, skilled birth attendance was included as indicator 3.1.2 under Goal 3 and Target 3.1 of the Sustainable Development Goals.

Despite recent accelerated progress, millions of births occur annually without any assistance from a skilled attendant at birth (Bhandari, 2015). In 2016, about one in five births (21%) took place without the assistance of a skilled birth attendant and this translated into approximately 31 million unattended births worldwide (UNICEF, 2017). Among the Central and Eastern Europe (CEE) and the Commonwealth of Independent States (CIS), East Asia and the Pacific as well as in Latin America and the Caribbean, about 9 in 10 births occur in health facilities in 2015. In contrast, in sub-Saharan Africa where

the burden of maternal and newborn deaths is highest, only half of all births (50 percent) are delivered in a health facility in the same year (UNICEF, 2017). Even with significant progress over the last two decades, inadequate or non-existent care during pregnancy and delivery was largely responsible for the annual deaths of an estimated 303,000 mothers in 2015 granted that roughly three quarters of all maternal deaths take place during delivery and in the immediate postpartum period (UNICEF, 2017).

The conditions for facility-based delivery to be effective, according to Agbanyo (2012), are: first, delivery should be assisted by trained health workers who are able to identify the signs of complications and act appropriately when a problem occurs. Second, referral facilities should be available to deal with obstetric emergencies once they have been identified, and on arrival at the referral facility patients should be observed promptly and appropriate decisions made to avoid further complications or even death (Agbanyo, 2012). Moreover, there needs to be a transport system to get women to the facility quickly for the service to be effective.

Postnatal or Postpartum Care

Postnatal or postpartum care (PNC) is the care of the mother and the new born baby after childbirth until about six weeks later. Thus, a postpartum period is the period beginning immediately after the birth of a child and extending for about six weeks (Lawn & Kerber, 2006). During this time, the mother is monitored for bleeding, bowel and bladder function, as well as baby care. The period is critical to the health and survival of a mother and her new-born baby. Lack of care in this period may result in death or disability as well as missed

opportunities to promote healthy behaviours, affecting both mothers and new-borns, according to Lawn and Kerber (2006).

Half of all postnatal maternal deaths occur during the first week after the baby is born, and the majority of these occur during the first 24 hours after childbirth (Lawn & Kerber, 2006; WHO, 2015c). Postpartum haemorrhage (excessive bleeding after birth) is recognised as a leading cause of maternal mortality, accounting for 27 percent of maternal deaths while sepsis and infection claim another 11 percent of maternal deaths, virtually all during the postnatal period (WHO, 2014b, 2015a). Since most of these deaths occur during the first 24 hours after childbirth, they can be avoided with the use of institutional delivery and PNC services. It is well documented that the utilisation of postnatal care service reduces maternal and neo-natal morbidity as well as mortality (WHO, 2014a). Healthcare providers should consider appropriate times, required numbers and quality of the services. It is recommended that the ideal first postnatal visit should be within 24 hours (Bhandari, 2015; WHO, 2014a).

It has been established that healthcare can replenish health stock and for that matter maternal healthcare can also replenish maternal health. However, the utilisation of healthcare can be influenced by series of factors. Accordingly, some factors can enhance the utilisation of healthcare while other factors can hinder it. Anderson (1995) developed a behavioural model that provides measures of access to medical care.

Andersen's Behavioural Model of Health Services Utilisation

The model was first developed in the 1960s by Anderson and has since gone through a few phases. According to this model, an individual's access to and use of health services is a function of three sets of characteristics:

1. Predisposing factors: The socio-cultural characteristics of individuals that exist prior to their illness. These are classified as: a) social structure which include education, occupation, ethnicity, social networks, social interactions, and culture; b) health beliefs including attitudes, values, and knowledge that people have concerning and towards the healthcare system; and c) demographic factors such as age and gender.
2. Enabling factors which refers to the logistical aspects of obtaining care: a) Personal/Family factors which relate to the means and know how to access health services such as income, health insurance, a regular source of care, travel, extent and quality of social relationships; b) community factors which relate to the availability of health personnel and facilities, and waiting time; c) possible additions relating to genetic factors and psychological characteristics.
3. Need factors concerns with the most immediate cause of health service use, from functional and health problems that generate the need for healthcare services. According to Anderson (1995), perceived needs would better help to understand care-seeking and adherence to a medical regimen, while evaluated needs would be more closely related to the kind and amount of treatment that will be provided after a patient has presented to a medical care provider. Anderson explained perceived need as how people view their own general health and functional state, as well

as how they experience symptoms of illness, pain, and worries about their health and whether or not they judge their problems to be of sufficient importance and magnitude to seek professional help. Evaluated need on the other hand represents professional judgment about people's health status and their need for medical care (Andersen, 1995).

Andersen teases out the concept of 'utilisation' from 'access' by identifying four types of access: potential access, realised access, equitable access, and inequitable access. 'Realised access' refers to the actual use of services (Andersen, 1995; Smith, 2010), and is used in this study as a conceptual definition of maternal health service utilisation. In this study, the behaviour of focus, maternal health services utilisation, is considered a 'health seeking behaviour', which is influenced by socio-economic and demographic characteristics of the individual expectant mothers, their households and the societies.

Factors Related to Utilisation of Maternal Healthcare

The utilisation of quality maternal healthcare is considered one of the surest ways of curbing maternal deaths. However, the use of these services depends upon a myriad of factors. While some of the factors enhance the use of the services, others hinder it. Therefore, the proportion of women who use these services is not encouraging, especially in the less developed settings. While globally births delivered with the assistance of a skilled health attendant stands at nearly 80 percent in 2016, it stands at 55 percent in least developed countries (UNICEF, 2017). The implication is that, globally in 2016, about one in five births (21 percent) took place without the assistance of a skilled birth attendant and this translated into nearly 31 million unattended births worldwide. Again,

in 2015, only 40 percent of all pregnant women in low-income countries had the recommended antenatal care visits (WHO, 2016a).

The factors that determine the use of maternal healthcare include demographic factors, socio-economic factors, as well as health system and healthcare related factors and they are classified in two groups as supporting factors and hindering factors (Bhandari, 2015). In most developing countries- better socio-economic condition of household, closeness to health facilities, better transportation facilities, improved educational and occupational status of women, higher women's autonomy at household level and society were seen to be positively associated with the utilisation of maternal healthcare services (Babalola & Fatusi, 2009; Bhandari, 2015). The WHO (2016a) identified other factors that prevent women from receiving or seeking care during pregnancy and childbirth as poverty, distance, lack of information, inadequate services, and cultural practices and suggested that to improve maternal health, barriers that limit access to quality maternal health services must be identified and addressed at all levels of the health system. Two factors are investigated in this study: one from the health system (health insurance) and the other from cultural practice (women's autonomy).

Theories and Concepts of Health Insurance

The *Dictionary of Health Economics* defines the term health insurance as consisting "of a contract between the client and the insurer to the effect that, in the event of specified events occurring, the insurer will pay certain sums of money either to the insured person or to the health service agency" (Culyer, 2005, p. 152). That is an arrangement by which the insurer pays contingent sums of money to the insured person or their service provider according to the terms

of the insurance policy. According to Culyer, a more accurate term would be 'healthcare insurance'. By implication, health insurance is a kind of insurance coverage that covers the healthcare expenses of an insured individual. Depending on the sort of health insurance coverage, either the insured pays costs out-of-pocket and is then reimbursed, or the insurer makes payments directly to the provider. In this case the provider is a clinic, hospital, doctor, laboratory, healthcare practitioner, or pharmacy. While the insured is the owner of the health insurance policy; the person with the health insurance coverage.

That is a health insurance policy like other policies is a contract between an insurer and an individual or group of individuals in which the insurer agrees to provide specified health insurance cover at a premium subject to terms and conditions specified in the policy. The implication is that health insurance organisations pool the healthcare risks of a group of people in order to make the individual costs predictable and manageable. By pooling risks the insurer can select premiums that actuarially make it worthwhile for the purchaser (Culyer, 2005). For the insured person, the advantage of insurance is that the probability of a large financial loss through lost earnings or expenses of medical care is exchanged for the certainty of a smaller loss in the form of the payment of a premium. Very often in countries without universal healthcare coverage, health insurance is commonly included in employer benefit packages and seen as an employment perk. In such situations, the cost of health insurance premiums is deductible to the payer, and benefits received are tax-free. Health insurance is thus a mechanism for people to protect themselves from the potentially extreme financial costs of medical care if they become severely ill and to ensure that

they have access to healthcare when they need it. Thus, insurance improves welfare of individuals when they pool their risk.

Welfare Improving Effects of Insurance

This section seeks to theoretically demonstrate the welfare benefits of insurance to the risk-averse individual in the presence of uncertainty. It is believed that risk-averse individuals can make themselves better off by pooling risk, given that each them is at risk for a negative event such as illness. The rationale of this believe is the "principle of large numbers", thus although an event is unpredictable for any single individual, the number of such events that will occur in a large group of individuals can be predicted. Assuming diminishing marginal utility of income, the standard expected utility explanation for people insuring is as in Figure 2.

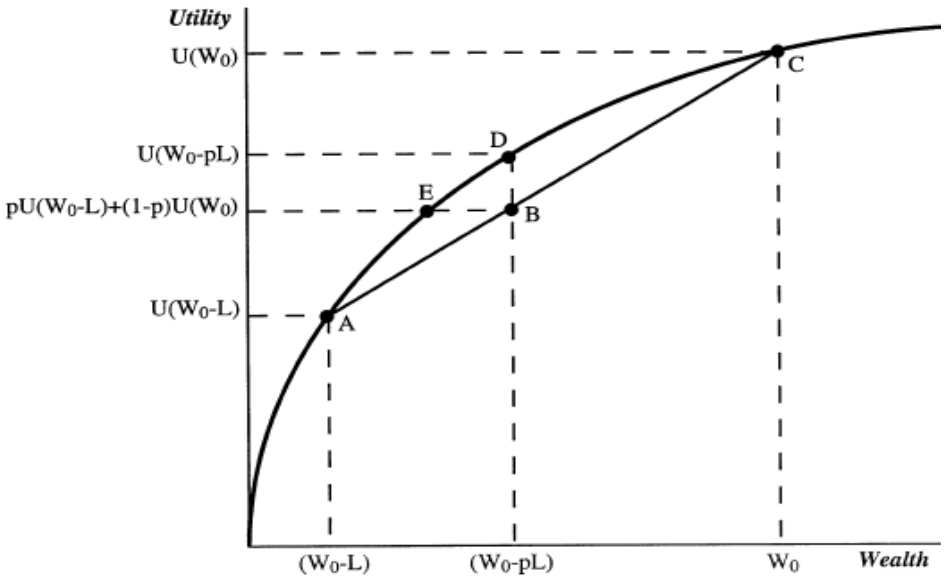

Figure 2: Welfare effects of insurance under risk aversion

Source: Culyer and Newhouse (2000)

Let W_0 be the individual's level of wealth if healthy. The individual will become ill with probability *p*, and experience a financial loss of *L*. The individual's expected wealth is: $p(W_0 - L) + (1 - p)(W_0)$, which equals $W_0 - pL$, where pL is the expected loss. Figure 2 depicts their level of utility under the different health states. The vertical axis represents total utility, the horizontal axis represents wealth, and the total utility curve is concave to reflect risk aversion (or equivalently, diminishing marginal utility for wealth). If the individual remains healthy, they attain $U(W_0)$ [point C]; if they become ill, they attain $U(W_0 - L)$ [point A]. Their expected utility is therefore $pU(W_0 - L) + (1 - p)U(W_0)$, which can be found on the chord connecting points A and C, in this case, at point B. Suppose, however, that the individual could buy an insurance contract with an actuarially fair premium (i.e., equal to the expected loss (pL)) that provided coverage for the financial loss in the event of illness. The individual would face a certain wealth level of $(W_0 - pL)$, and they would achieve utility of $U(W_0 - pL)$ [point D]. Purchasing such an insurance contract increases the individual's expected utility by the amount BD (Culyer & Newhouse, 2000).

An expectant mother can be risk-averse – scared of financial constraints associated with maternal healthcare and or with birth complications. When a woman fears birth complication, she will like to be delivered at an institutional health facility. As a result, such a woman will like to subscribe to health insurance and if she does, she stands to improve her wealth. With the increasing cost of health services and medical bills which a common man cannot afford, health insurance has a growing market therefore the theoretical explanation of demand for health insurance is warranted.

Theory of Expected Utility

The demand for health insurance is often explained using theories of decision-making under uncertainty, with expected utility theory being the most common (Alkenbrack, 2011; Marquis & Holmer, 1996). According to the expected utility theory, individuals maximise utility by reducing financial uncertainty and risk caused by possible illness and/or medical expenditures (Alkenbrack, 2011). Thus, in deciding whether to enrol, households weigh the expected utility of having health insurance with the expected utility of not having insurance. If the expected utility to be derived from enrolling is higher than that derived from not enrolling, the household will opt to enrol (Alkenbrack**,** 2011; Cutler & Zeckhauser, 2000).

Given the uncertainty of healthcare needs in the future, risk-averse individuals or households will be more likely to enrol in health insurance due to the desire to protect themselves from unforeseen health-related financial loss in the future (Arrow, 1963). Insurance also lowers the price of healthcare at the point of use, resulting in a higher demand for healthcare for the insured relative to the uninsured, everything else being equal (Alkenbrack**,** 2011).

Despite its wide application, authors have criticised Expected Utility theory for failing to account for the association between income and insurance choice (Schneider, 2004), societal context and expected pay-offs of insurance (Manning & Marquis, 1996), the status quo bias (Salkeld, Ryan, & Short, 2000), prospects of gains or losses (Marquis & Holmer, 1996), and the long-term implications of risk management (Dercon, 2007). Most of these theories are summarised by Schneider (2004), who explains that theories other than

Expected Utility may better explain the demand for health insurance in low-income contexts and among the poor (Alkenbrack**,** 2011, p. 31).

The Theory of Expected pay-offs

The theory of expected pay-offs (Manning & Marquis, 1996) for instance suggests that households will insure only if they perceive the benefits of enrolment to be higher than the costs, relative to being uninsured. However, the expected benefits are assessed not in terms of risk but in terms of the advantages of being enrolled, that is, access to better quality care, reduced waiting times, lower costs of care, among other things (Schneider, 2004). If individuals are uncertain about whether insurance will bring about these better outcomes, they will fail to insure (Alkenbrack, 2011).

The Theory of Status Quo Bias

In addition, the status quo bias suggests that consumers prefer the status quo to something new and unknown, especially when alternatives become more complicated (Salkeld et al., 2000). This theory suggests that the decision for poor and illiterate groups to enrol may be influenced by the extent to which these groups have clear information about a health insurance scheme, especially if the concept of insurance is new (Schneider, 2004; Alkenbrack, 2011).

The poverty literature explains that households are expected to become more risk averse as they move closer to poverty. In this situation, individuals may become risk-averse to "risky investments" that could push them into - or further into - poverty. The decision to enrol will also depend on differences in the ability to finance insurance, the relative values of current or future protection, and the ability to smooth consumption in the face of unexpected

illness (Schneider, 2004). Moreover, Dercon (2007) notes that insurance is a difficult concept to grasp and that purchasing insurance may increase uncertainty in low-income contexts. The upfront costs of insurance may also explain the reluctance of the poor to insure (Dercon, 2007).

Women's Autonomy

Given that health insurance may not be able to eliminate all barriers to the use of healthcare, the utilisation of maternal healthcare has been reviewed in a broader context. In this case, the use of maternal healthcare has been explored from motivational point of view, as rational choices made by women to actualise their potential (The Self-Determination Theory).

The Self-Determination Theory

Self-Determination Theory (SDT) is an important theory of motivation that addresses issues of extrinsic and intrinsic motivation (Deci & Ryan, 2002; Gagné & Deci, 2005). The SDT is a macro theory of human motivation and personality that concerns people's inherent growth tendencies and innate psychological needs. It is concerned with the motivation behind choices people make without external influence and interference. That is SDT focuses on the degree to which an individual's behaviour is self-motivated and self-determined (Deci & Ryan, 2012; Ryan & Deci, 2017). It provides a framework for understanding the factors that promote motivation and healthy psychological and behavioural functioning (Ryan & Deci, 2017).

According to the Self-Determination Theory, people have three innate psychological needs: competence, relatedness and autonomy and that if these universal needs are met, people will function and grow optimally (Ryan & Deci,

2017). In other words, the theory hypothesises that people have three basic psychological needs that are considered universal necessities and that it is necessary for these human psychological needs to be satisfied for the growth and success of an individual. Therefore, to actualise their inherent potential, the social environment needs to nurture these needs (David, 2014). The need for autonomy, competence, and relatedness suggests that individuals seek to be in "control" of their own lives, interact effectively with their environment, and form connections and relationships. This study, however, focusses on one of these needs (autonomy) and seeks to find out how autonomy influences a woman's decisions regarding maternal healthcare.

The need for autonomy concerns with the urge to be causal agents and to act in harmony with our integrated self. Deci and Ryan (2017) stated that to be autonomous does not mean to be independent. It means having a sense of free will when doing something or acting out of our own interests and values. Autonomous motivation, therefore, deals with intrinsic motivation and types of extrinsic motivation in which people integrate a value of an activity into their sense of self. When people are autonomously motivated, they gain self-support and self-advocacy through their own actions.

The concept of women's autonomy

Autonomy seemingly defies a single definition given that it has multiple dimensions. Despite significant philosophical literature devoted to the concept of autonomy, no univocal meaning of the concept exits, according to Beauchamp and Childress as cited in Osamor and Grady (2016). Similarly, although women's autonomy is widely referred to in many studies, especially about reproductive issues, there is no single widely accepted definition that

represents the multiple dimensions of women's autonomy (Osamor & Grady, 2016; Woldemicael & Tenkorang, 2010). Woldemicael (2007) also asserts that though the concept, "women's autonomy", is extensively referred to in several studies, especially studies on reproductive status and health in general, the concept remains ill-defined and its relationship to demographic processes has not been well articulated, either theoretically or empirically. Alternative terms such as women's status, female position or role, closer ties to natal kin, control over resources, and prestige are all frequently used in the literature interchangeably to define the concept (Bloom, Wypij & Das Gupta, 2001). Despite the difficulties in defining women's autonomy, several attempts have been made and some commonly used definitions of the concept have been established.

In a famous study on kinship structures, Dyson and Moore as cited in Arulampalam, Bhaskar and Srivastava (2012, p. 2) defined women's autonomy as "the capacity to obtain information and make decisions about one's private concerns and those of one's intimates". Similarly, Saflios-Rothschild cited in Arulampalam et al. (2012, p. 2), in the context of demographic change in the developing world defined autonomy as "the ability to influence and control one's personal environment". These vital fundamentals of autonomy – the ability and capacity to make decisions in a way that can influence one's environment – are echoed in other definitions (Jejeebhoy, 2000; Kamiya, 2011; Nigatu et al., 2014; Rahman et al., 2014; Woldemicael & Tenkorang, 2010). For instance, women's autonomy is the extent to which women exert control over their own lives within the families in which they live at a given point of time (Jejeebhoy, 2000). Basu cited in Osamor and Grady (2016) defined women's

autonomy as the capacity and freedom to act independently, for example, the ability to go places, such as health facilities or the market, or to make decisions regarding contraceptive use or household purchases alone and without asking anyone's permission. Mason also cited in Osamor and Grady (2016) defined woman's autonomy as her ability to make and execute independent decisions pertaining to personal matters of importance to their lives and their families. Agarwala and Lynch (2006, p. 2078) summarised this set of definition and said that "these definitions assert a single construct that captures the multifaceted ability to gain control over the circumstances of one's life". One can thus say that to be autonomous is to be self-governed and that individual acts autonomously when he or she acts on his own reasons. Therefore, to understand autonomous action, there is a need to know what it is for a reason to count as one's own.

The definition of autonomy in this way involves the capacity and the freedom of an individual to act independently of the authority of others. For example, the ability to leave the house without asking anyone's permission, make personal decisions regarding contraceptive use or obtaining healthcare, spending and purchases in the household. Thus, women's autonomy can be conceptualised as the ability to make and execute independent decisions pertaining to personal matters of importance to their lives or their family, even though men and other people may oppose their wishes (Woldemicael, 2007). The current study adopts this tradition of definition for the term, women's autonomy, and represents the concept by some selected reflective indicators or direct measures. These indicators include freedom of movement to visit families or relatives, economic decision-making power, household decision-making

power, and women's attitude toward domestic violence (wife beating). Arulampalam et al. (2012, p. 3) assert that "in essence, culling from various studies, the pieces that constitute the jigsaw of autonomy are having decision-making power, mobility, command and control over resources, and intolerance and unwillingness to put up with violence".

Women's autonomy has intrinsic significance for the well-being of women themselves and the society at large. According to Arulampalam et al. (2012), with regards to the woman herself, autonomy determines to a large extent the ability of the woman to make effective choices and exercise control over her life. It can also help women to make the greatest use of economic opportunities. Beyond the woman as an individual, autonomy has instrumental value in that women's autonomy contributes in large measure to enhancing quality of life for the family and for the community. That is to say that women's autonomy affects not only the present, but also shapes the future. Arulampalam et al. (2012) explained that a woman's attitudes and behaviour influence long term attitudes and behaviour of her children. The essence is that women's ability to exercise authority and control can promote positive attitudes to gender roles in the household and in the community. In a similar vein, the World Bank (2012) asserts that women's attitudes and vulnerability to domestic violence influence perceptions of children on what behaviour is acceptable and can limit 'intergenerational transmission of violence'.

Dimensions and Measurement of Women's Autonomy

The multidimensional nature of women's autonomy makes the concept elusive hence its definition and measurement are a challenge. Arulampalam et al. (2012, p. 8) assert that "if defining the elusive concept of autonomy is a

challenge, the measurement of this concept is even more so". It is therefore obvious that in constructing women's autonomy as a variable, there is the need to consider its multidimensionality. Balk, cited in Woldemicael (2007, p. 8) argues that women's "autonomy cannot be represented by one direct measure nor by one indirect proxy alone, and that different aspects of women's autonomy influence fertility differently, in terms of magnitude and direction". Arulampalam et al. (2012, p. 8) buttressed this assertion and stated that "since autonomy is a multi-dimensional concept, it is clear that no one indicator can adequately capture the multiple aspects".

Consequently, most scholars have combined various indicators to construct an index for autonomy. According to Samman and Santos (2009), this enables a focus on the issue of making purposeful choices, as distinct from the issue of the opportunity structure. However, (Arulampalam et al., 2012, p. 8) argue that "aggregating several indicators also raises many issues. What are the indicators that best capture the elusive concept of autonomy? How many indicators should be included? How should the selected indicators be combined? Should they be given weights? If so how?" The question is what are the desired dimensions and what are the appropriate indicators to capture this illusive concept?

Several dimensions have been identified and many indicators have been used to measure the concept of women's autonomy in the literature. Some proxies such as education, land ownership or employment history have been criticised and dropped in recent times. The argument has been that these are indicators that reflect preconditions to autonomy, rather than autonomy itself. That is to say that these indicators can empower women to become autonomous

but do not reflect autonomy in itself. It should even be noted that access to resources, for example land, does not guarantee the control of resources.

In a study, Bhandari (2015) synthesised and listed the most commonly used dimensions and indicators of women's autonomy by reviewing 11 recent studies. The current study adapted and updated the list, as in Appendix A. The dimensions of the women's autonomy as summarised in Appendix A can be grouped into four categories. These include economic decision autonomy, household decision autonomy, mobility autonomy, and autonomy of non-acceptance of violence against women (freedom from threat).

Economic decision making as indicator of women's autonomy

Control over decision making is a fundamental component to the concept of autonomy. According to Haque et al. (2011), women's autonomy in economic decision making refers to the women's ability to share or to control over the decision processes regarding domestic financial matters with husband or other male family members. It would uplift the status, control over resources, meeting the basic needs and altogether improving self-reliance, thereby reducing women's economic subordination. Indeed, the measurement of women's autonomy in economic decision making is based on three indicators such as participation in the family's major economic decision, final say on household or daily purchases, and opinion on how to spend money (Haque et al., 2011). The index so generated tends to provide the measurement of autonomy of women concerning economic decision making.

Household decision making as indicator of women's autonomy

Autonomy of women regarding household decision making refers to the extent of women's ability to participate in formulating and executing decisions on domestic affair, child welfare, own healthcare and family planning in coordination with other male family members (Haque et al., 2011). The increased role in household decision making would enable women to improve their self-determination, control over resources, self-esteem, autonomy, and status and power relations within households. Haque et al. (2011) assert that the measurement of women's autonomy in household decision making is calculated on the basis of four indicators such as women's participation in decision on their own healthcare, child healthcare, which food to be cooked each day and their participation in discussion on family planning.

Mobility as indicator of women's autonomy

Another measure of women's autonomy often used in the literature is their ability and freedom to move about. Mobility as an indicator of women's autonomy has two dimensions. One has to do with decision making regarding her movement and the second one has to do with her physical movements. Autonomy in physical movement refers to the freedom of women to move to their necessary places without being escorted. It is revealed that promotion of women's freedom of movement is necessary to make them capable of making their own choices, to change their attitudes, to improve their social networks and to reduce their level of poverty (Hague et al., 2011). According to Parveen and Leonhauser (2004), the lack of women's physical mobility deprives them of getting better livelihood opportunities. Mobility indicators generally ask whether it is acceptable for women to move around on their own in certain pre-

identified locations, such as the market, the health centre and the homes of her friends and family (Arulampalam et al., 2012).

In selecting the places that women are free to go as indicator of autonomy in wellbeing studies, one needs to be careful with questions to administer. Visits to some places may possess less degree of autonomy compared to other places (Arulampalam et al., 2012). For instance, visiting a local health centre or a friend's home in the same community may require less autonomy relative to similar places in adjoining towns. Moreover, it is not every place that a woman visits that enters her welfare basket. Kabeer cited in Arulampalam et al. (2012) delineates an important difference between locations that have 'consequential significance' and those that have 'transformatory significance'. It has been explained that the former would include for instance the health centre or a market which may have important consequence for a woman's well-being, but it would not be unusual to find women going there. By contrast, going to a cinema may not have any consequences for a woman's wellbeing, but it would have transformatory significance. For a woman to go there alone would mean breaking with established convention and sowing seeds of cultural transformation. Women's autonomy in physical movement often measured on the basis of questions about whether they can go shopping, outside the village/town/city or to hospital alone and whether they can visit their relative's house alone (Hague et al., 2011).

Non-Acceptance of domestic violence as indicator of women's autonomy

Male domestic violence perpetrated against women is another indicator that appears often in the literature of women's autonomy. This violence is regarded a direct expression of patriarchal power; men's ability to resort to

physical force to impose their own will. It is often condoned by social or religious norms that give men the authority to discipline their wives on various grounds (Arulampalam et al., 2012). There are two kinds of information available: a woman's attitude towards male violence and the actual experience of violence. This study takes the former as an indicator since actual experience of violence is frequently under-reported and hence may not be a reliable indicator. To measure attitude towards domestic violence, women are often asked whether they justify their husbands beating them for going out of the home, neglecting their children, arguing with husbands, refusing sex, or for burning food.

Empirical Literature Review

In this section, available related studies have been reviewed around health insurance enrolment and the relationship of health insurance and women's autonomy with the use of maternal healthcare.

Enrolment in Health Insurance Schemes

Although the concept of universal health coverage (UHC) is not new, over the last few years its importance and visibility have significantly increased. In 2005, the 58th World Health Assembly adopted a resolution encouraging countries to plan the transition to UHC in their health systems. In 2010, the World Health Organization devoted its *World health report* to a discussion of healthcare financing alternatives for achieving universal coverage (Giedion et al., 2013). Even if several forms of traditional risk sharing networks do exist in many low and middle-income counties, health insurance is a relatively new idea, particularly in rural areas (Mebratie, 2012; Meghan, 2010). The problem of low

enrolment in health insurance has been a topic of policy debates for decades. In an effort to understand these low enrolment levels, several studies have examined the factors affecting enrolment, either to understand enrolment on its own or as part of a larger effect evaluation within which factors affecting enrolment need to be measured to reduce bias in effect findings (Alkenbrack**,** 2011).

According to Gius (2010), by in 1977, most full-time positions had health insurance as part of their benefits packages. Hence, it stands to reason then that full-time employment would be a very good predictor of health insurance coverage. However, since then, given the rapidly escalating cost of health insurance, fewer and fewer employers are offering health insurance, or at least affordable health insurance, as part of their benefits package.

Focusing on the variables that relate to the demand for healthcare, Munkin and Trivedi (2003) also found positive correlations between the purchase of private insurance and marital status, years of education, and family income. The study found negative correlation between health insurance ownership and having excellent or poor health. Munkin and Trivedi also concluded that number of chronic conditions, being male, and old age adversely affect the enrolment in health insurance.

In Rwanda, Diop, Sulzbach and Chankova (2006) found that household size, education and employment status of the head of household have positive association with MHO membership. Also, households headed by women were seen more likely to enrol in MHOs than households headed by men. However, evidence on the association between household wealth quintile and MHO enrolment was inconclusive. With this result the researchers suggested that

enrolment in a MHO may have depended on other dimensions of social inclusion, such as type of MHO ownership.

Another study in the US, Gius (2010), examined the determinants of health insurance coverage among young adults and suggested that socioeconomic factors are most important in determining which young adults have health insurance and which do not. Specifically, the study found out that "if a person is a young, African-American male, who lives in the South, and does not have a full-time job, then that person, in all likelihood, will not have health insurance" (p. 1).

In Ethiopia, Mebratie (2012) also examined the role of some factors in determining initial scheme uptake and scheme uptake two years after the inception of the scheme. Specifically, Mebratie examined the role of household socio-wealth quintile in accessing community based health insurance with the mind to understand the extent to which the scheme reaches different socioeconomic groups; the role of individual health status and expected healthcare expenditure in driving enrolment decisions with the mind to assess the extent to which household assessment of health related risks drives decision to purchase health insurance; the role of awareness of health insurance in determining scheme enrolment; and the role of the availability and the quality of health facilities in determining scheme uptake.

The study found that the enrolment decision of households depends among other things on their knowledge of health insurance (Mebratie, 2012). In support of Nketiah-Amponsah and Sagoe-Moses (2009) and Shimeles (2010), Mebratie (2012) asserts that in addition to the knowledge of health insurance, the likelihood of individuals and households' enrolment on health insurance can

also be influenced by factors related to healthcare supply. The main supply factor used by these group of researchers is the distance to the nearest health facility (Mebratie, 2012).

Using the 2008-2009 Kenya Demographic Health Survey with a multinomial logit model, Kiplagat, Muriithi and Kioko (2013) found that wealth index, employment status, education level and household size are important determinants of health insurance ownership and choice. The study also found that lack of awareness prevents many people from enrolling in any form of health insurance scheme. Given the multinomial nature of Kiplagat et al. (2013), the study was able to establish that the type of health insurance in question can also determine health insurance subscription.

Alkenbrack (2011) examined the enrolment, effects, and the prospects for expansion of two types of health insurance schemes (community-based health insurance and social health insurance) in Lao People's Democratic Republic. The study found that in terms of the relationships between firm characteristics and enrolment in social health insurance, the odds of enrolling are higher in the trade industry than in the services, manufacturing, or construction industries.

Nair (2015) sought to document the demand side and supply side factors affecting the implementation of comprehensive health insurance scheme in Kerala and to explore the effect of the scheme on equity concerns and moral hazard. With a qualitative case study design a variety of stakeholders were interviewed using a combination of purposive and snowball sampling to trace out the supply side issues. In-depth group interviews conducted to document the demand side factors. The study found the major demand side factors to include lack of awareness regarding the benefits of the scheme; exclusion of outpatient

care; limited coverage; limitedness of provider choice; and unhappiness with the public health facilities. With regards to the supply side factors, the study documented delay in getting funds from government; less incentives; and over work load.

Wang et al. (2014) conducted an in-depth examination of the levels of health insurance coverage in 30 low-and-middle-income countries. The study was based on nationally representative data from the Demographic and Health Surveys using propensity score matching. Educational attainment was found to be associated with a higher likelihood of enrolling in health insurance. Pro-wealthy disparities in health insurance coverage existed in most of the countries. However, in Cambodia and Gabon, poor women were more likely than the rich to be covered by health insurance, suggesting that in these countries policies focusing on providing insurance for the poor have been effective (Wang et al., 2014).

In Ghana, Sekyi (2009) sought to explore the determinants of enrolment of the National Health Insurance Scheme and examine its effects on the probability of utilising outpatient care and expenditure in the Mfantseman Municipality of the Central Region of the country. The study used a sample of 384 individuals who were randomly selected and interviewed. Simple logit regression model was used to analyse the probability of utilisation of outpatient care and the determinants of enrolment in health insurance. It was revealed that factors which influence enrolment at the individual/household level were age, sex, education, income and wealth.

Dixon (2014) also explored the determinants of enrolment in the National Health Insurance Scheme in Ghana's Upper West Region. Dixon employed

mixed methods that combine quantitative and qualitative techniques in order to better understand patterned differences between enrolled, never enrolled and dropped out members of the scheme. With a sample of 2119 in a quantitative analysis, the study revealed that "while studies on the theoretically 'pro-poor' NHIS have thus far focused on wealth as driver of enrolment, the high rates of enrolment in the poorest and most deprived region of the country suggest that other factors underpin health insurance acquisition and maintenance" (Dixon, 2014, p. ii). Specifically, Dixon found that although wealth, education and desire for health insurance are primary determinants in enrolment, these factors influence men and women differently. That is gender differences come to play in terms of health insurance enrolment. In addition, "women with unreliable incomes, who reported being food insecure and those living with young children were more likely to drop out, whereas men, were more likely to drop out of the NHIS for being unsatisfied with services provided" (Dixon, 2014, p. ii).

Alatinga and Williams (2015) investigated the determinants of household participation in National Health Insurance Scheme in the Kassena-Nankana District of the Upper East Region of Ghana. The study adopted a cross-sectional survey and used a sample of 417 randomly selected household heads. The results, according to the authors, suggested an incremental progress towards achieving universal health coverage given that majority (67%) of the sampled population was enrolled in the NHIS.

Nevertheless, the study discovered that, majority (77%) of uninsured households indicated that they were not enrolled in the NHIS because they could not afford the cost of insurance premiums (Alatinga & Williams, 2015). In addition to income, the study found other significant determinants of health

insurance enrolment including socio-wealth quintile, formal employment, educational status, and gender.

Other studies also confirm the level of education as a determinant of the demand for health insurance (Bourne & Kerr-Campbell, 2010; Makoka, Kaluwa & Kambewa, 2007). Baloul and Dahlui (2014) for instance found that people with a university and higher education background were more likely to be insured, compared to those without formal education. Health status was also found to be a significant determinant of ownership of health insurance policy. Baloul and Dahlui (2014) again discovered that people with diabetes and hypertension were more likely to be insured, than those without such conditions. Baloul and Dahlui, also conclude that enrolment was determined by occupation, given that civil service workers had an 80% higher chance of being enrolled, compared to those unemployed. Finally, it is noted that self-rated health status has also been identified as one of the main determinants of decision to participate in voluntary insurance schemes (Lammers & Warmerdam, 2010).

In conclusion, a number of studies had explored the determinants of health insurance subscription and the key among the factors is income or wealth. Alkenbrack (2011) for instance found that the poor are the least likely to enrol and the poor who are enrolled incur higher out-of-pocket expenditures than the uninsured. Dixon (2014) asserts that studies on Ghana's NHIS and health insurance schemes more broadly have tended to focus equity questions around matters of wealth. For instance, Saprong et al. (2010) in the Ashanti Region found that the wealthy were almost five times more likely to enrol than the poor. Jehu-Appiah et al.'s study in the Central Region and Eastern Region also finds "compelling evidence of inequity in enrolment" (Jehu-Appiah et al., 2011: 162)

between the poor and the rich, and Dixon, Tenkorang and Luginaah (2011) who found that nationally the richest men were 2.73 times more likely to enrol and the richest women 2.15 as likely to enrol, compared to the poorest Ghanaians. Other factors identified include level of education, occupation, health status, sex of household head, residence, age, type of insurance, religion, distance to the nearest health facility, and awareness of health insurance.

Effect of Health Insurance on Maternal Healthcare

Maternal and child health services are typically covered in benefit packages of health insurance. However, few studies, especially those using rigorous methods, have assessed the effect of health insurance on use of maternal and child healthcare (Wang et al., 2014). Comfort, Peterson and Hatt (2013) conducted a systematic review of the evidence on health insurance and its effects on the use and provision of maternal health services and on maternal and neonatal health outcomes in middle- and low-income countries. The study found relatively consistent evidence that health insurance is positively correlated with the use of maternal health services.

A study assessed a pilot voucher programme in Bangladesh by comparing the intervention and comparison areas using difference-in-differences methods. The study found that women in intervention areas had significantly higher probability of using antenatal care, institutional delivery, and postnatal care (Nguyen et al., 2012).

The effect of health insurance status on the use of maternal healthcare was has been estimated in eight low-and-middle-income countries which had health insurance coverage exceeding 10 percent (Wang et al., 2014). The study was based on nationally representative data from the Demographic and Health

Surveys using propensity score matching. The study found significant positive effects of health insurance enrolment on the utilisation of at least one measure of maternal healthcare in seven of the eight countries (Wang et al., 2014). The positive effect of health insurance appeared more consistent on the use of facility-based delivery than use of antenatal care. The analysis provides clear evidence that health insurance has contributed to the increased use of maternal healthcare services, Wang et al. (2014) concluded.

In Rwanda, a set of ten-year (2000 to 2010) health sector reforms that sought to strengthen the public health system, with the aim of reducing maternal and new-born deaths was evaluated (Bucagu et al., 2012). The study used national policy documents and three Demographic and Health Surveys (2000, 2005 and 2010) to describe the reforms and the policies they were based on. It was found out that progress took place in 2000 to 2005 and became more rapid after 2006, mostly in rural areas. The authors attributed these improvements to the upscale of the community-based health insurance among other things. Specifically, according to the study, "between 2006 and 2010, the following increases in coverage took place as compared to 2000–2005, particularly in rural areas, where most poor women live: births with skilled attendance (77 percent increase versus 26 percent), institutional delivery (146 percent increase versus 8 percent)" (Bucagu et al., 2012, p. 50). It is however necessary to note that the paper did not employ any technique to examine the causal relationship hence the actual effect of health insurance holding on the use of maternal healthcare cannot be isolated, holding all other factors constant.

In Ghana, Mensah, Oppong and Schmidt (2010) employed propensity score matching to balance demographic characteristics such as region, age,

marital status, and wealth assets and found that women with insurance under the National Health Insurance Scheme, compared with women without insurance, had significantly fewer birth complications (1.4 versus 7.5 percent), had more births at a hospital (75 percent versus 53 percent), received professional assistance more commonly during birth (65 percent versus 47 percent), and had at least three prenatal check-ups (86 percent versus 72 percent) (Mensah et al. 2010). Women with insurance had postnatal check-ups and vaccinations for their children on average more than uninsured women (86 percent versus 71 percent) (Mensah et al., 2010; Wang et al., 2014).

Similarly, Frimpong et al. (2014) examined health insurance registration among pregnant women before and after the introduction of a premium exemption and tested whether registration increased utilisation of maternal health services in Ghana. Data were drawn from retrospective cohort study of 1,641 women who gave birth between January 2008 and August 2010 in two impoverished districts of Northern Ghana. Logistic regression was used to measure the association between insurance registration and receipt of essential maternal health interventions in the context of the premium exemption. The study also tested whether this association varied across levels of the health system.

Frimpong et al. (2013) indicate that health insurance enrolment increased among pregnant women after adoption of the premium exemption. Coverage of clinical and diagnostic services was high, but antenatal care clients received only partial counselling about safe motherhood (Frimpong et al., 2014). According to the authors, in hospitals and health centres, NHIS registration was associated with higher quality of services while in community health

compounds, NHIS registrants received fewer diagnostic tests, were less extensively counselled about safe motherhood and were less likely to be vaccinated against tetanus toxoid than non-registered clients. However, being an NHIS registrant was associated with an increased likelihood of delivering at a health facility among community health compound clients.

Nketiah-Amponsah and Arthur (2013) did a slightly different work where they examined the extent to which expectant mothers' access to health insurance influence their choice of delivery facilities broadly categorized into public health facilities, private health facilities and home delivery. The study employed multinomial logistic regression fitted on the 2008 Ghana Demographic and Health Survey data. The study found that women with access to health insurance are more likely access facility-based delivery care relative to home delivery. Specifically, women with health insurance are approximately 18 percent more likely to be delivered in a public health facility as compared to home delivery while the propensity to be delivered in private health facilities relative to home delivery increases by one percent for women with health insurance. The strength of the study by Nketiah-Amponsah and Arthur (2013) is the separation of health facilities into private and public and teasing out the effect of health insurance on each option relative to home delivery care. However, the study failed to address problems of endogeneity even though it is generally acknowledged that health insurance subscription is open to selection bias which can cause endogeneity.

Another study sought to examine whether enrolment in the National Health Insurance Scheme affects the frequency and timing of antenatal care among 1,610 women in Ghana (Dixon et al., 2014). The study employed

negative binomial and logistic models using data from the 2008 Ghana Demographic and Health Survey. The results are that irrespective of socio-economic and demographic factors, women who enrolled in the NHIS make more antenatal visits compared with those not enrolled. The study, however, found no statistical association with the timing of the crucial first visit (Dixon et al., 2014). In addition, the paper found that women who were educated, living in urban areas and wealthy were more likely to attend antenatal care than those living in rural areas, uneducated and from poorer households.

Singh et al. (2015) also investigated the use of maternal and child health services by health insurance subscriber in Ghana. Both qualitative and quantitative data from a baseline assessment for the maternal and new-born referrals evaluation from the Northern and Central Regions were used to describe women's experiences with the NHIS and to study associations between health insurance and skilled facility delivery, antenatal care and early care-seeking for sick children. The quantitative findings indicate that insurance coverage during the previous three years and insurance during pregnancy were associated with greater use of facility delivery but not ANC. Respondents with health insurance were also significantly more likely to indicate that an illness need not be severe for them to take a sick child for care. The therefore concluded that NHIS appear to enable pregnant women to access services and allow caregivers to seek care early for sick children.

In conclusion, it is observed that generally the previous studies lumped health facilities together and measured the utilisation of maternal healthcare as binary variable (facility-based and home) and thereby employed methods such as difference-in-difference (Nguyen et al., 2012), propensity score matching

(Mensah et al., 2010; Wang et al., 2014, 2016) or logistic regression (Frimpong et al., 2014). Moreover, the assessment of the effects of the National Health Insurance in Ghana was been done using 2008 data while the exemption policy was introduced in July 2008. In addition, the NHIA revised the policy implementation guidelines in 2010 to encourage women to register on the NHIS before accessing the free maternal care (Nketiah-Amponsah & Arthur, 2013).

Again, the findings of the studies reviewed were consistent with economic theories, in identifying a positive relationship between health insurance enrolment and the use of health services. Some studies, however, have reported mixed findings regarding the effect of health insurance on use of maternal healthcare. An evaluation of community-based health insurance in one province in India employed a propensity score matching technique and did not find differences in maternal healthcare by health insurance coverage, either in use of prenatal services or delivery in private facilities (Aggarwal, 2010). The author suggests that this was most likely because, at the time of the study, coverage of normal deliveries in private settings had been only recently added to the insurance scheme so that there was not enough time to measure meaningful change. Additionally, in the India province in question, maternal health fees were already negligible in government facilities. Similarly, Frimpong et al. (2013) reported that in community health compounds, NHIS registrants received fewer diagnostic tests, were less extensively counselled about safe motherhood and were less likely to be vaccinated against tetanus toxoid than non-registered clients (Frimpong et al., 2014). Finally, Singh et al. (2015) found that insurance coverage during the previous three years and insurance during

pregnancy were associated with greater use of facility delivery but not antenatal care.

Influence of Women's Autonomy on Maternal Healthcare

Women's autonomy in healthcare decision is a prerequisite for improvements in maternal and child health (Nigatu et al., 2014). The concept is considered essential for decision-making in a range of healthcare situations, from health seeking to choosing among treatment options. Evidence suggests that women in developing or low-income countries often have limited autonomy and control over their health decisions (Osamor & Grady, 2016). Women's ability to attend to their health and utilize healthcare appropriately may depend in part on their autonomy, especially their decision-making power (Osamor & Grady, 2016). In the literature on maternal health, women's decision-making ability regarding use of health services is often discussed using the concept of autonomy (Osamor & Grady, 2016; Woldemicael & Tenkorang, 2010). In recent years, researchers and policy makers agree that restriction of women's decision making is a key barrier to improve their maternal health status in developing countries (Bhandari, 2015).

Studies show that women with greater autonomy are more likely to seek healthcare for themselves (Bloom et al., 2001; Osamor & Grady, 2016) and use different forms of healthcare services available to them (Osamor & Grady, 2016; Rahman, Mostofa, & Hoque, 2014). A few previous studies with varied methods found positive association between the use of maternal healthcare and women's autonomy. Some of these studies examined the relationship between some dimensions of autonomy and aspects of maternal healthcare. Others used

composite index to capture women's autonomy concept hence investigated its effects on different aspects of maternal healthcare.

With respect to decision making as a dimension of autonomy, Mistry, Galal and Lu (2009) reported that greater autonomy in decision-making increased the likelihood of women receiving prenatal, delivery, and postnatal care in rural India and stressed that low levels of autonomy adversely affect women's likelihood of using maternal healthcare services, especially prenatal and postnatal check-ups. Kamiya (2011) reported that in households in which female members make decisions on financial matters, women have a greater chance of receiving antenatal and delivery care. Mistry et al. (2009) also showed that financial autonomy of women was associated with the use of delivery care and postnatal check-ups. Another study carried out in Pakistan found significant positive correlation between women's decision making power and maternal health uptake, but opposite result had been found with male's decision making after controlling for other socio demographic factors (Hou & Ma, 2013).

Similarly, Paudel and Pitakmanaket (2010) found that women who made sole decision on their healthcare were 1.61 times more likely to use antenatal care than the women making joint decision with husbands or others. A study from Egypt found that improved status of women regarding increased educational level, support from husbands and older age at marriage were likely to increase the use of maternal healthcare (Chiang et al., 2012). Chiang et al. also explained that the participation in decision making in household issues such as family planning was significant to the regular antenatal check-up and skilled attendants at birth.

Some studies further show that women who had greater autonomy over physical and financial resources were likely to seek healthcare and make fertility decision independently (Bhandari, 2015). Using logistic regression to assess the effect of women's autonomy on maternal healthcare in Nepal, Thapa and Niehof (2013) disclose that high women's autonomy contributed to the high utilisation of maternal healthcare services in 2012. Thapa et al. (2013) also found that financial autonomy, movement autonomy, decision autonomy had positive association with the utilisation of maternal healthcare services during pregnancy, delivery and postnatal period in Nepal. Also, Among Nepalese women, a low level of women's autonomy was found to be a contributory factor to poor maternal health service utilisation (Thapa & Niehof, 2013).

In a study from Bangladesh, Haque et al. (2010) studied the association between women's autonomy and maternal healthcare utilisation. They discovered that women having higher level of overall autonomy were more likely to receive more antenatal care and receiving antenatal care from skilled personnel. Women who had medium level of overall autonomy were 1.40 times more likely to be delivered with the assistance of skilled health personnel (Haque et al., 2010).

Wado (2013) investigated the potential importance of women's autonomy in the reproductive healthcare seeking behaviour of women in Ethiopia. The study tested a hypothesis that women's autonomy influences their reproductive healthcare seeking behaviour independent of maternal social and demographic characteristics based on data from the 2005 Ethiopian Demographic and Health survey (EDHS). Women's autonomy was measured by women's participation in domestic decision making, attitudes toward wife beating, attitudes toward

refusing sex with husband, and whether women said that getting permission to seek medical care is a big problem. Wado (2013) demonstrated that women's autonomy has an important influence on their reproductive healthcare seeking behaviour. Specifically, Wado (2013) found that women's participation in domestic decision making is strongly associated with ever-use of family planning, but not with use of antenatal care. Also, women's attitudes toward refusing sex with husband and the ease of getting permission to seek medical help are significantly associated with both ever-use of contraception and use of antenatal care services.

Similarly, Situ (2013) assessed the association between women's autonomy and maternal healthcare utilisation among Nepalese women. The study was based on the 2011 Nepal Demographic Health Survey (NDHS) with a sample of 4,148 women. Situ (2013) measured utilisation of maternal healthcare services in terms of number of ANC visits, timing of start of ANC visit, skilled attendants during ANC visits, place of delivery and skilled attendants during delivery. Likewise, women's autonomy was assessed in terms of decision-making regarding healthcare, large household purchases, visiting friends or relatives and spending money earned by husbands. Situ (2013) employed Pearson's chi-square test and multiple logistic regressions and found that women who had autonomy in their healthcare were significantly more likely to have at least three ANC visits and were also more likely to give birth at health facility.

Dangal and Bhandari (2014) also reported that physical, financial and decision-making autonomies as well as autonomy for spousal communication influence the fertility limitation and utilisation of maternal healthcare services.

In another study, women's autonomy was found to be a key predictor of the utilisation of maternal healthcare services (Bhandari, 2015). Precisely, women's autonomy seems as a mediating factor of the pathways in the utilisation of maternal healthcare services, according to Bhandari (2015).

In a closely related study, Urbaeva (2015) examined associations between household autonomy and utilisation of prenatal services among women of reproductive age in Armenia and Azerbaijan. The study was based on nationally representative survey data sets (DHS). Specifically, Urbaeva (2015) explored the influence of household autonomy of women on the timing of the first prenatal visit, the number of prenatal care visits, and the content of care during visits, using ordinary least squares (OLS) and simple Poisson regression. The study found that household autonomy was positively associated with the timing of the first visit for prenatal care, but the number of prenatal care visits and the content of care were negatively associated with the autonomy of women.

A recent study from Nepal explored dimensions of women's autonomy and their relationship with utilisation of maternal health services (Adhikari, 2016). The study used data from the 2011 Nepal Demographic and Health Survey with a sample of 4,148 and measured women's autonomy based on decision in household about obtaining healthcare, large household purchases and visit to family or relative. Adhikari (2016) employed multivariate logistic regression analysis and confirm that higher level autonomy was associated with higher use of maternal health services in Nepal.

In Bangladesh, again, a study constructed an index of women's autonomy and analysed its effect on maternal healthcare utilisation using conditional mixed process estimator with instrumental variable to correct for possible

endogeneity of women's autonomy (Haider et al., 2017). For this study, data was sought from the 2011 Bangladesh Demographic and Health Survey and women's autonomy variable was obtained through factor analysis of variables related to autonomy in decision making regarding healthcare, financial autonomy and freedom of movement. Haider et al. (2017) also found that women with low autonomy used the maternal healthcare less that women with higher autonomy. The strength of Haider et al. (2017) lies in the use of instrumental variable to correct for possible endogeneity. However, the study also concentrated on specific aspects of maternal healthcare and did not consider how autonomy can influence health insurance subscription and indirectly affect the utilisation of maternal healthcare.

In contrast, Fotso et al. (2009) did not find any relationship between utilisation of maternal health services for delivery and high levels of women's overall autonomy, freedom of movement, or decision-making in Kenya. Moreover, a study carried out in Tajikistan found some negative effects of women's autonomy on attending four ANC check-ups (Kamiya, 2011) even though there was a positive association between women's autonomy and the utilisation of reproductive healthcare services.

Conceptual Framework

The conceptual framework is designed to guide the choice of variables and estimation techniques for this study.

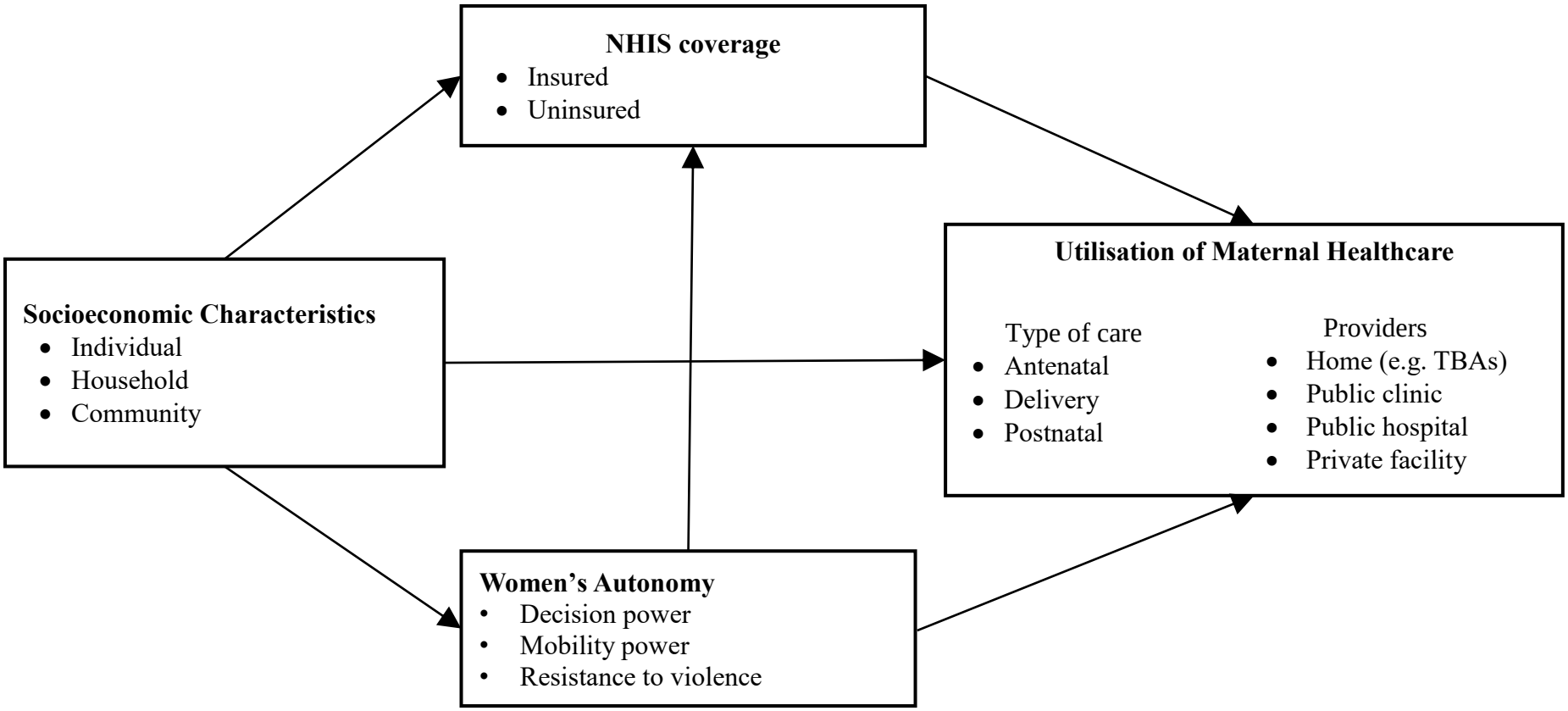

Figure 3: Maternal health seeking behaviour model

Source: Author (2018)

The design was mainly based on the theory of demand for health (Grossman, 1972) and the Behavioural Model of Health Services Utilisation developed of Anderson (1995). The framework, as shown in Figure 3, is an integrated maternal health seeking behaviour model, consisting of associations of variables considered relevant for explaining or predicting maternal health-seeking behaviours.

Following the theory of demand for health, an expectant mother is believed to restore or prevent the deterioration of her health by using maternal healthcare. Maternal healthcare services are grouped as antenatal care, delivery care and postnatal. The expectant mother also has options of care providers to choose from. The care providers are classified as home where the woman accesses care from relatives or traditional birth attendants (TBAs), public clinics, public hospital and private facilities. The study was unable to separate private hospitals and private clinics because the number of observations that used private hospitals was too small to be an option on its own. The STATA software collapses options with such small number of observations.

The utilisation of the maternal healthcare has been assumed to be determined by a sequence of factors namely individual, household and community factors. Anderson (1995) refers to these factors as predisposed, enabling and need factors. The individual factors centre on the idea that some people have a greater tendency to use maternal health services than others. Such factors include age, marital status, educational level, occupation, autonomy and health insurance status of the expectant mother. Household characteristics are the household level factors such as the wealth quintile of the household and sex of the household head. The community factors are the community level features

such as residence type (rural or urban), region, ethnic group, distance to the nearest health facility and the entire health system.

Though these sets of variables are believed to directly influence utilisation of maternal healthcare, some of them such as education and wealth can also determine the decision to subscribe to the NHIS while some can influence the level of women's autonomy. It means that the NHIS is a decision variable and can also determine the utilisation of maternal healthcare. This situation makes NHIS endogenous (Jowett et al., 2004) and needs to be treated as such. Moreover, when a woman becomes autonomous, she makes her own healthcare decisions better. She can decide to use maternal healthcare directly or subscribe to the NHIS to enable her utilise healthcare. This suggests that the NHIS can mediate women's autonomy and the utilisation of maternal healthcare.

Though this study focuses on the effects of the NHIS enrolment and women's autonomy on the utilisation of maternal healthcare, it recognises the fact that other social and economic factors can also directly or indirectly determine the use of maternal healthcare. There is therefore the need to control for such factors to avoid the problems of cofounding and omitted variable bias.

Conclusion

This chapter presents the review of related literature pertaining to health insurance, women's autonomy and maternal healthcare utilisation. The theory of demand for health by Grossman (1972) was engaged to explain the need for the utilisation of maternal healthcare as either preventive or curative care to prevent the deterioration or restore maternal health. Andersen's Behavioural Model of Health Services Utilisation was employed to justify possible factors of maternal healthcare utilisation. In terms of health insurance, theories of health

insurance were explored followed by health insurance subscription and the effects of the concept on the utilisation of maternal healthcare. Theories that explain health insurance subscription include the Theory of Expected Utility, Theory of Expected Pay-offs, and the Theory of Status Quo Bias.

Several factors have been identified as the determinants of the enrolment to health insurance some of which include education, wealth, sex, residence type, employment status, disease conditions among others. The literature also documents positive effects of health insurance on the use of maternal healthcare. However, the 2008 data sets used in the previous studies to assess the enrolment to the NHIS and its effects on maternal healthcare in Ghana might not tell convincing story about the phenomenon. This is because Ghana implemented the NHIS policy in the late 2005 and added "free" maternal healthcare policy in July 2008. Moreover, the implementation guidelines for the free maternal healthcare policy was revised in 2010 to encourage women to enrol on the NHIS before accessing the free care (Nketiah-Amponsah & Arthur, 2013). Given the level of education of the population in question and the fact that NHIS was a new concept, the 2008 data could not fully account for its enrolment and effects on maternal healthcare following the theory of status quo bias.

Moreover, studies that assessed the effects of health insurance on the place of delivery, generally, measure place of delivery as binary variable by lumping all kinds of health facilities together against home delivery. Common methods used to address endogeneity of health insurance include propensity score matching and difference-in-difference while others used simple logistic regression models. Some other studies (Nketiah-Amponsah & Arthur, 2013)

tried to separate place of delivery into home, private and public health facilities. However, these studies were unable to address endogeneity problems.

Regarding women's autonomy, the Theory of Self-Determination was adopted to explain how autonomy as an innate psychological need enables people make rational decisions and thereby function, grow optimally and actualise their inherent potential. The measurement of autonomy depends on its dimensions which include economic decision autonomy, household decision autonomy, mobility autonomy, and autonomy of non-acceptance of violence against women (freedom from threat). Most of the studies reviewed found strong positive association between women's autonomy and maternal healthcare. However, most of these studies either constructed composite index for the construct, autonomy, or studied the individual indicators or dimensions of the construct. That is, the indicators of autonomy are not often analysed to test their appropriateness in models. Again, the possibility of NHIS to mediate autonomy and desired maternal healthcare has also not been tested. It is, therefore, prudent to analyse the factors of autonomy, estimate its effects on desired maternal healthcare and test if NHIS mediates autonomy and desired maternal healthcare in the same model.

CHAPTER FOUR

RESEARCH METHODS

Introduction

This chapter presents the description of the methods employed in the conduct of the study. The chapter opens with philosophies and study design and followed by the theoretical framework for the study where demand for maternal healthcare has been modelled. It continued with the description of data for the study and concluded with explanations of empirical models and the estimation techniques.

Research Philosophies

Research philosophy relates to the development of knowledge and the nature of that knowledge, and since every research (basic or applied) develops new knowledge in a particular field, there is a need for a philosophical underpinning of this study (Saunders, Lewis, & Thornhill, 2009). Ontologically, following Saunders et al. (2009), four research philosophies could be identified which include positivism, realism**,** interpretivism and pragmatism**.** This study lies in the positivism because the real estimates of the effects of NHIS and women's autonomy on maternal healthcare needs to be external, objective and independent of social actors. Positivism predominates in science and assumes that science quantitatively measures independent facts about a single apprehensible reality (Agbanyo & Obeng, 2016; Healy & Perry, 2000).

Epistemologically**,** positivists believe that only observable phenomena can provide credible data and thereby focus on causality and law like generalisations while axiologically, research is undertaken in a value-free way, where the researcher is independent of the data and maintains an objective

stance. Finally, in terms of data collection, positivism relies on highly structured techniques, large samples, accurate and quantitative measurement of phenomenon. The essence of this stance in this study is to ensure objective and value-free-judgement in measurement of variables of interest and ensure quantifiable observations that lead to quantitative statistical analysis.

Moreover, given the subject matter of this thesis, the utilisation of maternal healthcare, the researcher follows the thoughts of the neoclassical economists. The neoclassical economic school of thought probably entails the most widely used economic theories such as supply, demand, profit, and utility. It is an approach to economics that relates supply and demand to an individual's rationality and his ability to maximise utility or profit. That is neoclassical economics focuses on how the perception of efficacy or utility of products affects supply and demand of the product. Neoclassical economists also use mathematical equations to study various aspects of the economy.

Neoclassical theory is often invoked by economists to justify public and private roles in the health sector (Preker & Harding, 2000) probably due to market failures in the health sector as a result of externalities and uncertainties that surround healthcare as a commodity. This study seeks to analyse the effect of national health insurance and women's autonomy on the uptake of maternal healthcare in Ghana. In this case, the expectant mother is a consumer of maternal healthcare. The expectant mother would act rationally and make decisions based on the utility she would derive from the use of a particular service. Moreover, the mother has alternative care providers and can thus compare services and then make consumption decisions based on the perceived utility.

Research Design

Based on the positivism and the neoclassical economic philosophical stance, the study is approached with quantitative methods where objective theories are tested by examining the relationship among variables. Numerical data is also analysed using statistical procedures to test the effects of the NHIS and women's autonomy on maternal healthcare (Creswell, 2014). The study is cross sectional and analytical in nature. As an analytical research, the study has used facts or information already available, analysed these and made evaluation of the results obtained (Kothari, 2004). With cross-sectional analysis, the study has the advantage of avoiding various complicating aspects of the use of data drawn from various points in time, such as serial correlation. It also has the advantage that the data analysis itself does not need an assumption that the nature of the relationships between variables is stable over time as in time series and panel data analysis.

The study adopted quantitative approach to analysis given the advantages of quantitative research. Quantitative studies allow for large-scale analyses and has greater generalisability of results obtained compared to qualitative studies (Choy, 2014; Uxmatters, 2012). Kruger (2003, p. 1) confirms that "quantitative methods allow us to summarize vast sources of information and facilitate comparisons across categories and over time". Another key benefit of quantitative studies is that it provides the means to separate out the large number of confounding factors that often obscure the main qualitative findings (Uxmatters, 2012). Multivariate statistics such as multiple regression or stepwise correlation regression break the data down even further and determine what factors we can attribute to differences between specific groups such as age

groups. Therefore, the complex nature of inter-relationships among social factors requires some degree of quantification of the data and a subsequent analysis by quantitative methods.

According to InterAction (2017), quantitative research has a number of other advantages. Some of which include its objectivity, accuracy, validity and reliability of results. Generally, quantitative methods are designed to employ prescribed procedures to ensure valid and reliable results. Similarly, quantitative studies employ standardised approaches that permit the study to be replicated in different areas or over time with the production of comparable findings. It is also possible with quantitative analysis to control for the effects of extraneous variables that might result in misleading interpretations of causality. Again, personal bias can be avoided by researchers when they keep a 'distance' from participating subjects and employing subjects that are not unknown. Finally, quantitative studies can obtain the magnitude and distribution of effects of one phenomenon on the other and this can be done faster relative to qualitative studies.

Despite these advantages of quantitative analysis, the approach has some weaknesses. One of the key shortcomings of quantitative data is that it fails to provide an in-depth interpretation or description of the experience and feelings of study participants (Uxmatters, 2012). According to Assessment Capacities Projects (ACAPS) (as cited in Choy, 2014), knowing how many people are affected by a phenomenon and what factors account for a particular situation does not provide sufficient information as to how people feel about such situations. InterAction (2017) confirmed that the results of quantitative analysis are limited as they provide numerical descriptions rather than detailed narrative

and generally provide less elaborate accounts of human perception. Thus, reduction of data to numbers results in lost information (InterAction, 2017). It can therefore be concluded that many important characteristics of people and communities such as perceptions and beliefs that cannot be meaningfully reduced to numbers or adequately understood without reference to the local context in which people live cannot be accurately studied quantitatively (Dudwick, Kuehnast, Jones & Woolcock, 2006).

Additionally, for most tests, there is an overreliance on the p-value and sample size even though there is possibility to manipulate a p-value by the sample size (Uxmatters, 2012). One needs a sufficient sample size to have enough statistical power to determine whether a finding is accurate. It is argued that if a study is underpowered because it has too small a sample size, one may fail to achieve statistical significance – even if the finding is accurate. By increasing the sample size, you can increase a finding's statistical power, but perhaps to a point where the finding becomes less meaningful (Uxmatters, 2012).

Type, Source and Description of Data

The analysis in this study is based on data from the 2008 and 2014 Ghana Demographic and Health Surveys (GDHS). These are nationally representative surveys. The 2008 and 2014 GDHS were the fifth and sixth in series of population and health surveys conducted in Ghana since 1988 as part of the global Demographic and Health Surveys (DHS) Program (GSS et al., 2015). The surveys were implemented by the Ghana Statistical Service (GSS), the Ghana Health Service (GHS), and the National Public Health Reference Laboratory (NPHRL) of the GHS.

For the 2008 GDHS, a total of 4,916 women age 15-49, and 4,568 men age 15-59 from 6,141 households were interviewed. Data collection took place over a three-month period, from early September to late November 2008. For the 2014 GDHS, a total of 9,396 women age 15-49, and 4,388 men age 15-59 from 11,835 interviewed households. Data collection took place over a three-month period, from early September to mid-December 2014. The primary purpose of the GDHS is to generate recent and reliable information on fertility, family planning, infant and child mortality, maternal and child health, and nutrition (GSS et al., 2015).

The unit of analysis in this study is the individual woman aged 15-49 years who had information on the utilisation of maternal healthcare for her latest live birth in the five years preceding the surveys. The age group is deemed appropriate because the women are in their child bearing age. There are two reasons for this focus: first, the women's questionnaire in the 2014 GDHS captured information which could enable analysis with the third Sustainable Development Goal (SDG-3) in mind. Secondly, this study investigates the details of the most recent birth only because it is assumed that information on maternal healthcare for the latest birth is more accurate than the one on previous birth (better recall on part of respondent) (GSS et al., 2015).

Analytical Framework for National Health Insurance Subscription

The empirical analysis underlying this part of the study is derived from a basic theoretical framework of health insurance utility maximisation. According to Nyman (2003), the origin of this theory can be traced back to Daniel Bernoulli, who developed the first specification of risk versus return. However,

it was not until 1944 that Bernoulli's ideas were applied to insurance and modelled by von Neumann and Morgenstern (Osei Adu, 2018).

A consumer chooses between being insured and uninsured based on his or her utility function. The rationale of the theory is that a consumer faces a choice between two alternatives; in this case to enrol on the NHIS or not. Each alternative chosen has an associated utility index describing the attractiveness of the alternative to the consumer.

The consumer appears to be presented with a choice between (1) being uninsured that is when the consumer does not subscribe and having an uncertain outcome with an expected utility or (2) being insured that is enrolling and have a certain outcome with certain utility. If the consumer chooses to become insured, the consumer is opting for certain level of utility over an uncertain level of utility.

The decision of a woman to enrol on NHIS or not depends on the characteristics of the individual (H) community characteristics (Z) and health insurance characteristics (N). The stochastic error term (ε), which is uncovariant with the other regressors was included to capture errors in model specification including omission of relevant variables and errors in data measurement.

Algebraically, the individual decision process can be expressed as follows:

$$EU_{ij} = f\,(N_i, Z_i, H_i) + \varepsilon \qquad (1)$$

where EU_{ij} is the utility that *i*th woman expects to derive from choosing *j*th option*; j = 1* if an individual has enrolled on NHIS; *j = 0* if an individual has has not enrol on the policy; and N, H, Z and ε are as defined above. There are three assumptions underlying equation (1). The assumptions are:

1. If $EU_{i1} > EU_{i0}$, then the *ith* individual will enrol on NHIS.
2. If $EU_{i1} < EU_{i0}$, then the *ith* individual will not enrol on NHIS
3. If $EU_{i1} = EU_{i0}$, the *ith* individual is indifferent between the two alternatives.

Therefore, the probability that the *ith* individual enrol on NHIS is given as equation (2).

$$Pi_1 = P(EUi_1 > EUi_0) \quad (2)$$

On the other hand, the probability that *i*th individual will not enrol on NHIS is given as equation (3).

$$Pi_0 = P(EUi_1 < EUi_0) \quad (5)$$

Binary Logit Model for NHIS Health Insurance Enrolment

In the first empirical study, this thesis sought to ascertain the determinants of national health insurance enrolment among expectant mothers in Ghana before and after 2008. The implication is that the dependent variable in the analysis is the national health insurance status and it is binary or dichotomous in nature. The commonly used models when the dependent variable is dichotomous are the binary logit and probit models. The probit and logit models are indistinguishable from each other except for their tails in which the logit has fatter tails. The choice between logit and probit models is largely one of convenience and convention, since the substantive results generated are indistinguishable. For the purpose of this study the logit model is preferred because it is computationally simpler. The probit model was not used because of the nature of the variables used in the study since it assumes cumulative normal distribution (Nketiah-Amponsah & Sagoe-Moses, 2009; Osei Adu, 2018).

The logistic regression can be understood simply as finding the parameters that best fit:

$$y = \begin{cases} 1 & \beta_0 + \beta_1 x + \varepsilon > 0 \\ 0 & \text{else} \end{cases} \quad (6)$$

Where y = the dependent variable with binary response (1 or 0) and 1 implies success (p), observed proportion of success while zero (0) implies failure (q = 1- p), observed proportion of failure. The *x* is any type of covariate (e.g. continuous, dichotomous) and β is a vector of parameters to be estimated.

The general logistic regression model with multiple covariates is then given as:

$$\log\left\{\frac{p}{1-p}\right\} = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \ldots\ldots\ldots \beta_k X_k \quad (7)$$

where log odds are a linear function of the covariates.

Alternatively, the probability function can be modelled as

$$p(y = 1|x) = G(b_0 + xb) \qquad \text{where } 0<G(z)<1$$

A common choice for G(z) is the logistic function, which is the cumulative density function (cdf) for a standard logistic random variable which is given as:

$$G(z) = \frac{Exp^z}{1+Exp^z} = L(z) \quad (8)$$

In general, the interest is in the effect of *x* on P(*y* = 1|***x***), that is, we care about *∂p/ ∂x*. Generally, in nonlinear models, the marginal effect is computed as:

$$\frac{\partial p}{\partial x_j} = g(b_0 + xb)b_j \qquad \text{where } g(z) \text{ is } \frac{dG}{dz} \quad (9)$$

Specifically, for logistic regression, the marginal effect is computed as

$$\frac{\partial p}{\partial x_j} = \frac{b_j Exp^{(b_0 + xb)}}{[1 + \text{Exp}^{(\text{b}_0 + \mathbf{xb})}]^2} \quad (10)$$

Empirical Model Specification

To determine the probability that *i*th woman enrols on the NHIS, the empirical model estimated was specified as:

$$NHIS_i = \beta_0 + \beta_1 Bord_i + \beta_2 Age_i + \beta_3 Edu_i + \beta_4 Wealth_i + \beta_5 Resid_i + \beta_6 Accesshf_i + \beta_7 sex\_hsehhed_i + \beta_8 FP\_TV_i + \beta_9 FP\_Radio_i + \beta_{11} Married_i + \beta_{12} Religion_i + \beta_{13} Empstats_i + \beta_{10} Time\_trend_i + \beta_{14} BMI_i + \beta_{15} \text{aware\_tb}_i + \varepsilon_i \quad (11)$$

Where *NHIS* is national health insurance status with two outcomes – whether a woman is insured under the national health insurance scheme or otherwise. *Bord* is birth order, *Age* is mother's age at current birth, *Edu* is education of woman, *Wealth* is household wealth, and $Resid$ is residential status whether rural or urban. $Accesshf$ captures accessibility of health facility as whether distance to the nearest health facility is a serious problem or not. The sex of the household head is captured as $sex\_hsehhed$ while FP_TV and FP_Radio denote accessing family planning programme on television and on radio respectively. *Married* refers to married woman and *Religion* indicates religious denomination of expectant women while $Empstats$ denotes employment status of the woman.

The variables *BMI* and $aware\_tb$ are the body mass index her awareness of the contagious disease, tuberculosis respectively. Moreover, $Time\_trend$ is a dummy variable which indicates whether a woman gave birth before or after 2008. Finally, ε is the error term which captures the combined effect of the omitted variables, assuming the combined effect of the omitted variables is 1)

independent of each variable included in the equation, 2) independent across subjects, and 3) has expectation zero (Freedman, 2005).

Estimation Technique for National Health Insurance Demand

Binary Logit model is nonlinear in the coefficient $\beta_0, \beta_1 \ldots \beta_k$ and so logit model cannot be estimated by ordinary least squares. The method used to estimate logit model is the Maximum Likelihood Estimation. Therefore, the estimation technique used to estimate Equation (11) which determine the probability that *i*th individual enrols on the NHIS was Maximum likelihood estimation technique.

Justification of Variables in the NHIS Demand Model

The following variables were used in the logit regression model that sought to investigate the demand for national health insurance scheme among expectant mothers in Ghana. The choice of the variables was informed by theories such as risk aversion, expected utility theory and the theory of status quo bias; literature and intuition.

Birth order

Wang et al. (2014) found birth order to be negatively associated with women's health insurance status. It is also documented that multiple birth reduces the use of maternal healthcare (Agbanyo, 2012; Kistiana, 2009; Wang et al., 2014). It is therefore believed that multiple birth could also influence the likelihood of expectant mother's enrolment on health insurance. It therefore stands to believe that any woman who believed that she would not need maternal healthcare from institutional health facilities may not subscribe.

Birth order could also influence maternal health seeking decision because as the number of birth increases, women tend to rely more on their past experiences and knowledge from the previous births and may fear no birth complication. In other words, women may become "risk-loving" with increasing birth and may not be worried about health insurance against maternity. Moreover, higher birth order signifies larger household size and the larger a household, the higher the pressure on economic resources hence resource allocation for healthcare may reduce.

Age of expectant mother

It has been shown that age has significant influence on health insurance subscription (Gius, 2010; Richardson, Roberts, Sava, Menon, & McKee, 2012) . Almost all these studies found positive effect of age on the insurance subscription, a finding which is consistent with the Grossman (1972)'s theory of demand for health. Grossman's theory of demand for health stipulates that as individual ages, his/her health stock depreciates. To replenish the health stock, one needs to directly consume healthcare or invest in health.

Education of expectant mother

Education is crucial in the formation of a person's mind set, therefore an individual's decision on health matters is influenced by his/her level of education. It is said that people with high level of education are typically more risk averse than people with low level of education (Jung, 2014). The implication is that people with higher education are more likely to purchase health insurance compared to people with lower level of education. Studies also

showed that higher education is associated with higher probability of health insurance subscription (Sekyi, 2009; Wang et al., 2014).

Household wealth

Household wealth been shown to be a significant determinant of health insurance subscription (Wang et al., 2014, 2016, Nketiah-Amponsah & Sagoe-Moses, 2009; Sekyi, 2009). It is often argued that because of affordability of premium, the wealthier buys health insurance more than the poor. However, according to the expected utility theory, individuals maximise utility by reducing financial uncertainty and risk caused by possible illness and/or medical expenditures (Alkenbrack, 2011). Thus, conventional theory of demand for health insurance holds that people purchase insurance because they prefer the certainty of paying a small premium to the risk of getting sick and paying a large medical bill. Therefore, given that households or individuals are expected to become more risk averse as they move closer to poverty (Alkenbrack**,** 2011), the poor will be willing more to be covered by health insurance.

Family planning programme on television and radio

Existing research on health outcomes in developing countries has shown the important role of the media in disseminating information on health-related issues. Sources of information usually used are radio, television, newspapers and magazines. Women's exposure to information through radio, television and newspaper significantly increases the utilisation rates for all health services. Nketiah-Amponsah and Sagoe-Moses (2009) and Agbanyo (2012) found positive influence of mass media on the use of delivery care in Ghana. It is

therefore believed that exposure to health information in the media can also influence the decision to purchase health insurance policy.

Married woman

This study assumes that the healthcare decisions are made jointly by both spouses through bargaining. Therefore, the decision to enrol on health insurance is expected to vary across marital status. Moreover, married couples may demand health insurance in order to protect their children and tend to be more averse to the risk of devastating health expenditure (Harmon & Nolan, 2001).

Religion

Religious denominations can influence one's level of faith in the supernatural powers. It could also be argued that Pentecostal/charismatic Christians and the African traditional faithful may believe more in supernatural healing powers hence may not count on health insurance compared to orthodox Christians. In Ghana, orthodox Christianity is more associated with formal health facilities. Catholic, for instance has established several hospitals across the country.

Awareness of tuberculosis

The awareness of tuberculosis is used in this model as an indication of risk factor. This variable may not be related to maternal healthcare utilisation but any risk averse woman who is aware of such a risk factor may seek coverage under health insurance scheme.

Body mass index (BMI)

Like awareness of tuberculosis, body mass index of a woman may not be directly related to the utilisation of maternal healthcare. However, it can also be a factor that can expose women to higher risk of diseases such as hypertension. It is believed that a person with high BMI will be more likely to enrol on NHIS in order to seek healthcare in time of need.

Time trend

The trend is a dummy variable which indicates whether a woman gave birth before or after 2008. The essence of its inclusion is to test if the pattern of demand for the NHIS has change after the free maternal healthcare policy was change where women must register onto the NHIS to enable them to access the free maternal healthcare.

The measurement and description of the variables in the NHIS demand model are summarised in Table 2.

Table 2: Description and measurement of variables in the NHIS Demand Model

Variable	Description	Measurement	Level	a priori
Dependent variable				
NHIS	National health insurance coverage	1 = Insured, 0 = uninsured	Nominal	
Independent variables				
Time_trend	Time trend	1=2014, 0 = 2008	Nominal	+
Bord	*n*th child	0 = first 1 = second – third 2 = fourth – fifth 3 = sixth and above	Nominal	–
Age	Woman's age at recent birth (in years)	0 = ≤ 20 years 1 = 21-25 years 2 = 26-30 years 3 = 31-35 years 4 = 36-40 years 5 = 41-45 years 7 = 46 + years	Nominal	+
Edu	Woman's educational attainment	0 = no formal education, 1 = primary 2 = secondary or higher	Nominal	+
Wealth	Household wealth quintile	1 = poorest 2 = poorer 3 = middle 4 = richer 5 = richest	Nominal	+/-

Table 2 Continued

Resid	Residence	1 = Rural, 0 = urban	Nominal	–
Accesshf	Distance to health facility			
Sex_hsehhed	Sex of household head	1=Female, 0=Male	Nominal	+/-
FP_TV	Heard family planning on tv last few months	1=Yes, 0=No	Nominal	+
FP_Radio	Heard family planning on radio last few months	1=Yes, 0=No	Nominal	+
Married	Marital status	1 = Married, 0 = if otherwise	Nominal	+/-
Religion	Religious denomination	0 = No Religion 1 = Orthodox Christians 2 = Pentecostal/Charismatic Christians 3 = Islam 4 = African tradition	Nominal	+/-
Empstats	Employment status	1 = Employed, 0 = if otherwise	Nominal	+
Time_trend	Time trend	1 = 2014, 0 = 2008	Nominal	+
Aware_tb	Awareness of tuberculosis	1 = aware of TB, 0 = if otherwise	Nominal	+
BMI	Body mass index	Standard deviation (WHO's standard)	Continuous	+

Source: Author (2018)

Diagnostic Tests for the NHIS Demand Model

It was deemed necessary to ensure that the conclusions drawn from this model were warranted and therefore a few statistical tests were conducted to improve the validity and reliability of the study. The *linktest* test was conducted to check the specification of the logistic model; the Hosmer-Lemeshow and Pearson tests for goodness-of-fit; the Collin test for multicollinearity.

Model Specification Error Tests

According to Ali, Ali and Riaz (2014), a model specification error can occur when one or more relevant variables are excluded from the estimated model or one or more irrelevant variables are incorporated in the estimated model. If relevant variables are omitted from the model, the common variance they share with included variables may be wrongly attributed to those variables, and the error term is inflated. However, if irrelevant variables are included in the model, the common variance they share with included variables may be wrongly attributed to them. Model specification errors can substantially affect the estimates of regression coefficients (Ali et al., 2014; Gujarati & Porter, 2009).

The Link Tests

The link test is based on the idea that if a regression is properly specified, one should not be able to find any additional independent variables that are significant except by chance. The link test follows χ^2 distributions and the null hypothesis is that the model is correctly specified. To be free from specification error, the estimated p-value associated with the link test (χ^2) needs to be greater than 0.05 and be statistically insignificant. In other words, we need not reject

the null hypothesis to achieve correct specification of the model. Alternatively, we might want to make use the *linktest* command in STATA. With the linktest command, we regress the dependent variable on the predicted values and their squares and if the model is specified correctly, the squares of the predicted values will have no power (Baum, 2006; Hardin & Hilbe, 2012).

Multicollinearity Tests

To ensure a reasonable level of multicollinearity, the correlation matrix was carefully observed and highly correlated ($r > 0.5$) variables were dropped. In addition, collinearity diagnostics was carried out with the *Collin* test and suggested that the Variance Inflation Factors (VIF), the tolerance of the variables and the condition index in the model were within the acceptable range (Gujarati, 2003). In this study, individual VIFs were all less than four (VIF<4). According to Gujarati (2003), as a rule of thumb, if the VIF of a variable exceeds 10, which will happen if R^2 exceeds 0.90, that variable is said be highly collinear. The condition number also has a threshold of 30 (Gujarati, 2003).

Goodness-of-fit

The goodness-of-fit tests were also conducted to be sure that the models properly fit the data. For consistency, the Hosmer-Lemeshow and the Pearson tests of goodness of fit were adopted for that purpose. Both tests follow χ^2 distribution hence insignificant p-values were accepted.

Validity of the Subsample for the NHIS Demand model

This section explains the techniques employed to analyse the demand for NHIS among expectant mothers with emphasis on the pattern of such demand before and after 2008. To investigate the differences in demand before and after

2008, the 2008 GDHS and the 2014 GDHS data sets were pooled together and a dummy variable was introduced to indicate the two time periods.

Given that the study is limited to only women who gave birth within five years preceding the surveys, the sample used in the analysis has reduced from the total sample surveyed in the GDHS. The reduction in the sample is explained in Table 3.

Table 3: Reduced sample for the NHIS demand model

	Full sample		2008 Sample		2014 Sample	
Variable	Obs	NHIS%	Obs	NHIS%	Obs	NHIS%
Surveyed Sample	14,312	56.26	4,916	38.8	9,396	62.00
Place of delivery	8,818	59.32	2,959	39.41	5,859	69.38
Residence type	8,817	59.33	2,958	39.42	5,859	69.38
Distance problem	8,814	59.34	2,955	39.42	5,859	69.38
Religion	8,807	59.34	2,948	39.38	5,859	69.38
Awareness of TB	8,805	59.35	2,946	39.41	5,859	69.38
Total Subsample	8,805	59.35	2,946	39.41	5,859	69.38

Source: Author (2018)

In the 2008 and 2014 GDHS, 4916 and 9,396 women were sampled respectively. This gives a total of 14,312 women. In 2008, about 38.8 percent of the women enrolled on the NHIS (GSS, GHS, & ICFI, 2009) and 62 percent enrolled in 2014 (GSS et al., 2015). When the data is limited to the women who gave birth, the sample reduced to 8,818 women with 59.32 percent enrolled on the NHIS. Out of these 8,818 women, 2,959 and 5,859 were from the 2008 and the 2014 data sets respectively. The percentage enrolment on the NHIS were

39.41 and 69.38 percent respectively in 2008 and 2014. This shows slight increase in percentage enrolment in both data sets when the data is limited to only women who gave birth.

With the inclusion of other variables, the subsample reduces to 8,805 with the percentage enrolment slightly changing from 59.32 percent to 59.35 percent of the women enrolled on the NHIS. Out of the 8,805 women in the final sample, 2,946 were from the 2008 data set with 39.41 percent enrolment while the number and percentage enrolment from the 2014 data set remain 5,859 and 69.38 percent respectively. The subsamples are therefore believed to be valid representatives of the original samples.

Theoretical Framework for Choice of Place of Delivery

The empirical analysis of this part of the study is derived from a basic theoretical framework of utility maximisation that is based on the approach used by Mwabu, Ainsworth and Nyamete (1993), modified by Odwee, Okurut and Adebua (2006) and used by Osei Adu (2018). In the event of an illness, a patient is assumed to seek help from a healthcare system that is characterised by many providers. In this case, an expectant mother can be delivered at home, public hospital, public clinic, or a private health facility. It is further assumed that the woman or her care taker is to choose the healthcare alternative that yields the maximum expected utility. Conditional on seeking treatment, the direct utility derived by a woman *i* from treatment alternative *j* can be expressed as:

$$U_{ij} = u_{ij}(h_{ij}, c_{ij}) \quad (1)$$

where U_{ij} is the direct conditional utility that individual *i* expects from healthcare provider *j*; h_{ij} is the expected improvement in health status for individual *i* after receiving treatment from provider *j*, and c_{ij} is the consumption

of non-healthcare goods, the amount of which depends on choice *j*, because of the monetary and nonmonetary costs of treatment from provider *j*. To facilitate empirical work, the unobservable variables, h_{ij} and c_{ij}, can be expressed as in equations (2) and (3).

$$h_{ij} = h(x_i, z_{ij}) \tag{2}$$

where x_i is a vector of observable socioeconomic attributes of individual *i*, such as age and education; z_{ij} is a vector of medical and physical attributes faced by individual *i* in facility *j*, such as availability of drugs and medical equipment and sanitary conditions of the facility.

$$c_{ij} = y_i - e_{ij} \tag{3}$$

where C_{ij} is the monetary value of non-healthcare goods that individual *i* can consume after paying for medical care in facility *j*; y_i is annual income of respondent *i*; e_{ij} is the value of resources that individual *i* devotes to medical care received from facility *j*. The level of e_{ij} is determined by such factors as the treatment fees, waiting time, and access variables such as distance and travel time. The observed medical care expenditure, e_{ij}, that determines the level of c_{ij} for a given level of y_i, can be written out in full as follows:

$$e_{ij} = D_{ij} + wT_{ij} \tag{4}$$

where D_{ij}, is the total monetary cost of seeking treatment from health facility *j* for individual *i*; T_{ij} is the travel time to health facility *j* for individual *i*, including the time spent to wait for treatment there; and *w* is the shadow wage rate. Notice that expressions (2) and (3) are merely accounting identities, which permit identification of c_{ij}, a variable for which information is normally not collected in healthcare demand surveys.

Equations (1) to (4) represent a general structural specification of a behavioural model of healthcare demand. The next stage is the choice of the functional form for the utility function in equation (1). Ideally, we want a mathematical form for the utility function that is consistent both with actual demand behaviour and with rules of rational choice. Given that the utility function in equation (1) is linear in health status and quadratic in consumption, it is consistent with well-ordered preferences.

Such a functional form generates typically observed demand patterns. In these specifications, it is the variation in monetary or time prices across healthcare providers that ensure identification of behavioural parameters. Given this role of prices, and a further assumption that consumer preferences over the entire range of consumption goods are well defined, empirical healthcare demands can be shown to be consistent with the assumption that ill individuals maximise an indirect conditional utility function, v_{ij}, as shown in equation (5):

$$V_{ij} = v_{ij}(x_i, z_i, y_i, r_{ij}, a_i) \quad (5)$$

where x_i, z_j, and y_i, are as previously defined; r_{ij} is the price of healthcare received by individual *i* from health facility *j*; a_i is the price of non-healthcare goods consumed by individual *i*. The general functional form for the indirect utility function in (5) contains three important features. First, by solving (5) one gets healthcare consumption bundles, rather than health status improvements or health outcomes. Second, consumption of non-health goods and services is constant for different levels of medical services. The constancy is achieved by assuming that the direct utility function that underlies (5) is separable in medical care goods and other consumption bundles. Third, apart from other prices, the

indirect utility function in (5) is dependent on "medical care" prices and not on prices of "improvements in health status".

The undesirable feature of (5) is that, in the underlying direct utility function, people's welfare depends on medical care services, rather than on health outcomes. This disadvantage is mitigated by the fact that in the event of illness, people restore health status by consuming medical care services (Grossman, 2000). The attractiveness of equation (5) lies in the fact that it permits an investigation of direct demand effects of prices and incomes. Equation (5) is the standard expression for the indirect utility function in consumer demand theory (Mwabu et al., 1993).

In the present context, it shows the maximum utility that individual *i* can achieve, conditional on being delivered, controlling for income y_i, healthcare prices r_{ij}, prices of other goods a_i, personal attributes x_i, and facility specific characteristics z_j. To ease econometric work, a_i may be normalised to unity. Notice further that all the elements of the indirect conditional utility function in equation (5) are directly observable and are the variables of interest to policymakers. Econometric implementation of the model requires the standard assumption that the utility function in equation (6) is stochastic, and is of the form:

$$V_{ij} = v^*_{ij} + \mu_i \qquad (6)$$

where v^*_{ij} is the systematic component of utility and u_i is an additive disturbance term.

If u_i is normally distributed, equation (6) leads to a multinomial specification of individual choice of medical treatments. The probability P_{ij} that individual *i* will seek treatment from health facility *j* can be expressed as:

$$P(H_{ij}) = \frac{{\mu_i}^{v^*_{ij}}}{\sum {\mu_i}^{v^*_{ij}}} \quad (7)$$

which is the multinomial specification where, $P(H_{ij})$ is the probability that individual i will seek healthcare from provider j; $H_{ij}$is healthcare provider alternatives from which individual i can seek treatment from ; μ_i and ${v^*}_{ij}$are as previously defined. But ${v^*}_{ij}$can be expressed as

$${v^*}_{ij} = \beta x_i + \varphi z_j + \lambda r_{ij} \quad (8)$$

In which case (19) becomes

$$P(H_{ij}) = \frac{{\mu_i}^{\beta x_i + \varphi z_j + \lambda r_{ij}}}{\sum {\mu_i}^{\beta x_i + \varphi z_j + \lambda r_{ij}}} \quad (9)$$

where,$P(H_{ij})$, H_{ij} andμ_i are as previously defined; β, ϕ and$\lambda$are vectors of coefficients of x_i, $z_j$and r_{ij}respectively.

Estimation of equation (9) requires use of numerical methods to find values of parameter vectors β, ϕ and λ that maximise the likelihood (or the log-likelihood) of observing the sample data on x_i, z_j and r_{ij}. The log-likelihood function that needs to be maximised in order to estimate values of the parameter vectors β, ϕ and λ is simply

$$L = \sum i \sum j G_{ij} \, log \, P_{ij} \quad (10)$$

where L is the logarithm of the likelihood function; G_{ij} = 1 if individual i chose health facility j; otherwise G_{ij} takes a value of zero. The estimated values for β, ϕ and λ show the marginal effects of social and provider characteristics on conditional utility from a medical care provision alternative, as shown for example, in equation (9). Expression (10) can be used to estimate multinomial logit or probit.

Multinomial Probit Model

Given that utilisation of maternal healthcare is based on the decision of the expectant mother and/or her caretakers, choice models are inevitable. It has been pointed out that healthcare decisions and healthcare demand are discrete in nature hence they are best studied using discrete choice models (Agbanyo, 2012; Tonsuglo et al., 2014)

In the conceptual framework, it is postulated that individual with certain socio-economic characteristics will decide whether to enrol on the NHIS or otherwise. Moreover, the decision to enrol on the scheme will, in turn, influence the decision of the woman to utilise maternal healthcare services from any of the options available to her. Consequently, NHIS was treated as an intervention hence treatment effect model was deemed appropriate for the analysis.

Again, following the argument put up in the problem statement and advanced in the conceptual framework in relation to the classification of service providers (health facilities), this study classified maternal healthcare providers into four categories – home care providers (for example TBAs), public hospitals, public clinics, private facilities. The implication is that, taking delivery care for instance, an expectant mother is faced with a choice of service from four alternative providers such that

$$\text{Place of delivery} = \begin{cases} 1 & \text{home care} \\ 2 & \text{public hospital} \\ 3 & \text{public clinic} \\ 4 & \text{private facility.} \end{cases} \tag{11}$$

Consequently, multinomial models were deemed more appropriate. Both multinomial logit (MNL) and multinomial probit (MNP) models fit this

requirement as each may be derived from economic theories of utility maximization (Dow & Endersby, 2004) and that the two models apply to situations in which an agent chooses from more than two alternatives that are not inherently ordered (Roodman, 2011) such as the health facilities. The study however, adopted MNP because the conditional mixed process framework in which the endogenous treatment effects have been estimated relies on probit models. Since multinomial probit does not assume independence of irrelevant alternatives (IIA) property it is often assumed to be more accurate than multinomial logit (Alvarez & Nagler, 1998). The IIA assumption means that the relative choice probabilities (the choice between any two options) do not depend on any other alternatives.

In multi-health-facility choices, assume expectant mother *i*'s utility for health facility *j*, y_{ij}, (i = 1, ..., n; j = 1, ..., m) is a function of individual, household, and community attributes (including NHIS) as well as a stochastic error. A typical representation is the following model for the latent variable y_{ij}^*:

$$y_{ij}^* = x_i'\beta_j + \epsilon_{ij} \qquad (12)$$

Where y_{ij}^* is the utility or satisfaction individual i derives from using health facility j, and x_i is a matrix of the attributes under investigation while β is a vector of coefficients to be estimated and ε is the stochastic error.

In the multinomial probit model it is assumed that the ϵ_i's follows a multivariate normal distribution with covariance matrix Σ where Σ is not restricted to be a diagonal matrix and that the ϵ's are correlated across choices:

$$\epsilon \sim MND(0,\Omega), with\ \Omega = \mathrm{I}_N \otimes \Sigma \text{ and } \Sigma = \mathrm{E}(\epsilon_i\epsilon_i') = \begin{pmatrix} \sigma_{11} & \cdots & \sigma_{1M} \\ \vdots & \ddots & \vdots \\ \sigma_{M1} & \cdots & \sigma_{MM} \end{pmatrix}$$

Now choice of facility *j* implies that y^*_{ij} is highest for j. That is:

$$y_i = j \; if \; y_{ij}^* = \begin{cases} j & if \; y_{ij}^* = \max(y_{i1}^*, y_{i2}^*, \dots, y_{iM}^*) \\ 0 & otherwise \end{cases} \quad (13)$$

The probability to choose category j can then be written as:

$$p(y_i = j|x_i) = \; y_{ij}^* > \; y_{i1}^*, \dots, y_{ij}^* > y_{i(j-1)}^*, y_{i(j+1)}^*, \dots, y_{ij}^* > \; y_{iM}^*)$$

$$= \quad p\Big((\epsilon_{ij} - \epsilon_{i1}) > x_i'(\beta_1 - \beta_j), \dots, (\epsilon_{ij} - \epsilon_{i(j-1)}) > x_i'(\beta_{(j-1)} - \beta_j), (\epsilon_{ij} - \epsilon_{i(j+1)}) > x_i'(\beta_{(j+1)} - \beta_j), \dots, (\epsilon_{ij} - \epsilon_{iM}) > x_i'(\beta_M - \beta_j)\Big). \quad (14)$$

With close look at this probability, one can see that only the differences between the y^*_{ij}'s are identified and hence a reference category has to be assigned. Consequently, the covariance matrix also reduced in its dimension from ($M \times M$) to (M - 1) × (M - 1).

If we define $\tilde{\epsilon}_{il} \equiv \epsilon_{ij} - \epsilon_{il}$ and $\xi_{il} \equiv x_i'(\beta_l - \beta_j)$ for $l = 1, \dots, (j - 1), (j + 1), \dots, M$ then the probability $p(y_i = j|x_i)$ is given by:

$$\int_{\xi_{i1}}^{\infty} \dots \int_{\xi_{i(j-1)}}^{\infty} \int_{\xi_{i(j+1)}}^{\infty} \dots \int_{\xi_{iM}}^{\infty} \emptyset(\tilde{\epsilon}_{i1}, \dots, \tilde{\epsilon}_{i(j-1)}, \tilde{\epsilon}_{i(j+1)}, \dots, \tilde{\epsilon}_{iM}) d\tilde{\epsilon}_{i1} \dots$$

$$d\tilde{\epsilon}_{i(j-1)} d\tilde{\epsilon}_{i(j+1)} \dots d\tilde{\epsilon}_{iM} \quad (15)$$

Theoretically, the multinomial probit model is attractive, but it has some practical limitations given that the response probabilities are very complicated, involving a (J + 1) - dimensional integral. "This complexity not only makes it difficult to obtain the partial effects on the response probabilities, but also makes maximum likelihood infeasible for more than about five alternatives" (Wooldridge, 2002, p. 502). However, with recent advances on estimation through simulation, multinomial probit estimation is made feasible for many alternatives.

Endogeneity of National Health Insurance Variable

As noted in the literature review, since the decision to enrol on national health insurance scheme is voluntary, the effect of being insured is potentially subject to selection bias which results in endogeneity and biased coefficient estimates. According to Jowett et al. (2004), there may be unobservable factors influencing the decision to enrol on health insurance which also influence treatment-seeking behaviour resulting in unobserved heterogeneity. This manifest itself through the insurance coefficient not representing a pure insurance effect.

Therefore, to estimate the effect of an expectant mother's health insurance status on her choice of healthcare facility for maternal healthcare and account for endogeneity, treatment effect model was estimated. This was done by estimating the effect of NHIS on place of delivery using multinomial endogenous treatment effect model with maximum likelihood technique using conditional mixed process (CMP) estimator developed by Roodman (2007). "*Mixed process*" means that in a system of equations, different equations can have different kinds of dependent variables and a dependent variable in one equation can appear on the right side of another equation (Bormann, 2011; Roodman, 2007). This model has advantage over the traditional propensity score matching (e.g. Mensah et al., 2010; Wang et al., 2014, 2016) and the difference-in-difference (e.g. Giedion et al., 2013) because these alternatives could not handle multinomial dependent variables in the outcome equations.

Specification of Multinomial Endogenous Treatment Effect Model in Conditional Mixed Process Framework

The CMP is rooted in the Heckman tradition with selection and outcome equations estimated simultaneously. In order to estimate the effects of NHIS on the choice of place of delivery, following (Makate, Wang, Makate, & Mango, 2016) and Roodman (2011), we estimated the following equation with the expectant mother as the unit of analysis:

$$Place\_Del_{ij} = \beta_0 + \beta_1 NHIS_i + X_i\beta_{2j} + \eta_1 + v_i \qquad (16)$$

where $Place\_Del_{ij}$ measures the choice of place of delivery j by a woman i; *NHIS* is a binary variable taking 1 if a woman i is insured and 0 if otherwise. $\boldsymbol{X\beta}$ is a matrix of j individual, household and community level characteristics with their respective coefficients that can influence y. Also, $\eta_1$is a term capturing unobserved heterogeneity assumed to be unrelated to the explanatory variables $\boldsymbol{X}$ and applying to each woman living in the same community; and $v_i$captures all the remaining variation with $v_i \sim IIDN(0, 1)$.

Assuming the vector $\boldsymbol{X}$ consists of all the variables assumed to influence NHIS subscription and are uncorrelated with the error, v_i, then multinomial logit/probit regression of (16) will yield consistent estimates for place of delivery. It follows that, the coefficient of interest $\beta_1$can thus be regarded as the true impact of NHIS on place of delivery.

Nevertheless, since NHIS potentially endogenous and, if not corrected, will manifest itself through the β_1 not representing a pure NHIS effect (Jowett et al., 2004; Makate et al., 2016; Roodman, 2011) even when the sample size becomes large (Haider et al., 2017).

The potentially endogenous variable, NHIS, takes the form:

$$NHIS_i^* = \alpha_0 + \alpha_1 Z_i + X\alpha_{3j} + \eta_2 + \varepsilon_i \quad (17)$$

where $NHIS_i^*$ is the propensity to enrol onto the NHIS. However, $NHIS_i^*$ is unobserved and what we observe instead is:

$$NHIS = \begin{cases} 1 \ \ if \ NHIS \ score > 0 \\ 0 \ \ if \ otherwise \end{cases}$$

The vector Z_i comprises variables thought to influence NHIS subscription such as chronic diseases (e.g. high blood pressure) (Munkin & Trivedi, 2003; Wagner et al., 2011) and knowledge of risky health conditions such as tuberculosis; η_2 is as defined in (16) and ε_i captures the remaining unobserved variation. The subscripts $\{1, 2\}$ in the unobserved heterogeneity components (η) are equation indicators.

The traditional method, in the economics literature, to resolve endogeneity bias is to estimate (16) with instrumental variables for NHIS. Instrumental variables are variables which are highly correlated with the endogenous variable (NHIS) and not correlated with the unobserved factors that may affect the outcome variables, place of delivery (Haider et al., 2017; Makate et al., 2016). However, a well-known problem is the difficulty associated with obtaining good instruments (Makate et al., 2016) especially, in this case, where both the endogenous and the outcome variables are health seeking behaviours.

Alternatively, for the assessment of the effect of health insurance, one may consider methods such as propensity score matching (Mensah et al., 2010; Wang et al., 2014, 2016) and the difference-in-difference (Giedion et al., 2013). However, these alternatives are also deficient since our outcome variable (place of delivery) is multinomial.

To address the potential endogeneity of the NHIS, equations (16) and (17) were estimated jointly in the conditional mixed process framework,

following Roodman (2011) and Makate et al.(2016). Moreover, this study follows related studies examining the effects of health insurance on the use of healthcare and used variables measuring chronic health conditions (Z_i), as instruments (Munkin & Trivedi, 2003; Wagner et al., 2011). Specifically, NHIS was instrumented with two variables. The first is a dummy variable equals 1 if a woman is aware of tuberculosis and zero if otherwise. The second instrument is the body mass index of the woman. It is believed that these variables are more likely to have a direct impact on NHIS subscription and can influence the use of place of delivery, through its impact first on NHIS subscription and not vice versa.

Joint estimation

The CMP controls for the selection bias that arises from unobserved factors affecting our outcome variables by building from the seemingly unrelated regression framework and allowing for cross-equation correlation of the error terms (Makate et al., 2016; Roodman, 2011). When we allow for the potential endogeneity of NHIS in (16), the joint marginal likelihood can be expressed as:

$$\int_{\eta_2}\int_{\eta_1}[\Pi L_2(\eta_2)\,\Pi L_1(\eta_1)]\,f(\eta_2,\eta_1)d\eta_2 d\eta_1 \qquad (18)$$

where L_1 and L_2 are the conditional likelihood functions of equations (16) and (17) respectively; $f(\eta_2,\eta_1)$ is the joint distribution of the unobserved heterogeneity components. In this case, the joint distribution of the unobserved effects $f(\eta_2,\eta_1)$ is assumed to be a two-dimensional normal distribution characterized as follows:

$$\begin{pmatrix}\eta_2\\ \eta_1\end{pmatrix} \sim N\left(\begin{bmatrix}0\\0\end{bmatrix},\begin{bmatrix}\sigma_2^2 & \\ \rho_{12}\sigma_2\sigma_1 & \sigma_1^2\end{bmatrix}\right)$$

The likelihood function in (18) is then jointly estimated in the CMP framework which utilises the Geweke, Hajivassiliou, and Keane (GHK) algorithm (Makate et al., 2016; Roodman, 2007, 2011). Maitra (2004) and Makate et al.(2016) explained that joint estimation suggests the likelihood of non-zero covariance between the error terms of equations (16) and (17), thus $Cov(\eta_2, \eta_1) \neq 0$. Now, given that we condition on the heterogeneity terms, equations (16) and (17) become independent, therefore making it easy to get the likelihood function in (18) above by simply multiplying the individual conditional likelihood functions of (16) and (17) (Chamberlain & Griliches, 1975; Makate et al., 2016). The joint model (with correlated errors) allows the derivation of selection-bias revised estimates for maternal healthcare utilisation granted that equations (16) and (17) are identified.

Identification

The identification of the model is ensured by its recursive nature and the covariance restrictions in (16) and (17). In this instance, a recursive structure is ensured by the fact that the outcome variables measuring place of delivery in (16) depends on NHIS but not vice-versa (Chamberlain et al., 1975). Following Chamberlain and Griliches (1975), Roodman (2011) and Makate et al. (2016), set of instruments are not necessarily required to identify the system of equations. However, it is generally considered a good practice to include some instrumental variables for the identification of the NHIS equation. The two instruments explained above are believed to enhance the identification of the model.

Empirical Model Specification for the Choice of Delivery Services

To determine the probability that *i*th woman will choose *j*th place of delivery, equation (19) was specified:

$$Place\_Del_{ij} = \beta_0 + \beta_1 Bord_i + \beta_2 Age_i + \beta_3 Edu_i + \beta_4 Wealth_i + \beta_5 Resid_i + \beta_6 Accesshf_i + \beta_7 sex\_hsehhed_i + \beta_8 FP\_TV_i + \beta_9 FP\_Radio_i + \beta_{11} Married_i + \beta_{12} Religion_i + \beta_{13} Empstats_i + \beta_{10} Time\_trend_i + \gamma_i \quad (19)$$

where $Place\_Del$ is place of delivery, the outcome variable with four options – whether a woman was delivered at 1) home, 2) public hospital, 3) public clinic, or 4) at private facility. The other variables are as defined.

The selection equation (NHIS enrolment) remains as in the first study. It is therefore specified as

$$NHIS_i = \beta_0 + \beta_1 Bord_i + \beta_2 Age_i + \beta_3 Edu_i + \beta_4 Wealth_i + \beta_5 Resid_i + \beta_6 Accesshf_i + \beta_7 sex\_hsehhed_i + \beta_8 FP\_TV_i + \beta_9 FP\_Radio_i + \beta_{11} Married_i + \beta_{12} Religion_i + \beta_{13} Empstats_i + \beta_{10} Time\_trend_i + \beta_{14} BMI_i + \beta_{15} \text{aware\_tb}_i + \varepsilon_i \quad (20)$$

where all variables remained as defined. The ε and γ are error terms in the selection and outcome models respectively and capture the combined effect of the omitted variables, assuming that the combined effect of the omitted variables 1) is independent of each variable included in the equations, 2) is independent across subjects, and 3) has expectation zero (Freedman, 2005).

The measurement and description of the variables in the place of delivery model are summarised in Table 4.

Table 4: Description and measurement of variables in the place of delivery model

Variable	Description	Measurement	Level	a priori
Dependent variable				
Place_Del	Place of delivery	0 = Home 1 = public hospital 2 = Public clinic 3 = Private facility	Nominal	
Independent variables				
NHIS	National health insurance coverage	1 = Insured, 0 = uninsured	Nominal	+
ANC_visit	Antenatal care visits	Number of visits	count	+
Bord	*n*th child	0 = first 1 = second – third 2 = fourth – fifth 3 = sixth and above	Nominal	–
Age	Woman's age at recent birth (in years)	0 = ≤ 20 years 1 = 21-25 years 2 = 26-30 years 3 = 31-35 years 4 = 36-40 years 5 = 41-45 years 7 = 46 + years	Nominal	+
Edu	Woman's educational attainment	0 = no formal education, 1 = primary 2 = secondary or higher	Nominal	+

Table 4 Continued

Wealth	Household wealth quintile	1 = poorest 2 = poorer 3 = middle 4 = richer 5 = richest	Nominal	+
Resid	Residence	1 = Rural, 0 = urban	Nominal	–
Accesshf	Distance to health facility			
Sex_hsehhed	Sex of household head	1=Female, 0=Male	Nominal	+/-
FP_TV	Heard family planning on tv last few months	1=Yes, 0=No	Nominal	+
FP_Radio	Heard family planning on radio last few months	1=Yes, 0=No	Nominal	+
Married	Marital status	1 = Married, 0 = if otherwise	Nominal	+/-
Religion	Religious denomination	0 = No Religion 1 = Orthodox Christians 2 = Pentecostal/Charismatic Christians 3 = Islam 4 = African tradition	Nominal	+/-
Empstats	Employment status	1 = Employed, 0 = if otherwise	Nominal	+
Time_trend	Time trend	1 = 2014, 0 = 2008	Nominal	+

Source: Author (2018)

Justification of Variables in the Place of Delivery Choice Model

The following variables were used in the CMP regression model that sought to investigate the effect of national health insurance scheme ownership on the choice of place of delivery in Ghana. The choice of the variables was informed by Anderson's behavioural healthcare utilisation model, Grossman's theory of demand for health, as well as literature and intuition.

National health insurance status

National Health Insurance is deemed one of the strongest enabling factors that could influence the access and use of institutional maternal healthcare in Ghana. Under Ghana's National Insurance Scheme, maternal health services are extremely subsidised with an aspect called "free maternal healthcare". Pregnant women can access all forms of care including caesarean section free of charge given that she subscribes to the scheme. Studies also have shown that health insurance ownership increases the likelihood of expectant mothers using maternal healthcare (Agbanyo, 2012; Mensah et al., 2010; Nketiah-Amponsah & Sagoe-Moses, 2009; Wang et al., 2014, 2016).

Birth order

Studies have shown negative association between birth order and the use of maternal healthcare (Agbanyo, 2012; Nketiah-Amponsah & Sagoe-Moses, 2009; Wang et al., 2014). Agbanyo (2012) for instance found that an increase in birth order reduces the probability of a woman being delivered at a public health facility by 3.46 percent.

Age of mother at recent birth

Following Anderson (1995), age is considered a predisposing factor that can influence healthcare utilisation decisions. Since older and younger women have different experiences, their behaviour on health seeking also varies. Sharma, Sawangdee and Sirirassamee (2007) found out that women over the age 35 are less likely to utilise prenatal care but more likely to utilise delivery and postnatal care compared to younger women. Agbanyo (2012), however, found that a year increase in the age of expectant woman increases the probability of being delivered at public health facility by 1.07 percent. Grossman's theory of demand for health also stipulates that as individual ages, his/her health stock depreciates and to replenish the health, one needs to directly consume healthcare (Grossman, 1972).

Household wealth

Household wealth Status is another main enabling factor (Anderson, 1995). It is shown to have a positive effect on the utilisation of modern healthcare services (Agbanyo, 2012; Tonsuglo, et al., 2014; Wang et al., 2014). The wealth of household is an indicator of the ability of the household to acquire the necessary health inputs such as the parturition care services in order to produce the required health for the members of the household (Agbanyo, 2012).

Education of Expectant Mother

Education, both own and parental has received widespread empirical attention, showing a positive association with the demand for healthcare. Woman's education has been found to be one of the strongest predictors of maternal healthcare utilisation (Agbanyo, 2012; Wang et al., 2014, 2016).

Educated mothers are considered to have a greater awareness of the existence of maternal healthcare services and benefited in using such services. Educated mothers are likely to have better knowledge and information on modern medical treatment and have greater capacity to recognise specific illnesses. As education empowers women, they have greater confidence and capability to make decision to use modern healthcare services for themselves and for the children.

Education also enables women to take personal responsibility for their own health and the health of their children. Finally, schooling reflects a higher standard of living and access to financial and other resources, because better educated women are more likely to marry wealthier men or have increased earnings themselves. Low educational attainment has been found to have positive relationship with the choice of public health facilities (Karkee & Kadariya, 2013; Oyekale, Olowa, Olowa & Aina, 2016).

Antenatal Care Visits

Antenatal visit is included in the place of delivery model as an explanatory variable given that mother's knowledge about danger signs of pregnancy showed an effect on women's preferences for place of delivery (Tebekaw, Mashalla & Thupayagale-Tshweneagae, 2015). Berhan and Berhan (2014) found that woman attending antenatal care had more than 7 times increased chance of being delivered in a health facility. It is also reported that women who had less than four ANC visit were significantly associated with home delivery with adjusted odd ratio of 5.04 (Kasaye, Endale, Gudayu & Desta, 2017). Pervin et al. (2012) confirm that ANC visits are associated with increased uptake of facility-based delivery.

Family planning programme on television and radio

The importance of the media in disseminating health information in health-related issues has been established. Media exposure was found to be a determinant of home delivery (Kasaye et al., 2017). Some other studies found positive influence of mass media on the use of delivery care (Agbanyo, 2012; Nketiah-Amponsah and Sagoe-Moses, 2009).

Married women

The choice of place of delivery could be a household decision reached through bargaining by both spouses. Therefore, the decision to be delivered in a particular setting is expected to vary across marital status.

Religion

Religious denominations can influence one's level of faith in the supernatural healing powers. Tebekaw et al. (2015) found that Christians women are more likely to be delivered at private health facilities compared to Muslim women.

Estimation Technique for Choice of Place of Delivery Model

The conditional mixed process estimator is fundamentally a seemingly unrelated regressions (SUR) estimation program (Roodman, 2011). The Maximum Likelihood seemingly unrelated regressions can consistently estimate parameters in an important subclass of mixed-process simultaneous systems: ones that are recursive, with clearly defined stages, and that are fully observed, meaning that endogenous variables appear on the right-hand side only as observed (Roodman, 2011). Therefore, the estimation technique used to

estimate Equations (19) and (20) which examined effect of national health insurance scheme status on place of delivery choice was Maximum likelihood.

Validity of the Subsample for the Place of Delivery Model

With the introduction of a new variable (ANC visits) and the exclusion of the instrumental variables from the place of delivery model, the sample size further reduces from 8,805 women to 6,319 women. The reduction in the sample is captured in Table 5.

Table 5: Reduced sample for the place of delivery model

	Full sample		2008 Sample		2014 Sample	
Variable	Obs	NHIS%	Obs	NHIS%	Obs	NHIS%
Surveyed Sample	14,312	56.26	4,916	38.8	9,396	62.00
Place of delivery	8,818	59.32	2,959	39.41	5,859	69.38
Residence type	8,817	59.33	2,958	39.42	5,859	69.38
Distance problem	8,814	59.34	2,955	39.42	5,859	69.38
Religion	8,807	59.34	2,948	39.38	5,859	69.38
Antenatal care visit	6,319	59.87	2,065	40.92	4,254	69.06
Total Subsample	6,319	59.87	2,065	40.92	4,254	69.06

Source: Author (2018)

When the original data is limited to the women who gave birth, the sample reduced to 8,818 women with 59.32 percent enrolled on the NHIS. Out of these 8,818 women, 2,959 and 5,859 were from the 2008 and the 2014 data sets respectively. The percentage enrolment on the NHIS were 39.41 and 69.38 percent respectively in 2008 and 2014.

With the inclusion of other variables, the subsample for the place of delivery mode eventually reduces to 6,319 with the percentage enrolment slightly changing from 59.32 percent to 59.87 percent of the women enrolled on the NHIS. Out of the 6,319 women in the final sample, 2, 065 were from the 2008 data set with 40.92 percent enrolment while the number and percentage enrolment from the 2014 data set remain 4,254 and 69.06 percent respectively. Given that the percentage of the women who enrolled on the scheme did not vary largely from the original and the reduced sample, it could be said that the subsamples are valid representatives of the original samples.

Endogeneity Test in the CMP Framework

According to Roodman (2018), the endogeneity test is conducted by examining the correlation between the error terms of the two equations. We therefore check if the *athanrho* parameter for a variable is statistically difference from zero. For example, if you do

```
cmp (y = x1 x2 w) (x1 = z1 w) (x2 = z2 w) ....
```

Then the atanhro_12 parameter (also transformed and reported as rho_12) tells you about the correlation between the error terms of the first and second equations, meaning the *y* and *z1* equations. If it is different from zero, then there are unobserved factors simultaneously affecting *y* and *x1*, meaning it is endogenous.

Women's Autonomy Models and Estimation Techniques

In the third empirical study, a set of models and estimation techniques have been employed to investigate the effect of women's autonomy on the utilisation of desired maternal healthcare in Ghana. Following the argument put

up in the problem statement and the literature review in relation to the construction of women's autonomy as well as its endogenous potential, this study adopts Structural Equation Modelling (SEM), to examine both measurement and structural relations. That is empirical data has been used to measure the autonomy and the SEM technique was used to build the measurement and structural models. Later, statistical estimates were used to validate the model that has been built and data analysis helped to determine whether to accept or reject the hypothesis that has been stated based on the structural model.

Structural Equation Modelling

Structural Equation Modelling (SEM) is a multivariate statistical analysis technique that is used to analyse structural relationships. The technique is the combination of factor analysis and multiple regression analysis, and it is used to analyse the structural relationship between measured variables and latent constructs (Vinodh & Joy, 2012). When estimated in Partial Least Squares (PLS), it "provides a powerful framework for estimating causal models with latent variables and systems of simultaneous equations with measurement errors" (Henseler, Ringle & Sinkovics, 2009, p. 310).

Partial Least Squares Path Modelling

PLS is a family of alternating least squares algorithms which extend principal component and canonical correlation analysis designed for the analysis of high dimensional data in a low-structure environment (Henseler et al., 2009; 2016). In PLS, path models are formally defined by two sets of linear equations: the inner model (structural models) and the outer model

(measurement models). The inner model specifies the relationships between unobserved or latent variables, whereas the outer model specifies the relationships between a latent variable and its observed or manifest variables. The PLS-SEM method uses partial regressions to estimate the path coefficients between the latent variables and their indicators in the measurement models, as well between the latent variables in the structural model. In order to simplify the notation of the model and in line with conventional descriptions of PLS, we assume that latent and manifest variables are standardized so that the location parameters can be discarded in the following equations. The inner model for relationships between latent variables can be written as:

$$\xi = \beta\xi + \zeta \qquad (1)$$

where ξ is the vector of latent variables, β denotes the matrix of coefficients of their relationships, and ζrepresents the inner model residuals. The basic PLS design assumes a recursive inner model that is subject to predictor specification (Henseler et al., 2009). Predictor specification reduces (1) to:

$$(\xi|\xi) = \beta\xi \qquad (2)$$

PLS path modelling includes two different kinds of outer models: reflective (Mode A) and formative (Mode B) measurement models. The selection of a certain outer mode is subject to theoretical reasoning (Henseler et al., 2009) . Refer to Figure 4.

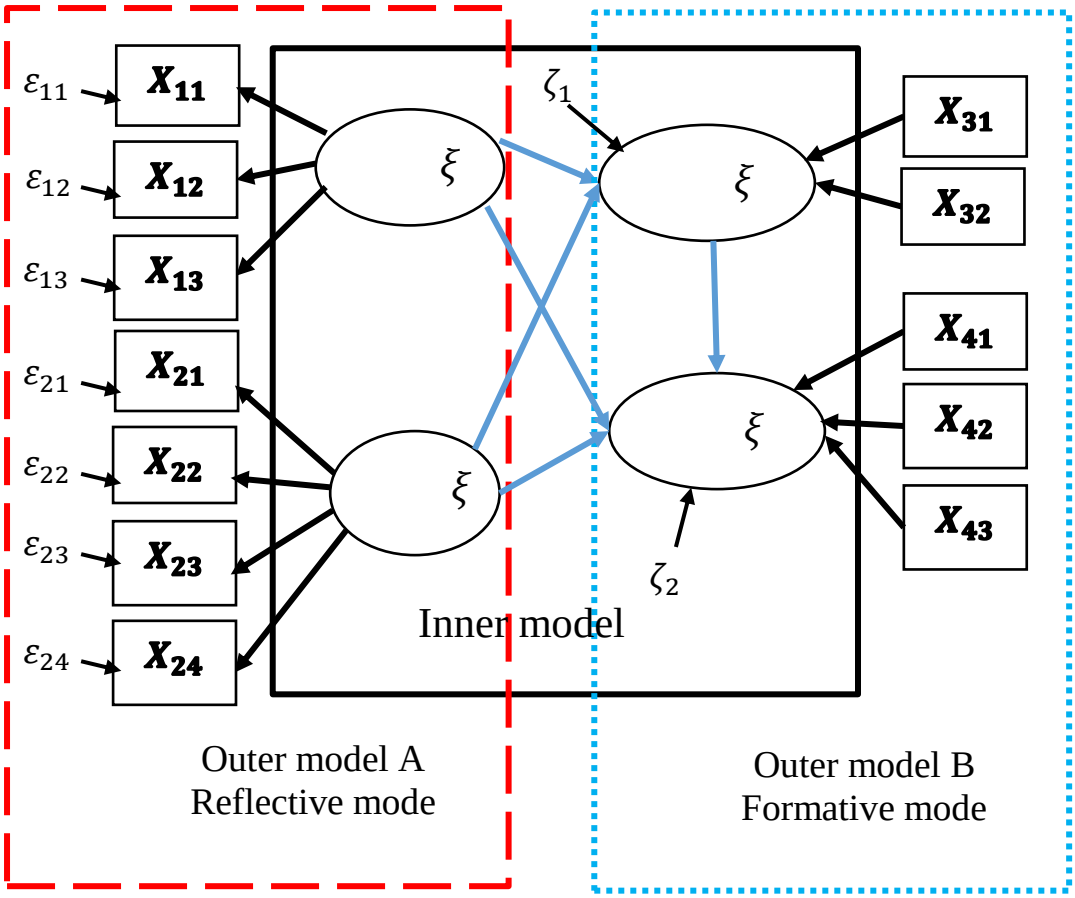

Figure 4: Example of a PLS Path Model

Source: Henseler et al. (2009)

The reflective mode has causal relationships from the latent variable to the manifest variables in its block. Thus, each manifest variable in a certain measurement model is assumed to be generated as a linear function of its latent variables and the residual, ε:

$$X_x = \Lambda_x \xi + \varepsilon_x \quad (3)$$

Where Λ represents the loading (pattern) coefficients. The outer relationships are also subject to predictor specification – implying that there are no correlations between the outer residuals and the latent variable of the same block. Therefore (3) reduces to

$$(X_x|\xi) = \Lambda_x \xi \quad (4)$$

The formative mode of a measurement model has causal relationships from the manifest variables to the latent variable. For those blocks, the linear relationships are given as follows:

$$\xi = \Pi_x X_x + \varepsilon_x \quad (5)$$

In the formative mode, predictor specification is also in effect, reducing (5) to:

$$\xi|(X_x) = \Pi_x X_x \quad (6)$$

Empirical Model for Women's Autonomy and desired maternal healthcare

In this study however, the reflective measurement models have been adopted given the theoretical relationship between the indicators and the latent variables. The empirical model has been specified as in Figure 5. The latent variables include women's empowerment (Empnt), women's autonomy (Auto), national health insurance status (NHIS) and desired maternal healthcare (DMH). Each of the latent variables has its respective manifest variables. The autonomy of a woman manifests in her attitude towards domestic violence, and both economic and household decisions making. The use of desired maternal healthcare reflects in the use of appropriate use of ANC, delivery services, PNC and tetanus toxoid. Women's empowerment also reflects in their level of education, wealth of their households, employment status and exposure to media while health insurance has two indicators: the coverage and the type of insurance.

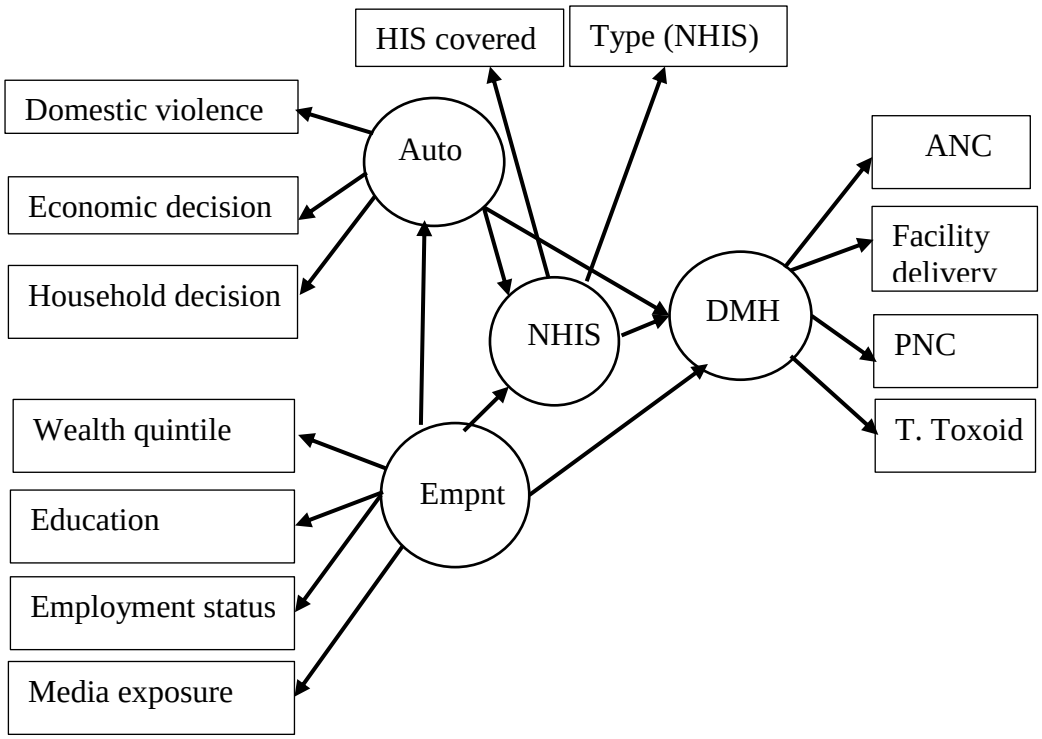

Figure 5: Women's Autonomy and Desired Maternal Healthcare

Source: Author's construct

Definition and Measurement of Variables in the Autonomy Model

The detailed description of the dimensions with indicators of the latent variables are summarised in Table 6. Although the 2008 and 2014 GDHS were not designed to directly capture the specific concept of women's autonomy as a variable, the information in these surveys did cover the major dimensions and indicators of the concept. The dimensions used in this study include (a) economic decision making, (b) household decision making, and (c) attitude towards domestic violence. The use of these dimensions and their indicators are consistent with (Bhandari, 2015; Gunasekaran, 2010; Haque et al., 2011; Mahapatro, 2012; Thapa & Niehof, 2013; Woldemicael & Tenkorang, 2010).

Table 6: Dimensions and indicators of constructs in the autonomy model

Dimension	Indicators	Coding
Economic Decision Making	Who decides on large purchases.	1 = someone else, 2 = husband alone, 3 = jointly, 4 = woman alone.
	Who decides on how to spend man's earnings.	1 = someone else, 2 = husband alone, 3 = jointly, 4 = woman alone.
	Who decides on how to spend woman's earnings.	1 = someone else, 2 = husband alone, 3 = jointly, 4 = woman alone.
Household Decision Making	Who has final say on use of contraception	1 = someone else, 2 = husband alone, 3 = jointly, 4 = woman alone.
	Who has final say on woman's healthcare	1 = someone else, 2 = husband alone, 3 = jointly, 4 = woman alone.
	Who has final say on woman's movement outside the home	1 = someone else, 2 = husband alone, 3 = jointly, 4 = woman alone.
Attitude towards Domestic violence	Beating you for going out	1= justified, 2 = undecided, 3 = not justified.
	Beating you for child neglect.	1= justified, 2 = undecided, 3 = not justified.
	Beating you for arguing with him	1= justified, 2 = undecided, 3 = not justified.
	Beating you for refusing sex.	1= justified, 2 = undecided, 3 = not justified.

Table 6 Continued

Dimension	Indicators	Coding
	Beating you for burning food	1= justified, 2 = undecided, 3 = not justified.
ANC visits	ANC in first trimester	1 = no, 2 =yes
	Had eight ANC visits	1 = no, 2 =yes
Facility delivery	Was delivered at health facility	1 = no, 2 =yes
Postnatal care	Accessed postnatal care in 24 hours after delivery.	1 = no, 2 =yes
Tetanus toxoid	Tetanus injections before birth	Number of tetanus injections
NHIS	NHIS coverage	1 = not insured, 2 = insured
House hold wealth	Wealth quintile	1 = poorest, 2 = poorer, 3 = middle, 4 = richer, 5 = richest
Education	Level of education	1= no formal education, 2 = Basic, 3 = secondary 4= higher
Employment	Employment status	1= not employed, 2 = employed
Media exposure	Heard family planning on radio last few months	1= no, 2 = yes
	Heard family. planning on TV last few months.	1= no, 2 = yes
	Read about family planning on newspaper last few months.	1= no, 2 = yes

Source: Author (2018)

This study follows the autonomy-empowerment debate and believes the argument that autonomy is not equivalent to empowerment, stressing that autonomy implies independence whereas empowerment may well be achieved through interdependence (Govindasamy & Malhotra 1996; Haque et al., 2011; Malhotra & Mather, 1997). Empowerment may be understood as the process of removing the factors which cause powerlessness. It is therefore made of enabling factors in exercising autonomy and include education, position in the household, closeness to kin, economic status of the household and of the woman, access and availability of infrastructure, and norms and attitudes of the larger community (Arulampalam et al., 2012). This study captured empowerment based on household wealth quintile, level of education, employment status and media exposure of the woman.

Estimation

The basic PLS algorithm is such that in estimating the path relationships starts with the data matrix of manifest variables and successively computes the latent variable scores and all unknown relationships. The algorithm is essentially a sequence of regressions in terms of weight vectors (Henseler et al., 2009) and the weight vectors obtained at convergence satisfy fixed point equations (Dijkstra, 2009). According to Henseler et al. (2009), the basic PLS algorithm, as suggested by Lohmoller in 1989 includes the following three stages:

Stage 1: Iterative estimation of latent variable scores, consisting of a four-step iterative procedure that is repeated until convergence is obtained: 1) outer approximation of the latent variable scores, 2) estimation of the inner weights,

3) inner approximation of the latent variable scores, and 4) estimation of the outer weights.

Stage 2: Estimation of outer weights/loading and path coefficients.

Stage 3: Estimation of location parameters.

Finally, in order to determine the path coefficients, for each endogenous latent variable a (multiple) linear regression is conducted and the significance of estimated values for path relationships in the structural model has been evaluated via bootstrapping.

Diagnostic and Fitness Tests for the Autonomy Model

PLS path modelling can be used both for explanatory and predictive research and for either purpose, there is the need for model assessment (Henseler et al., 2016). PLS path modelling results can be assessed globally (for the overall model) and locally (for the measurement models and the structural model). Since the SEM in PLS involves two sets of models, different tests have been conducted to ascertain the appropriateness of each set. Henseler et al. (2016) stressed that if the specified measurement (or outer) model does not possess minimum required properties of acceptable reliability and validity, then the structural (inner) model estimates become meaningless. That is, a necessary condition to even proceed to assess the "goodness" of the inner structural model is that the outer measurement model has already demonstrated acceptable levels of reliability and validity. There must be a sound measurement model before one can begin to assess the "goodness" of the inner structural model or to rely on the magnitude, direction, and/or statistical strength of the structural model's estimated parameters.

Assessing Reflective Measurement (outer) Models

Several tests have been used to ascertain the appropriateness of the measurement models based on internal consistency reliability and validity. The amount of random error in construct scores should be acceptable, or in other words: the reliability of construct scores should be sufficiently high. Nunnally and Bernstein (1994) recommend a minimum reliability of 0.7. The most important reliability measure for PLS is ρA (Dijkstra & Henseler, 2015; Henseler et al., 2016). It is currently the only consistent reliability measure for PLS construct scores. Other reliability measures include composite reliability (Dillon-Goldstein's ρ, factor reliability, Jöreskog's ρ, ω, or ρc) as well as Cronbach's alpha (α). Therefore, the internal reliability has been checked with the Dijkstra-Henseler's rhoA (ρA), Composite Reliability (Dillon-Goldstein's ρc), and Cronbach's alpha (α). The statistic in all cases needed to be greater than or equal to 0.7 (Henseler et al., 2009, 2016). The study also employed indicator reliability which ensures that the absolute standardized outer (component) loadings should be higher than 0.7.

Construct validity which is the degree to which instruments truly measure the constructs which they are intended to measure **(**Voorhees, Brady, Calantone & Ramirez, 2016) is also of great concern for the appropriateness of the measurement models. This is because the measurement of factors should also be free from systematic measurement error (Henseler et al., 2016). Construct validity has two dimensions: convergent validity and discriminant validity. Generally, a factor should be unidimensional, a characteristic examined through convergent validity. That is Convergent validity is the degree of confidence we have that a trait is well measured by its indicators (Shyu, Li & Tang, 2013). The

dominant measure of convergent validity is the average variance extracted (AVE) and it shows the amount of variance that a latent variable component captures from its indicators relative to the amount due to measurement error (Voorhees et al., 2016; Henseler et al., 2009, 2016). That is

$$AVE = \frac{\sum \lambda_i^2}{\left[\sum \lambda_i^2 + \sum Var(\varepsilon_i)\right]} \quad (7)$$

where λ_i is the component loading to an indicator and $Var(\varepsilon_i) = 1 - \lambda_i^2$ in case of standardized indicators. If the first factor extracted from a set of indicators explains more than one half of their variance, there cannot be any second, equally important factor, therefore an AVE of 0.5 or higher is therefore regarded as acceptable (Hair, Black, Babin, Adderson & Tatham, 2005; Henseler et al., 2016; Shyu et al., 2013).

Discriminant validity on the other hand is the degree to which measures of different traits are unrelated (Shyu et al., 2013). The motivation for applying discriminant validity tests is related to the need to identify the content and substance of constructs. Because constructs are intangible, researchers are required to show evidence that all constructs in a model or research study are distinct and not just empirical reflections of each other (Voorhees et al., 2016). Three criteria have been used to ascertain information about discriminant validity (Henseler et al., 2016; Voorhees et al., 2016). These are Fornell-Larcker criterion; the heterotrait-monotrait ratio of correlations (HTMT), developed by Henseler et al. in 2016; and cross-loadings. The Fornell-Larcker criterion says that a factor's AVE should be higher than its squared correlations with all other factors in the model. The HTMT is an estimate for the factor correlation (more precisely, an upper boundary). In order to clearly discriminate between two factors, the HTMT should be significantly smaller than one. Finally, the cross-

loadings was assessed to make sure that no indicator is incorrectly assigned to a wrong factor (Henseler et al., 2016).

Assessing the Structural model

Following Henseler et al. (2016), the structural model was assessed based on empirical bootstrap inference statistics. These included the R^2 of the endogenous variables as well as path coefficient (absolute size, sign), significance (p-value), and effect size of direct effects. In addition, coefficient (absolute size, sign) and significance (p-value) have been examined for both indirect effects and total effects. For the significant effects the study quantified how substantial they were, which was done by assessing their effect size, f^2. The Cohen criterion was adopted where f^2 values above 0.35, 0.15, and 0.02 were regarded as strong, moderate, and weak, respectively (Henseler et al., 2016). The path coefficients were essentially standardised regression coefficients and were assessed based on their sign and absolute size. They were therefore interpreted as the change in the dependent variable if the independent variable is increased by one and all other independent variables remain constant (Henseler et al., 2016).

Assessing the Overall Model

PLS path modelling's tests of model fit rely on the bootstrap to determine the likelihood of obtaining a discrepancy between the empirical and the model-implied correlation matrix that is as high as the one obtained for the sample at hand if the hypothesized model was indeed correct (Dijkstra & Henseler, 2015; Henseler et al., 2016). This concern is of particular interest relevant if this discrepancy is significant (Henseler et al., 2016). The study relied on the

approximate model fit criterion and adopted the standardized root mean square residual (SRMR). "Currently, the only approximate model fit criterion implemented for PLS path modelling is the standardized root mean square residual" (Henseler et al., 2016, p. 9). By this criterion, a value of zero for SRMR indicates a perfect fit but a cut-off value of 0.08 as proposed by Hu and Bentler in 1999 and supported by Henseler et al. (2016) has been adopted in this study.

Treating Endogeneity in the PLS – SEM

In explanatory modelling, which involves "the use of statistical models for testing causal explanations," (Shmueli, 2010, p. 290) controlling for endogeneity is crucial in order to adequately test hypotheses (Papies, Ebbes & van Heerde, 2016). Approaches for dealing with endogeneity in regression models can be transferred to PLS-SEM. However, contrary to regression analysis, in which the approaches use the (observed) indicator variables as input, their implementation in PLS-SEM draws on the composite scores obtained after the algorithm's convergence (Hult et al., 2018).

The presence of endogeneity can be tested using the Gaussian copula approach (Hult et al., 2018). Assuming Y is regressed on X_1 and X_2 to estimate the structural model path coefficients β_1 and β_2:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon \quad (8)$$

If X_1 is thought to be correlated with the error term (ε) of the dependent variable Y and may therefore induce an endogeneity problem in the estimation of Equation (8). The Gaussian copula approach requires the composite scores of the endogenous construct X_1 to be non-normally distributed. If this requirement

is met, the Gaussian copula of X_1 can be calculated as follows (Papies et al. 2016):

$$C^* = \Phi^{-1}(H(X_1)) \quad (9)$$

where $H(x)$ is the empirical cumulative density function and Φ^{-1} is the inverse normal cumulative density function. Next, the copula is included as an additional independent variable that controls for the correlation between the error term and the endogenous independent construct in the regression model:

$$y = \beta_0 + \beta_1' X_1 + \beta_2' X_2 + \beta_3 C_1^* + \varepsilon' \quad (10)$$

To attend to the endogeneity problem, estimating Equation (10) yields the new path coefficients β_1' and β_2'.

The critical level of endogeneity depends on the bootstrapped copula coefficient's (β_3) (Park & Gupta 2012). A significant coefficient indicates a critical level of endogeneity even though treated by including the copula in the regression model (10) (Hult et al., 2018). If the coefficient is not significant, no critical endogeneity issue affects the regression results and original path coefficients can be interpreted. In addition to the Gaussian copula approach, endogeneity can also be dealt with in PLS-SEM using of control variables, and instrumental variables approaches (Hult et al., 2018).

Summary

The chapter described the methods employed in the conduct of the study. It started with the philosophy and design of the study, continued with the description of data and variables. Sample selection issues were also discussed.

The methods of analysis with appropriate diagnostic and fitness tests conducted for each empirical study were carefully explained. For the simple logistic regression model, the tests conducted include the *linktest* for model

specification tests; the Hosmer-Lemeshow and Pearson tests for goodness-of-fit; and the Collin test for multicollinearity. While for the multinomial endogenous treatment effect model estimated in the CMP framework, the Wald's chi-square test was relied upon in addition to the multicollinearity checks as well as the use of robust variance–covariance estimators (robust VCE) to achieve highly efficient standard errors.

Finally, chapter concluded with the employment of SEM with PLS and checked the internal reliability of the measurement models using the Dijkstra-Henseler's rhoA (ρA), Dillon-Goldstein's ρc, and Cronbach's alpha (α). The statistics in all cases were greater than 0.7. The AVE which is the dominant measure of convergent validity for PLS was also employed. Again, the study used three criteria to ascertain information about discriminant validity in the measurement models and these include Fornell-Larcker criterion, the heterotrait-monotrait ratio of correlations (HTMT), and the cross-loadings.

In assessing the structural model, the study followed Henseler et al. (2016) and used empirical bootstrap inference statistics including the R^2 of the endogenous variables as well as path coefficient (absolute size, sign), significance (p-value), and effect size of direct effects. Moreover, coefficient and significance (p-value) have been examined for both indirect effects and total effects. Finally, the study relies on approximate model fit criterion and adopts the standardised root mean square residual (SRMR) for the assessment of the overall model. The SRMR is currently the only approximate model fit criterion implemented for PLS path modelling (Henseler et al., 2016).

CHAPTER FIVE

DEMAND FOR NATIONAL HEALTH INSURANCE AMONG EXPECTANT MOTHERS

Introduction

This chapter presents results of the analyse of demand for national health insurance among expectant mothers before and after the year 2008 in Ghana. This is deemed necessary to give meaning to the effect of the NHIS on the choice of place of delivery in the following chapter. The chapter presents three multivariate logistic regression estimates with the maximum likelihood technique. The first one is based on the 2008 data set, the second is based on the 2014 data set while the third is based on the pooled data set with a time trend.

Characteristics of Expectant Mothers in the NHIS Demand Model

The decision to enrol on health insurance may be understood as a health seeking behaviour. This is because health insurance serves as a key to access healthcare. That is health insurance enables individuals to seek appropriate care and on timely basis. Following Anderson (1995), this decision can be influenced by several social, demographic and economic characteristics of the individual. These characteristics of respondents are captured in Table 7.

In all, a total of 8,805 women had information on the study variables in this chapter. Out of this total number, 2,946 women gave birth before the year 2008 and were captured in the 2008 GDHS while 5,859 of them had their latest birth after 2008 and were captured in the 2014 GDHS. As explained in the previous chapter, the representativeness of the reduced sample was insured by assigning sample weight to everyone, controlling for clusters of the individual and the use of the robust command.

Table 7: Descriptive statistics for the NHIS demand model

	Pooled Sample		2014 Subsample		2008 subsample	
Variable	Freq.	Percent	Freq.	Percent	Freq.	Percent
NHIS coverage						
Insured	5,226	59.35	4,065	69.38	1,161	39.41
Uninsured	3,579	40.65	1,794	30.62	1,785	60.59
Age of women in years						
≤ 20	572	6.50	360	6.14	212	7.20
21-25	1,911	21.70	1,193	20.36	718	24.37
26-30	2,302	26.14	1,545	26.37	757	25.70
31-35	1,911	21.70	1,324	22.60	587	19.93
36-40	1,376	15.63	943	16.09	433	14.70
41-45	572	6.50	389	6.64	183	6.21
≥ 46	161	1.83	105	1.79	56	1.90
Educational attainment						
No education	3,142	35.68	2,034	34.72	1,108	37.61
Primary	1,920	21.81	1,207	20.60	713	24.20
Secondary	3,456	39.25	2,395	40.88	1,061	36.01
Higher	287	3.26	223	3.81	64	2.17
Wealth quintile						
Poorest	2,831	32.15	1,877	32.04	954	32.38
Poorer	1,944	22.08	1,298	22.15	646	21.93
Middle	1,575	17.89	1,080	18.43	495	16.80
Richer	1,381	15.68	883	15.07	498	16.90
Richest	1,074	12.20	721	12.31	353	11.98
Birth order						
First	2,002	22.74	1,330	22.70	672	22.81
Second and third	3,294	37.41	2,180	37.21	1,114	37.81
Fourth and fifth	2,080	23.62	1,418	24.20	662	22.47
sixth and above	1,429	16.23	931	15.89	498	16.90
Religion						
No religion	409	4.65	264	4.51	145	4.92
Orthodox Christians	2,098	23.83	1,366	23.31	732	24.85
Pentecostal/charismatic	4,012	45.57	2,793	47.67	1,219	41.38
Islam	1,798	20.42	1,200	20.48	598	20.30
African traditionalist	488	5.54	236	4.03	252	8.55

Table 7 continued

Variable	Pooled Sample		2014 Subsample		2008 subsample	
	Freq.	Percent	Freq.	Freq.	Percent	Freq.
Distance to health facility						
Not a big problem	5,947	67.54	3,983	67.98	1,964	66.67
Is a big problem	2,858	32.46	1,876	32.02	982	33.33
Marital status						
Not married	1,048	11.90	774	13.21	274	9.30
Married	7,757	88.10	5,085	86.79	2,672	90.70
Sex of household head						
Male	6,659	75.63	4,476	76.40	2,183	74.10
Female	2,146	24.37	1,383	23.60	763	25.90
Employment status						
Not employed	1,595	18.11	1,216	20.75	379	12.86
Employed	7,210	81.89	4,643	79.25	2,567	87.14
Family planning on radio						
No	3,874	44.00	2,636	44.99	1,238	42.02
Yes	4,931	56.00	3,223	55.01	1,708	57.98
Family planning on television						
No	5,493	62.39	3,531	60.27	1,962	66.60
Yes	3,312	37.61	2,328	39.73	984	33.40
Residence type						
Urban	3,322	37.73	2,333	39.82	989	33.57
Rural	5,483	62.27	3,526	60.18	1,957	66.43
Aware of tuberculosis						
No	1,887	21.43	1,310	22.36	577	19.59
Yes	6,918	78.57	4,549	77.64	2,369	80.41
Observations	8,805		5,859		2,946	

Source: Author (2018)

Regarding the distribution of the variable of interest, it could be observed that in 2008, only 39.41 percent of the women were insured while 60.59 percent were not insured. However, by 2014, the percentage insured increased to 69.38 while only 30.62 percent were not insured. From the pooled data, about 59.35 percent of the women were insured while the remaining 40.65 percent were not insured. This is relatively consistent with the original sample used in the survey, 2014 GDHS, where "38 percent of women reported that they were not covered by any type of the health insurance scheme" (GSS et al., 2015, p. 272).

On average, a woman in this study is about 31 years old and the age of women ranged from 15 to 49 years with the modal age group being 26-30 years. This age group is deemed appropriate for the study because it constitutes the active childbearing age. The original survey sample was constituted by women who gave birth within the five years preceding the data collection. Inferences from such a sample can comfortably be applied to the entire childbearing population with caution that few births could occurs outside this age bracket.

Again, from Table 7, the women from poorest households were 2,831 (32.15 percent) of the 8,805 women studied in this work. Women from the other wealth quintile are poorer: 1,944 (22.08 percent), middle: 1,575 (17.89 percent), richer: 1,381 (15.68 percent) and richest: 1,074 (12.20 percent). Wealth quintile depicts social classes. It could be observed that more people lie at the bottom of the strata while few people remain at the top.

Some other covariates include level of education, media exposure, marital status, and religion. While 35.68 percent of the women had no formal education, 39.25 percent of them had secondary education. Women who heard family planning on television or radio few months preceding the data collection were deemed to have access to health information. It was found out that 4,931 (56 percent) and 3,312 (37.61 percent) accessed health information via radio and television respectively. It is also evident that 7,757 (88.1 percent) were married or staying with their partners while 1,048 (11.9 percent) were not married. In terms of religion, it could be said that most (69.4 percent) of the women were Christians with 2,098 (23.83 percent) being orthodox Christians and 4,012 (45.57 percent) being Pentecostal or charismatic Christians. In addition, it is realised that 409 (4.65 percent) of the women belong to no religious denomination, 1,798

(20.42 percent) were Muslims and 488 (5.54 percent) belong to the African Traditional Religion. The distribution of religion also confirms the well-known fact that Christians have highest population in Ghana. In the next section, the association between the dependent variable and the independent variables are explored prior to the causal analysis.

Relationship of National Health Insurance with its determinants

Before doing any rigorous analysis to determine the effects of independent variables on the demand for NHIS, the relationships between dependent variable and the independent variables were explored. This is done using bivariate analysis involving chi square test and the results are in Table 8.

Table 8: Selected independent variables by NHIS coverage

Variable	Uninsured	Insured	Chi square Test
Time trend			
2008	1,785 (60.59)	1,161(39.41)	729.89***
2014	1,794(30.62)	4,065(69.38)	
Age of women in years			
≤20	299(52.27)	273(47.73)	87.97***
21-25	853(44.64)	1,058(55.36)	
26-30	859(37.32)	1,443(62.68)	
31-35	682(35.69)	1,229 (64.31)	
36-40	544(39.53)	832(60.47)	
41-45	260(45.45)	312(54.55)	
46+above	82(50.93)	79(49.07)	
Educational attainment			
No education	1,407(44.78)	1,735(55.22)	173.20***
Primary	922(48.02)	998(51.98)	
Secondary	1,195(34.58)	2,261(65.42)	
Higher	55(19.16)	232(80.84)	
Wealth quintile			
Poorest	1,250(44.15)	1,581(55.85)	127.16***
Poorer	904(46.50)	1,040(53.50)	
Middle	629(39.94)	946(60.06)	

Table 8 continued

Variable	Uninsured	Insured	Chi square Test
Richer	496(35.92)	885(64.08)	
Richest	300(27.93)	774(72.07)	
Birth order			
First	757(37.81)	1,245(62.19)	44.16***
Second-third	1,291(39.19)	2,003(60.81)	
Fourth-fifth	841(40.43)	1,239(59.57)	
sixth and above	690(48.29)	739(51.71)	
Religion			
No religion	216(52.81)	193(47.19)	169.43***
Orthodox Christians	756(36.03)	1,342(63.97)	
Pentecostal/charismatic	1,671(41.65)	2,341(58.35)	
Islam	629(34.98)	1,169(65.02)	
Traditionalist	307(62.91)	181(37.09)	
Distance to health facility			
Is not a big problem	2,315(38.93)	3,632(61.07)	22.47***
Is a big problem	1,264(44.23)	1,594(55.77)	
Residence type			
Urban	1,129(33.99)	2,193(66.01)	98.13***
Rural	2,450(44.68)	3,033(55.32)	
Marital status			
Not married	530(50.57)	518(49.43)	48.57***
Married	3,049(39.31)	4,708(60.69)	
Sex of household head			
Male	2,606(39.14)	4,053(60.86)	25.90***
Female	973(45.34)	1,173(54.66)	
Employment status			
Not employed	583(36.55)	1,012(63.45)	13.54***
Employed	2,996(41.55)	4,214(58.45)	
Family planning on radio			
No	1,665(42.98)	2,209(57.02)	15.59***
Yes	1,914(38.82)	3,017(61.18)	
Family planning on television			
No	2,447(44.55)	3,046(55.45)	92.08***
Yes	1,132(34.18)	2,180(65.82)	
Aware of tuberculosis			
No	908(48.12)	979(51.88)	55.57***
Yes	2,671(38.61)	4,247(61.39)	

Note: *** Significant at 1%; row percentages in parenthesis

Source: Author (2018)

Table 8 shows selected independent variables by National Health Insurance coverage. Using the chi-square test, the results show that all the selected variables were significant at the bivariate level, buttressing the fact that the enrolment onto the NHIS is influenced by a host of economic, social and demographic factors. Specifically, the chi-square test indicates a statistically significant difference between time periods (2008 and 2014) and the insurance status of the expectant mothers.

Household wealth is an economic factor considered to be an enabling factor in healthcare utilisation and hence the decision to enrol on health insurance. There is a significant variation in the decision to subscribe to health insurance scheme across wealth quintile (Pearson $chi^2(4) = 127.16$, $p = 0.000$). it can also be observed that as wealth quintile improves from poorer to richest, percentage of insured women also increases from 53.50 to 72.07 percent. Following most of the previous studies wealth is expected to have positive relationship with health insurance subscription with the argument that the wealthier is more likely to afford the insurance premium.

Similarly, there exists a well-known large and persistent relationship between education and health and this relationship has been observed in many countries and time periods, and for a wide variety of health measures (Cutler & Lleras-Muney, 2006). The implication is that the educated may have more information on where and how to seek healthcare (for example, enrolling on health insurance) – either preventive or curative care. If health insurance serves as a key to healthcare, then the educated is likely to have more information about health insurance hence the decision to enrol or otherwise can be influenced by the level of education. The results in Table 8 suggest that there is a significant

relationship between education and the demand for national health insurance (Pearson $chi^2(4) = 173.2$, $p = 0.000$). As education increases from primary school to the level higher that secondary, the percentage of women insured increases from 51.98 to 80.84 percent. It is therefore expected that education would have positive effect on the NHIS enrolment.

Birth order reflects the fertility of women and is closely related to household size and a woman's experience in maternity. How people value children, what satisfaction they find in them, is of great significance for an understanding of fertility behaviour (Kagitcibasi, 1982). The value of children symbolises the motivations for childbearing and assumes an important role in any micro model of fertility and intrafamily dynamics. Birth order is known to have relationship with maternal health seeking decisions. It could be observed that as birth order increases from the first child to the sixth child and above, the percentage of women insured decreases from 62.19 percent throughout to 51.71 percent. This suggests negative relationship between birth order and the demand for NHIS. That is multiple birth may reduce the tendency of a woman to enrol on national health insurance scheme.

Even though the variation in the decision to subscribe to the national health insurance scheme across the selected independent variables is significant at bivariate level, a more rigorous analysis (logistic regression) has been employed to investigate the effect of these variables on NHIS enrolment in a subsequent section.

Determinants of NHIS Ownership Among Expectant Mothers in Ghana

The ownership of health insurance demonstrates the health seeking decision of an individual and assesses that individual's valuation of the health system as well as his or her own health conditions hence the need for healthcare. Table 9 shows the social and economic characteristics which were hypothesised to influence the decision of an expectant woman to subscribe to the NHIS. A determination done using a multivariate logistic regression. The coefficients are in Appendix B while the marginal effects (in Table 9) are interpreted and discussed.

To ensure valid and reliable conclusions from this model a few statistical tests were conducted. In all, both the diagnostic tests and the post estimation statistics show that the model was robust and appropriate. The *linktest* and the Ramsey RESET tests were conducted and the results show that all the three models were correctly specified. It was therefore concluded that there was no specification error in the estimated models and that all the relevant variables are incorporated in the estimated models.

To ensure a reasonable level of multicollinearity, the correlation matrix (Appendix C) was carefully observed and highly correlated ($r > 0.5$) variables were dropped. In addition, collinearity diagnostics was carried out with the Collin test and suggested that the Variance Inflation Factors (VIF), the tolerance of the variables and the condition index in the models were within the acceptable range (Gujarati, 2003). In this study, individual VIFs were all less than four (VIF<4) and the mean VIF were 1.41 and 1.43 for the pooled estimates and the individual models respectively.

Table 9: Factors that influence NHIS enrolment among expectant mothers in Ghana – Regression output (Marginal effects)

	Pooled Sample				2014 Subsample				2008 Subsample			
Variables	M. Effect	RSE	Z	*p-val*	M. Effect	RSE	Z	*p-val*	M. Effect	RSE	Z	p-val
Time trend (1=2014)	0.301***	0.0225	13.39	0.000								
Age of expectant mothers (ref = ≤ 20 years)												
21-25 years	0.0712**	0.033	2.13	0.033	0.039	0.038	1.02	0.309	0.134**	0.056	2.38	0.017
26-30 years	0.146***	0.032	4.54	0.000	0.119***	0.035	3.37	0.001	0.195***	0.059	3.29	0.001
31-35 years	0.162***	0.036	4.52	0.000	0.118***	0.040	2.96	0.003	0.259***	0.064	4.08	0.000
36-40 years	0.155***	0.039	3.95	0.000	0.120***	0.042	2.85	0.004	0.241***	0.072	3.35	0.001
41-45 years	0.118**	0.046	2.56	0.010	0.078	0.048	1.62	0.106	0.218***	0.082	2.65	0.008
≥ 46 years	0.076	0.063	1.20	0.229	0.061	0.069	0.88	0.382	0.113	0.120	0.94	0.345
Level of education (ref = no education)												
Primary	0.038	0.025	1.53	0.126	0.021	0.029	0.71	0.478	0.063	0.041	1.54	0.124
Secondary	0.066***	0.025	2.65	0.008	0.0498*	0.029	1.72	0.085	0.083**	0.041	2.02	0.043
Higher	0.113**	0.056	2.00	0.046	0.119***	0.044	2.73	0.006	0.120**	0.051	2.40	0.016
Household wealth (ref = poorest)												
Poorer	0.060**	0.023	2.56	0.010	0.051**	0.025	2.01	0.022	0.078*	0.045	1.71	0.086
Middle	0.072***	0.024	2.96	0.003	0.047**	0.033	2.02	0.021	0.106**	0.052	2.05	0.040
Richer	0.152***	0.049	3.08	0.002	0.092***	0.019	4.72	0.000	0.210***	0.057	3.70	0.000
Richest	0.171***	0.043	3.95	0.000	0.076***	0.022	3.45	0.000	0.215***	0.070	3.08	0.002
Birth order (ref = first child)												
Second-third	-0.0822***	0.018	-4.53	0.000	-0.054***	0.021	-2.66	0.008	-0.107***	0.026	-4.04	0.000
Fourth-fifth	-0.134***	0.031	-4.26	0.000	-0.121***	0.038	-3.19	0.001	-0.132***	0.035	-3.80	0.000
6^{th} and more	-0.149***	0.035	-4.31	0.000	-0.158***	0.041	-3.86	0.000	-0.110**	0.049	-2.26	0.024
Religious denomination (ref = no religion)												
Orthodox Christians	0.070**	0.023	2.56	0.010	0.048**	0.021	2.26	0.024	0.072**	0.033	2.21	0.027

Table 9 continued

Variable	Pooled Sample				2014 Subsample				2008 Subsample			
	M. Effect	RSE	Z	*p-val*	M. Effect	RSE	Z	*p-val*	M. Effect	RSE	Z	p-val
Pentecostal/charismatic	0.024	0.037	0.63	0.526	0.037	0.043	0.87	0.384	-0.019	0.069	-0.28	0.782
Islam	0.115***	0.041	2.84	0.005	0.134***	0.039	3.40	0.001	0.049**	0.021	2.33	0.020
Traditional African	-0.051	0.045	-1.14	0.255	-0.00001	0.049	-0.00	0.999	-0.126*	0.069	-1.83	0.068
Distance problem (not big)	0.012	0.021	0.58	0.560	0.005	0.024	0.22	0.827	0.026	0.032	0.82	0.414
Married	0.137***	0.028	4.97	0.000	0.139***	0.033	4.18	0.000	0.089**	0.041	2.21	0.027
Female household head	-0.051**	0.023	-2.25	0.025	-0.034	0.027	-1.26	0.207	-0.072**	0.031	-2.33	0.020
Employed	0.015	0.022	0.68	0.495	0.038*	0.023	1.69	0.091	0.046	0.042	1.10	0.273
Family planning on radio	0.011	0.021	0.52	0.600	0.028	0.024	1.16	0.244	-0.042	0.031	-1.34	0.179
F. Planning on Television	0.016	0.022	0.71	0.479	0.027	0.025	1.11	0.267	-0.026	0.037	-0.72	0.474
Rural Resident	-0.004	0.029	-0.13	0.893	-0.014	0.032	-0.45	0.654	0.011	0.044	0.25	0.805
Body mass index	0.074***	0.011	3.80	0.000	0.014**	0.007	2.05	0.040	0.131***	0.041	3.23	0.026
Awareness of Tuberculosis	0.048***	0.012	4.02	0.000	0.024***	0.008	3.08	0.002	0.114***	0.034	3.35	0.001
Observations	8,805				5,859				2,946			
y = Pr(NHIS) (predict)	0.784				0.694				0.766			

Notes: RSE is robust standard errors. *** p<0.01, ** p<0.05, * p<0.1

Source: Author (2018)

According to Gujarati (2003), as a rule of thumb, if the VIF of a variable exceeds 10, which will happen if R^2 exceeds 0.90, that variable is said to be highly collinear. The condition numbers were 28.42, 28.81and 28.92 for the pooled model, 2014 model and the 2008 model respectively which were less than the threshold of 30 (Gujarati, 2003). In all, the diagnosis indicated acceptable level of multicollinearity in all the models.

In addition to the specification and multicollinearity checks, the goodness-of-fit of the models was also ascertained. That is to be sure that the models properly fit the data. The Hosmer-Lemeshow test was adopted for that purpose. The Hosmer-Lemeshow test returned $chi^2(1) = 2.03$, $p = 0.1545$ for the pooled model, $chi^2(1) = 1.58(1)$ $p= 0208$ for the 2014 model and $chi^2(1) = 2.32(2)$ $p= 0.3134$ for the 2008 model. Therefore, the hypothesis that the model correctly fit the data cannot be rejected.

The robust option in STATA was used to resolve problems of heteroscedasticity. The Wald chi square and the Pseudo R square values also indicate that the hypothesis that all the coefficients of the predictors except the constant are zero is rejected implying that the models are robust. The pseudo-R-squares indicate how well the regressors explain the probability of insurance (Peprah, 2013). The predicted values of insurance Pr(Insurance) are 0.784, 0.694 and 0.766 for the pooled, the 2014 and the 2008 models respectively. These suggest that all the explanatory variables together explained about 78.4 percent 69.4 percent and 76.6 percent of the decision to enrol on national health insurance in the pooled, the 2014 and the 2008 models respectively.

Now that the appropriateness of the models has been ascertained, the results are worth discussing. From the results in Table 9, it could be observed

that several the socio-economic and demographic factors under investigation in this chapter were found to be significant in explaining the subscription to national health insurance scheme among expectant mothers in Ghana. The significant factors include time trend, birth order, level of education, household wealth, women's age, marital status, and religion, body mass index, awareness of tuberculosis among others.

The time trend has a marginal effect of 0.301 and significant at one percent ($p = 0.000$). This implies that a woman who gave birth after 2008 is 30.1 percent more likely to enrol on the NHIS than compared to her counterpart who gave birth before 2008. Therefore, using the conventional significance level of 0.05, we fail to accept the null hypothesis expectant mothers' enrolment or demand for national health insurance did not significantly increase after 2008.

This increase in enrolment could be explained by the free maternal healthcare policy which was introduced into the NHIS in 2010. With the introduction of the free maternal healthcare into the NHIS, an expectant mother is expected to register with the scheme to access maternal healthcare free of charge. However, uninsured woman who goes for the first ANC is given free consultation while she pays for medication. She is then given a card confirming her pregnancy that enables her to register with the NHIS. Moreover, unregistered expectant mothers also pay full costs for delivery services.

Further explanation can be given from theoretical point of view. The theory of *status quo bias* suggests that consumers prefer the status quo to something new and unknown, especially when alternatives become more complicated (Salkeld et al., 2000). This theory suggests that the decision for poor and illiterate groups to enrol may be influenced by the extent to which

these groups have clear information about a health insurance scheme, especially if the concept of insurance is new (Alkenbrack, 2011; Schneider, 2004). It could be the case that as of 2008, individuals did not have adequate information and understanding of the concept of health insurance since the policy was implemented in the late 2005. That is following the theory of the status quo bias, it could be said that the idea of health insurance was new at the time the 2008 data was collected.

Another significant variable is the level of formal education. Though education has positive effects on enrolment, the effects of primary education is not significant. A woman who attained secondary education is 6.6 percent more likely to enrol on NHIS compared to a woman without any formal education. Moreover, the effects of secondary education reduced from 8.3 percent in 2008 to 4.98 percent in 2014. Similarly, a woman who attained higher education is 11.3 percent more likely to enrol on NHIS compared to a woman without any formal education. Moreover, the effects of higher education reduced from 12.0 percent in 2008 to 11.9 percent in 2014. That is all other things being equal, the higher a woman goes on the educational ladder, the more she would prefer insuring her health supporting the notion that the educated is more risk averse than the less educated (Jung, 2014).

The positive effect of education on health insurance in the current study substantiates Wang et al. (2014) where the effect of health insurance on maternal health was examined in some low-income countries (including Ghana), it was concluded that educational attainment was associated with a higher likelihood of enrolling in health insurance. In Ghana, a study by Sekyi (2009) sought to explore the determinants of enrolment of the NHIS in the

Mfantseman Municipality of the Central Region of the country and revealed that factors which influence enrolment at the individual/household level included education of the individual.

The positive association between level of education and the likelihood of enrolment on national health insurance could have some implications. From the conceptual framework, it is conceived that individual social and economic characteristics such as education can influence one's decision to use or not to use health insurance. Again, from the Anderson's healthcare utilisation model, health insurance is an enabling factor in enhancing healthcare utilisation. It is noted that most factors that enhance the use of healthcare also promote the subscription to health insurance. In case of formal education, some explanations as to why the factor is a key determinant of a woman's choice of health insurance can be given. Education is likely to enhance women autonomy so that women develop greater confidence and capabilities to make decisions regarding their own health (Raghupathy, 1996). It is believed that women increase their use the healthcare with higher autonomy. Education also enables women to have better knowledge and information on modern medical treatment and have greater capacity to recognise specific illnesses.

The results in Table 9 also show that household wealth is a significant factor in influencing a woman's decision to enrol on NHIS. Household wealth quintile has five categories: poorest, poorer, middle, richer and richest with the poorest category being the reference group. As expected, household wealth has positive effects on NHIS enrolment. The indication from Table 9 is that as wealth improves, the probability of a woman in the household enrolling on the NHIS increases.

Specifically, when a woman lives in a poorer household, the probability that she will enrol on the NHIS increases compared with a woman with similar characteristics but duels in poorest household. The poorer household has a marginal effect of 0.06, p = 0.010, suggesting that when a woman lives in a poorer household, the probability of her subscribing to the NHIS increases by 6 percent relative her counterpart in the poorest household, all other thing being equal. Moreover, the marginal effect of middle wealth quintile is 0.072, p = 0.003 indicating that when a woman lives in such households, the probability of her subscribing to the NHIS increases by 7.2 percent relative her counterpart in the poorest household, holding all other factors constant. Women from richer and the richest quintile households respectively have 15.3 and 17.1 percentage point increase in the likelihood of their enrolment onto the scheme.

It can also be noted that household wealth has greater effects on NHIS subscription in 2008 than in 2014. In 2008, a woman in the poorer household is 7.8 percent more likely to enrol on the NHIS compared to a woman in the poorest household. However, this percentage point reduces to 5.1 in 2014. Similarly, in 2008, a woman in a household with middle wealth quintile is 10.6 percent more likely to enrol on the NHIS compared to a woman in the poorest household. However, this percentage point reduces to 4.7 in 2014. Again, in 2008, a woman in the richer household is 21 percent more likely to enrol on the NHIS compared to a woman in the poorest household. However, this percentage point reduces to 9.2 in 2014. Finally, in 2008, a woman in the richer household is 21.5 percent more likely to enrol on the NHIS compared to a woman in the poorest household. However, this percentage point reduces to 7.6 in 2014.

The positive effects of household wealth on health insurance subscription is consistent with most of the previous studies. Wang et al. (2014, 2016) used propensity score matching and found that household wealth was positively correlated with participation in health insurance in five of the eight countries studied, including Ghana, after adjusting for other factors. Singh et al. (2015) also used mixed methods to study the determinants of NHIS subscription in the Northern part of Ghana and found that both the quantitative and qualitative assessments indicated that the poor were less likely to have insurance than their wealthier counterparts.

Again, Sekyi (2009) which sought to explore the determinants of enrolment of the NHIS and examine its effects on the probability of utilising outpatient care and expenditure in the Mfantseman Municipality of the Central Region of Ghana revealed that income and wealth are among the factors that influence enrolment at the individual and household level. In a recent study, Wang et al. confirmed pro-wealthy disparities in health insurance coverage in most countries included in their study.

Birth order is found to have negative effects on NHIS enrolment. That is a woman who has multiple births is less likely to enrol on the NHIS relative to her counterpart who has few births. Put differently, as the number of births increases, a woman is less likely to register with the national health insurance. The marginal effect for the second and the third child is negative 0.0822 which is significant at one percent (p = 0.000) signifying that a woman who is expecting the second or third child is 8.22 percent less likely to enrol on the NHIS compared to her counterpart who is expecting the first child, all other things being equal. The likelihood further reduces 13.4 percent for the fourth and fifth child

and 14.9 percent for the sixth or more child. There is no clear direction as to whether the effect of birth order on NHIS has changed from 2008 to 2014

The negative effect of birth order on NHIS enrolment corroborates Wang et al. (2014). Perhaps, a possible explanation for this is that as the number of birth increases, women tend to rely more on their past experiences and knowledge from the previous births and may fear no birth complication. In other words, women may become "risk-loving" with increasing birth and may not be worried about health insurance against maternity. Again, higher birth order signifies larger household size and the larger a household, the higher the pressure on economic resources hence resource allocation for healthcare may reduce.

Again, it is documented that multiple birth reduces the use of maternal healthcare (Agbanyo, 2012; Kistiana, 2009). This fact could also explain the reduction in the likelihood of expectant mother's enrolment on health insurance with increasing birth. The current study involved women who had their most current birth within the five years preceding the collection of the data and having health insurance also meant that the woman either enrolled or renewed her subscription in the preceding year. It therefore stands to believe that any woman who believed that she would not need maternal healthcare may not subscribe or renew her health insurance.

The age of expectant mothers is found to increase with higher tendency to enrol on the NHIS. The positive effect of age on health insurance enrolment corroborates Gius (2010). In Ghana, Sekyi (2009) discovered that the subscription of an individual onto the NHIS is positively influenced by the age of the individual and the age of the household head. The consistency of this

finding with the above studies must be accepted with caution. This is because even though the current study also found positive effect of age and the likelihood of health insurance subscription, the current study is unique in its sample elements. While this study used only expectant mothers, some of the previous studies, for instance Sekyi (2009), used adults in general (both men and women).

The results in Table 9 indicate that some religious denominations have significant effect on the decision of women to be insured under the Ghana's NHIS. Specifically, whereas orthodox Christianity and Islamic religions have significant effects on the use of the NHIS, the Pentecostal or charismatic Christianity has no significant effect on the enrolment on the NHIS. However, a woman who belongs to the Traditional African religion is 12.6 percent less likely to enrol on the scheme relative to the non-religious woman.

Some meanings can be read into these findings. Orthodox Christianity is more associated with formal education in Ghana. Christian denominations such as the Catholic, Presbyterians and the Anglicans are well noted for their formal educational institutions in the country. Therefore, if education proves to be one of the key determinants of heath decisions, then women who belong to these religious groups would make informed decisions regarding their health. It could also be argued that Pentecostal/charismatic Christians may believe more in supernatural healing powers hence may not count on the NHIS for orthodox healthcare. In addition, in Ghana, African Traditional Religion is more prevalent in the rural areas where most people tend to rely on alternative sources of medication. In the rural setting, people have access to traditional medicines such as herbs and traditional spiritual healers. Given the mentioned reasons, the

traditional religious may not depend on NHIS as a main enabling factor for medical care.

Conclusions

This chapter analysed the demand for national health insurance among expectant mothers before and after the year 2008 in Ghana. Multivariate logistic regression was employed using data from the 2008 and 2014 GDHS data sets as well as the pooled data from the two surveys.

It is concluded that there was significant increase in the demand for NHIS after 2008 and that a woman who gave birth after 2008 is 30.1 percent more likely to enrol on the NHIS relative to a woman who gave birth before 2008. Moreover, household wealth had greater effect on enrolment before 2008 compared to afterwards. Level of education of expectant mothers also had greater effects on enrolment in 2008 compared to 2014. In the next chapter, the effect of the NHIS on the choice of place of delivery has been examined.

CHAPTER SIX

EFFECTS OF NATIONAL HEALTH INSURANCE ON THE CHOICE OF PLACE OF DELIVERY

Introduction

The chapter presents results of investigation into the effects of NHIS on various of facility-based delivery services relative to home delivery care and the analysis of such effect before and after the year 2008 in Ghana. The effects of NHIS on place of delivery was analysed with multinomial endogenous treatment effect model estimated with maximum likelihood technique using conditional mixed process estimator. The results of the multinomial endogenous treatment effect model are compared with binary choice models (binary endogenous treatment effect model and hackman probit model) and with multinomial probit model.

Characteristics of Study Participants

Ownership of health insurance shows the health seeking behaviour of an individual. Though focus of the chapter is to analyse the effects of the NHIS on choice of delivery services, there has been preliminary exploration of the characteristics of the expectant mothers as well as the relationship between the types of delivery services and the independent variables before the causal analysis. Table 10 illustrates the distribution of women in the place of delivery model.

The reduction in sample size from 8,805 in the previous chapter to 6,319 in this chapter is due to the inclusion of the antenatal care visit variable in the place of delivery model. Still the representativeness of the sample was insured

by the use of the sample weight and the robust command in STATA as well as accounting for the clusters.

Table 10: Descriptive statistics of women in the place of delivery model

	Pooled Sample		2014 Subsample		2008 subsample	
Variable	Freq.	Percent	Freq.	Percent	Freq.	Percent
NHIS coverage						
Insured	3,783	59.87	2,938	69.06	845	40.92
Uninsured	2,536	40.13	1,316	30.94	1,220	59.08
Time trend						
2008	2,065	32.68				
2014	4,254	67.32				
Age of women in years						
≤ 20	477	7.55	301	7.08	176	8.52
21-25	1,326	20.98	855	20.10	471	22.81
26-30	1,576	24.94	1,075	25.27	501	24.26
31-35	1,342	21.24	921	21.65	421	20.39
36-40	1,023	16.19	715	16.81	308	14.92
41-45	438	6.93	296	6.96	142	6.88
≥ 46	137	2.17	91	2.14	46	2.23
Educational attainment						
No education	2,134	33.77	1,403	32.98	731	35.40
Primary	1,350	21.36	863	20.29	487	23.58
Secondary	2,619	41.45	1,819	42.76	800	38.74
Higher	216	3.42	169	3.97	47	2.28
Wealth quintile						
Poorest	1,896	30.00	1,303	30.63	593	28.72
Poorer	1,371	21.70	911	21.42	460	22.28
Middle	1,172	18.55	807	18.97	365	17.68
Richer	1,064	16.84	683	16.06	381	18.45
Richest	816	12.91	550	12.93	266	12.88

Table 10 continued

Variable	Pooled Sample		2014 Subsample		2008 Subsample	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Birth order						
First	1,371	21.70	932	21.91	439	21.26
Second and third	2,322	36.75	1,556	36.58	766	37.09
Fourth and fifth	1,535	24.29	1,049	24.66	486	23.54
sixth and above	1,091	17.27	717	16.85	374	18.11
Religion						
No religion	265	4.19	169	3.97	96	4.65
Orthodox Christians	1,558	24.66	1,013	23.81	545	26.39
Pentecostal/charismatic	2,913	46.10	2,042	48.00	871	42.18
Islam	1,284	20.32	879	20.66	405	19.61
African traditionalist	299	4.73	151	3.55	148	7.17
Distance to health facility						
Not a big problem	4,361	69.01	2,951	69.37	1,410	68.28
Is a big problem	1,958	30.99	1,303	30.63	655	31.72
Marital status						
Not married	884	13.99	656	15.42	228	11.04
Married	5,435	86.01	3,598	84.58	1,837	88.96
Sex of household head						
Male	4,686	74.16	3,197	75.15	1,489	72.11
Female	1,633	25.84	1,057	24.85	576	27.89
Employment status						
Not employed	1,153	18.25	882	20.73	271	13.12
Employed	5,166	81.75	3,372	79.27	1,794	86.88
Family planning on radio						
No	2,701	42.74	1,867	43.89	834	40.39
Yes	3,618	57.26	2,387	56.11	1,231	59.61
Family planning on television						
No	3,840	60.77	2,496	58.67	1,344	65.08
Yes	2,479	39.23	1,758	41.33	721	34.92
Residence type						
Urban	2,504	39.63	1,765	41.49	739	35.79
Rural	3,815	60.37	2,489	58.51	1,326	64.21
Observations	6,319		4,254		2,065	

Source: Author (2018)

The distribution of the variable is similar to that of the previous chapter hence little is discussed here. Similar to the preceding subsample, it could be observed that in 2008, only 40.92 percent of the women were insured while 59.08 percent were not insured. However, by 2014, the percentage insured increased to 69. 06 while only 30.94 percent were not insured. From the pooled data, about 59.87 percent of the women were insured while the remaining 40.13 percent were not insured. The trend also shows that 2,065 (32.68 percent) of the women gave birth before 2008 while 4,254 (67.32 percent) of them gave birth after 2008.

Table 11: Selected independent variables by place of delivery

Variable	Home delivery	Public hospital	Public clinic	Private facility	Chi square Test
National health insurance					
Insured	931(24.61)	1,704(45.04)	882(23.31)	266(7.03)	286.85***
Not insured	1,126(44.40)	764(30.13)	465(18.34)	181(7.14)	
Time trend					
2008	880(42.62)	688(33.32)	327(15.84)	170(8.23)	170.33***
2014	1,177(27.67)	1,780(41.84)	1,020(23.98)	277(6.51)	
Age of women in years					
≤ 20	159(33.33)	158(33.12)	132(27.67)	28(5.87)	77.94***
21-25	448(33.79)	484(36.50)	305(23.00)	89(6.71)	
26-30	481(30.52)	633(40.16)	348(22.08)	114(7.23)	
31-35	402(29.96)	574(42.77)	252(18.78)	114(8.49)	
36-40	326(31.87)	428(41.84)	196(19.16)	73(7.14)	
41-45	168(38.36)	158(36.07)	90(20.55)	22(5.02)	
≥ 46	73(53.28)	33(24.09)	24(17.52)	7(5.11)	
Level of education					
No formal education	1,113(52.16)	486(22.77)	475(22.26)	60(2.81)	971.87***
Primary	485(35.93)	465(34.44)	321(23.78)	79(5.85)	
Secondary	455(17.37)	1,370(52.31)	526(20.08)	268(10.23)	
Higher	4(1.85)	147(68.06)	25(11.57)	40(18.52)	
Wealth quintile					
Poorest	1,056(55.70)	325(17.14)	487(25.69)	28(1.48)	1700***
Poorer	559(40.77)	383(27.94)	360(26.26)	69(5.03)	
Middle	303(25.85)	543(46.33)	240(20.48)	86(7.34)	
Richer	108(10.15)	671(63.06)	177(16.64)	108(10.15)	

Table 11 continued

Variable	Home delivery	Public hospital	Public clinic	Private facility	Chi square Test
Richest	31(3.80)	546(66.91)	83(10.17)	156(19.12)	
Birth order					
First	273(19.91)	665(48.50)	313(22.83)	120(8.75)	317.21***
Second-third	667(28.73)	973(41.90)	488(21.02)	194(8.35)	
Fourth-fifth	567(36.94)	550(35.83)	325(21.17)	93(6.06)	
Sixth and above	550(50.41)	280(25.66)	221(20.26)	40(3.67)	
Religion					
No religion	154(58.11)	55(20.75)	48(18.11)	8(3.02)	440.57***
Orthodox Christians	429(27.54)	653(41.91)	374(24.01)	102(6.55)	
Pentecostal/charis	824(28.29)	1,253(43.01)	571(19.60)	265(9.10)	
Islam	420(32.71)	471(36.68)	326(25.39)	67(5.22)	
Traditionalist	230(76.92)	36(12.04)	28(9.36)	5(1.67)	
Distance to health facility					
Big problem	909(46.42)	601(30.69)	363(18.54)	85(4.34)	258.73***
Not a big problem	1,148(26.32)	1,867(42.81)	984(22.56)	362(8.30)	
Awareness of tuberculosis					
No	652(51.79)	293(23.27)	279(22.16)	35(2.78)	320.29***
Yes	1,405(27.77)	2,174(42.97)	1,068(21.11)	412(8.14)	
Residence type					
Urban	300(11.98)	1,442(57.59)	449(17.93)	313(12.50)	1100.00***
Rural	1,757(46.06)	1,026(26.89)	898(23.54)	134(3.51)	
Marital status					
Not married	243(27.49)	378(42.76)	190(21.49)	73(8.26)	13.76***
Married	1,814(33.38)	2,090(38.45)	1,157(21.29)	374(6.88)	
Sex of household head					
Male	1,608(34.31)	1,776(37.90)	979(20.89)	323(6.89)	25.89***
Female	449(27.50)	692(42.38)	368(22.54)	124(7.59)	
Employment in the last 12 months					
Not Employed	314(27.23)	485(42.06)	254(22.03)	100(8.67)	20.96***
Employed	1,743(33.74)	1,983(38.39)	1,093(21.16)	347(6.72)	
Heard family planning on radio last few months					
No	1,048(38.80)	874(32.36)	628(23.25)	151(5.59)	133.71***
Yes	1,009(27.89)	1,594(44.06)	719(19.87)	296(8.18)	
Heard family planning on TV last few months					
No	1,623(42.27)	1,113(28.98)	918(23.91)	186(4.84)	637.55***
Yes	434(17.51)	1,355(54.66)	429(17.31)	261(10.53)	
Observations	6319				

Note: ***Significant at 1%.

Source: Author (2018)

Before doing any rigorous analysis to determine the effects of NHIS on place of delivery, the relationship between place of delivery and its determinants is explored. This is done using bivariate analysis involving chi square test and the results are in Table 11.

Table 11 shows selected independent variables by choice of delivery facility. Using the chi-square test, the results indicate that all the selected variables were significant at the bivariate level, strengthening the fact that the choice of public hospital, public clinic, private facilities and home delivery services is influenced by several economic, social and demographic factors. In particular, the chi-square test shows a statistically significant difference between national health insurance status of the expectant mother and the choice of delivery facility. It is also apparent, in Table 11, that while about 44.40 percent of the women who are not insured were delivered at home, only 24.61 percent of the insured expectant mothers were delivered at home ($p = 0.000$). In a similar study, Nketiah-Amponsah and Arthur (2013) found that at the bivariate level, there are statistically significant association between insurance ownership and place of delivery.

Furthermore, the bivariate analysis indicates that while only 27.67 percent of the women in 2014 were delivered at home, as many as 42.62 percent of them were delivered at home by 2008, representing a 14.95 percentage point difference ($p = 0.000$). This seems to suggest that facility-based delivery improved after 2008. In addition, while only 3.8 percent of the women in the richest wealth quintile were delivered at home, a staggering 55.70 percent of the poorest were delivered at home, indicating a 51.9 percentage point difference ($p = 0.000$). Some other studies have demonstrated that differences in wealth

quintiles partly explain differences in facility-based delivery although the gap is bridging following the introduction of the exemption fee (Nketiah-Amponsah & Arthur, 2013; Wang et al., 2014, 2016). Though the variation in the decision to choose place of delivery across national health insurance status and other variables is significant (p = 0.000), there is the need for a rigorous analysis to ascertain the causal relationship between health insurance status and the choice of place of delivery.

Effect of NHIS ownership on Maternal Delivery Services in Ghana

From the preceding findings, one may be tempted to conclude that health insurance positively influences the utilisation of institutional maternal delivery services. However, causality between the two sets of variables cannot be established from the Pearson chi square test hence the need to proceed with a more rigorous causal analysis where the significance of the relationship can also be ascertained and tested.

Given that the study employed treatment effect methods in this analysis, the selection model was estimated and analysed before the outcome model. However, granted the focus of this section, the significance of the selection model is of greater concern than the significance of the individual variables within it. The results of the selection model are captured in in the last column of Appendix D. It is observed that higher birth order reduces the tendency of enrolling on health insurance. However, age, education, wealth quintile, being married or living with a partner, being an orthodox Christian or a Muslim rather than a non-believer, body mass index and awareness of tuberculosis increase the likelihood of subscribing to the national health insurance scheme.

Table 12: Factors influencing facility delivery — Heckman probit, conditional mixed process and multinomial probit regression outputs

Variables	Facility		Public hospital				Public clinic				Private facility			
	Heckprob	Z	Mprobit	Z	CMP	Z	Mprobit	Z	CMP	Z	Mprobit	Z	CMP	Z
Insured (NHIS)	0.154***	3.85	0.1694***	6.40	0.203***	19.56	0.089***	4.08	0.091***	10.72	0.028***	4.67	0.023***	4.00
	(0.040)		(0.026)		(0.010)		(0.023)		(0.008)		(0.006)		(0.006)	
Time trend (2014=1)	0.048***	3.40	0.065***	4.24	0.063***	9.72	0.073***	5.74	0.049***	8.92	0.025***	3.57	0.0077**	2.02
	(0.014)		(0.015)		(0.007)		(0.013)		(0.006)		(0.007)		(0.004)	
Age of expectant mothers (ref = ≤ 20 years)														
21-25 years	0.123***	4.29	0.038	1.22			0.0342	1.43			0.006	0.40		
	(0.029)		(0.031)				(0.024)				(0.015)			
26-30 years	0.219***	5.35	0.071*	1.52			0.037	1.44			0.008	0.49		
	(0.041)		(0.046)				(0.026)				(0.017)			
31-35 years	0.301***	6.49	0.132***	3.67	0.071*	1.73	0.074	1.3			0.027**	2.24		
	(0.046)		(0.036)		(0.041)		(0.027)				(0.012)			
36-40 years	0.364***	8.08	0.192***	5.01	0.275***	4.74	0.089	1.02			0.031***	3.37		
	(0.045)		(.038)		(0.058)		(0.027)				(0.009)			
41-45 years	.398***	8.95	0.204***	4.60	0.375***	7.35	0.087	1.12			0.021**	2.02		
	(0.044)		(0.044)		(0.051)		(0.030)				(0.01)			
≥ 46 years	0.412***	9.13	0.155**	2.38	0.174*	1.69	0.115	1.13			0.065**	2.10		
	(0.045)		(0.065)		(0.103)		(0.037)				(0.031)			
Level of education (ref = no education)														
Primary	0.025**	2.01	0.046**	2.22	0.142***	10.50	0.006***	5.32	0.078***	3.55	0.015***	3.20	0.021***	7.01
	(0.013)		(0.021)		(0.013)		(0.001)		(0.022)		(0.005)		(0.003)	
Secondary	0.031**	2.11	0.096***	4.79	0.160***	8.61	0.0004***	2.91	0.232***	10.09	0.029***	2.79	0.029***	9.67
	(0.015)		(0.020)		(0.019)		(0.0001)		(0.023)		(0.010)		(0.003)	
Higher	0.046***	4.18	0.130***	2.76	0.223***	9.70	0.024*	1.53			0.073***	2.88	0.074***	3.70
	(0.011)		(0.047)		(0.023)		(0.016)				(0.025)		(0.02)	
Household wealth (ref = poorest)														
Poorer	0.059***	3.61	0.077***	3.54	0.089***	7.42	0.054	1.14			0.0543***	3.33		
	(0.0164)		(0.022)		(0.012)		(0.047)				(0.0163)			
Middle	0.103***	5.00	0.221***	9.50	0.262***	7.94	0.129	1.21			0.0667***	3.73		
	(0.021)		(0.023)		(0.033)		(0.107)				(0.018)			

Table 12 continued

Variables	Facility		Public hospital				Public clinic				Private facility			
	Heckprob	Z	Mprobit	Z	CMP	Z	Mprobit	Z	CMP	Z	Mprobit	Z	CMP	Z
Richer	0.169***	5.98	0.336***	13.86	0.351***	11.70	0.154***	10.21	0.191***	9.10	0.087***	4.27	0.088***	4.19
	(0.028)		(0.024)		(0.030)		(0.015)		(0.021)		(0.020)		(0.021)	
Richest	0.190***	6.15	0.319***	10.66	0.362***	17.24	0.198***	13.99	0.164**	2.02	0.168***	5.92	0.118***	4.07
	(0.031)		(0.030)		(0.021)		(0.014)		(0.081)		(0.0284)		(0.029)	
Birth order (ref = first child)														
Second-third	-.071***	-9.27	-0.084***	-4.01	-0.083***	-4.15	-0.019***	-3.04	-0.155**	-2.38	-0.005**	-2.01		
	(0.008)		(0.021)		(0.020)		(0.006)		(0.065)		(0.003)			
Fourth-fifth	-.183***	-12.42	-0.144***	-5.58	-0.123***	-5.35	-0.012***	-2.91	-0.129***	-8.46	-0.018***	-2.77	-0.028**	-2.01
	(0.015)		(0.026)		(0.023)		(0.004)		(0.015)		(0.006)		(0.014)	
6th and more	-.307***	-10.06	-0.174***	-5.79	-0.141***	-4.41	-0.024***	-3.20	-0.018**	-2.02	-0.027***	-2.89	-0.0295*	-1.92
	(0.031)		(0.030)		(0.032)		(0.027)		(0.009)		(0.013)		(0.015)	
Religious denomination (ref = no religion)														
Orthodox Christians	0.021	1.07	0.070***	4.71	0.030*	1.88	0.041***	4.19	0.036**	2.01	0.007*	1.52		
	(0.019)		(0.015)		(0.016)		(0.010)		(0. 018)		(0.005)			
Pentecostal/charismatic	0.014	0.73	0.048**	2.25			0.004	0.11			0.026**	2.06		
	(0.019)		(0.019)				(0.032)				(0.013)			
Islam	0.021**	2.10	0.055***	3.35			0.042***	3.21	0.016*	1.72	0.011*	1.51		
	(0.010)		(0.016)				(0.013)		(0.009)		(0.007)			
Traditional African	-0.059*	-1.89	0.00638	0.11			-0.0846**	-2.28	-0.018**	-2.02	0.002	0.07		
	(0.031)		(0.057)				(0.037)		(0.009)		(0.033)			
Distance not a problem	0.018*	1.84	0.042***	3.27	0.088***	7.33	0.055***	4.35	0.064***	4.57	0.013***	3.95	0.065***	4.33
	(0.009)		(0.013)		(0.012)		(0.013)		(0.014)		(0.003)		(0.015)	
Married	0.022*	1.83	0.0335	1.46	0.018**	2.02	0.042	1.02			0.020***	1.64	0.129***	8.46
	(0.012)		(0.023)		(0.009)		(0.042)				(0.0122)		(0.0152)	
Female household head	0.004	0.46	-0.036	-1.04			0.0437	0.76			-0.015*	-1.53		
	(0.009)		(0. 035)				(0.058)				(0.010)			
Employed	0.005	0.44	0.002	0.13			0.0112	0.72			0.016	1.12		
	(0.012)		(0.018)				(0.015)				(0.014)			
Family planning on radio	0.004	-0.39	0.003	0.19			0.0107	0.79			0.0004	0.05		

Table 12 continued

Variables	Facility		Public hospital				Public clinic				Private facility			
	Heckprob	Z	Mprobit	Z	CMP	Z	Mprobit	Z	CMP	Z	Mprobit	Z	CMP	Z
	(0.009)		(0.016)				(0.013)				(0.0079)			
Family planning on TV	0.016	-1.45	0.0289	1.18			0.0295	1.12			0.00322	0.37		
	(0.011)		(0.018)				(0.025)				(0.009)			
Antenatal care visit	0.021***	7.83	0.0205***	7.83	0.032***	8.01	0.017***	7.74	0.019***	9.5	0.003***	2.67	0.005***	3.125
	(0.003)		(0.003)		(0.004)		(0.002)		(0.002)		(0.001)		(0.002)	
Observations	6,319		6,319		6,319		6,319		6,319		6,319		6,319	
Wald chi^2	1561.11		2056.71		4025.90									
Prob > chi^2	0.000		0.000		0.000									
Log pseudolikelihood	-12480.2		-6448.43		-10285.48									
Atanhrho					-0.579***				-0.442***				-1.082***	
Wald test $chi^2(1)$	12.74													
Prob > chi^2	0.000													

Notes: Home delivery is the base outcome; Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Author (2018)

Now that the significance of the selection model has been ascertained, the results of the outcome model, in Table 12, is worth discussing.

To ensure that the conclusions drawn from this study were valid and acceptable, a number of statistical checks were conducted. In all, the diagnostic and post estimation statistics show that the models were robust and appropriate.

In the first place, the study compared endogenous models with models that do not address endogeneity. Secondly, binary models are compared with multinomial models to check if separating health facilities makes any difference in the effects of NHIS on delivery services. For binary models, the study employed Heckman probit model and binary endogenous treatment effect model. With the Heckman probit model, the Wald test chi^2 returned a value of 12.74 with $p = 0.000$, suggesting that NHIS is endogenous, hence the Heckman probit is preferred to ordinary probit. Also, comparing the multinomial endogenous treatment effect model estimated in CMP with the multinomial probit model, the study relies on the significance of the Atanhrho parameter. The Atanhrho is significant and suggests that the error terms of the selection and outcome equations in the CMP model are correlated hence the problem of endogeneity (Roodman, 2018). It can also be observed that the marginal effects in the multinomial probit estimator were biased downward. Therefore, the CMP estimator results are preferred to that of the multinomial probit.

The study also checked the consistency of the Heckman probit results with binary endogenous treatment effect model results (Table 13). From the Heckman probit results, in Table 12, an insured woman is about 15.4 percent more likely to be delivered at health facility instead of home compared to uninsured woman. The potential outcome mean (POmean) from the treatment

effect model in Table 13 suggests that if all woman are uninsured in the population, a woman will be 28.57 percent likely to be delivered at health facility.

Table 13: Effects of NHIS on delivery services: *Eteffect* regression output

Place of delivery	Coef.	Robust S.E.	z	P>z	[95%	C I]
ATET						
Insured vs Uninsured	0.4670***	0.1309	3.57	0.000	-.1814	1.115
POmean						
Uninsured	0.2857**	0.1306	2.19	0.029	-.3623	.9337
Observations	6,319					

Note: The difference (marginal increase) is 0.4670 - 0.2857 = 0.181 or 18.1%
Source: Author (2018)

However, a woman who is insured is about 46.7 percent likely to be delivered at health facility instead of home (ATET). The implication is that relative to an uninsured woman, the insured woman is about 18.1 percentage point more likely to be delivered at health facility instead of home.

Now the results of the Heckman probit model and the binary endogenous treatment effects model are compared with the multinomial endogenous treatment effects model results estimated in CMP. While the results of the binary endogenous treatment effect model indicate that an insured woman is about 18.1 percentage point more likely to be delivered at health facility instead of home, the results of the multinomial endogenous treatment effects model estimated in CMP show that an insured woman is about 20.3 percentage point more likely to be delivered at public hospital instead of home relative to an uninsured woman. The CMP results also show that an insured woman is about

9.1 percentage point more likely to be delivered at public clinic instead of home relative to an uninsured woman. Finally, the CMP results indicate that an insured woman is about 2.3 percentage point more likely to be delivered at private facility instead of home relative to an uninsured woman.

Per the comparisons of the binary models with multinomial models on one hand and endogenous models with nonendogenous models on the other hand, this study proceeds to interpret the results of the multinomial endogenous treatment effects models estimated in CMP framework. Moreover, the Wald chi square value of 4025.90 (p = 0.000) indicates that the model has strong explanatory power and that the hypothesis that all the coefficients of the predictors except the constant is zero is rejected implying that the model is robust.

The treatment variable, national health insurance, proved significant in explaining the choice of a delivery facility by an expectant mother. The NHIS is an enabling factor and is expected to improve the use of professional delivery services (Anderson, 1995) and this expectation is met in this study. The results indicate that a woman who is covered under the NHIS is more likely to be delivered at any form of institutional health facilities than would be delivered at home compared to uninsured women.

However, NHIS ownership has varied effects on the use of maternal delivery services from the different kinds of facilities relative to home care. Even though the marginal effects of NHIS on the delivery service use from the various facilities are significant at the same level of significance (p = 0.000), the absolute effects are different. For public hospitals, the NHIS has a marginal effect of 0.203 which is significant at one percent (p = 0.000) signifying that

coverage under the scheme increases the probability of using public hospitals for delivery by 20.3 percent relative to home care delivery services such TBAs. In terms of public clinics, the NHIS has a marginal effect of 0. 091 which is also significant at one percent (p = 0.000) suggesting that ownership of the national health insurance increases the probability of using public clinics for delivery by 9.1 percent relative to home care delivery services. Finally, the NHIS has a marginal effect of 0.023 for private health facilities. The marginal effect is significant at one percent (p = 0.000) indicating that coverage under the NHIS increases the probability of using private health facilities for delivery by 2.3 percent relative to home care delivery services. Since the marginal effects in all instances had probability values less than 0.05 (0.000 < 0.05), the hypothesis that NHIS has no effect on the use of health facilities for maternal delivery was rejected for all health facilities.

Since the marginal effects of NHIS across the different health facilities are not the same and with p-values less than 0.05, we fail to accept the null hypothesis that the effects of NHIS on facility-based delivery services relative to home care do not vary across facilities in the health system of Ghana.

The difference between the effects of NHIS holding on public hospital and the public clinics could be explained by the difference in the quality of care offered at the two facilities. Generally, in Ghana, experienced and specialised health workers are more often found in the cities working at hospital compared to the clinics in the villages (Ghana Ministry of Health, 2011). In addition, there is vast difference between hospitals and clinics in terms of equipment and critical care. Most clinics lack some services such as medical lab services, ultrasounds among others (Ghana Ministry of Health, 2011). Therefore, if it is

assumed that, all other things being the same, when two people with national health insurance are entitled to same care, then it stands to reason that any rational woman covered under the NHIS will be more likely to be delivered at hospital compared to clinics.

Regarding the difference between the public and the private felicities, it could be argued that it is because the private sector is not fully integrated into the National Health Insurance Scheme. Currently the National Health Insurance Authority is integrating the private health facilities into the scheme by way giving them accreditation. However, preceding the data collection many private health facilities were not accredited to work with the NHIS. It is therefore not surprising that NHIS subscribers are more likely to be delivered at public facilities relative to private ones.

The positive effect of NHIS on maternal delivery services validate a number of studies and theories. From the perspective of the theory of expected pay-offs it is argued that individuals will get insured if they perceive the benefits of enrolment to be higher than the costs, relative to being uninsured. The expected benefits are assessed in terms of the advantages of being enrolled, thus, access to better quality care, reduced waiting times, lower costs of care, among other things (Schneider, 2004). It stands to reason that individuals purchased insurance because they were certain about the insurance bringing about these better outcomes (Alkenbrack, 2011). It is therefore no wonder that the insured were more likely to utilise maternal delivery care compared to the uninsured counterpart.

Moreover, any woman who is risk averse may enrol on the national health insurance scheme. It stands to reason therefore that any woman who is covered

under the NHIS is likely to be more risk averse than the counterpart who is not covered. It follows therefore that the one who has the insurance and is more risk averse would surely seek professional assistance and would not like to be delivered at home. Again, the Healthcare Utilisation Model of Anderson (1995) also identified health insurance as an enabling factor. This implies that a person covered under the NHIS is more capable to access healthcare compared to her counterpart who is not covered. It is therefore not surprising that health insurance was found to have positive effects on the use of maternal delivery services in this study.

Even though the current study employed a different method in assessing the effect of the NHIS on maternal delivery services, the results corroborate some previous studies. Two of such studies in Ghana found that health insurance improves the utilisation of facility-based maternal delivery services (Mensah et al., 2010; Wang et al., 2014). Mensah et al. (2010) employed propensity score matching and found that in Ghana, women with insurance under the NHIS, compared with women without insurance, had significantly more births at a hospital (75% against 52.9%). Wang et al. (2014) also used propensity score matching in assessing the effect of health insurance on the use of facility-based delivery care, found strong evidence of positive effects of health insurance in Cambodia, Ghana, Indonesia, and Rwanda, where delivery care is fully covered by health insurance" (Wang et al., 2014). In a similar study, Wang et al. (2016) found that health insurance coverage contributed to a 5–11 percentage-point increase in use of facility-based delivery care in Ghana, Indonesia and Rwanda.

However, the positive association between use of maternal delivery care and health insurance coverage is inconsistent with a study in Gabon where

Wang et al. (2014), using propensity score matching methods, found that health insurance status contributes to a decrease in facility delivery care. This could be described as unintended effects of health insurance status on use of healthcare services and has been documented in some other studies (Wang et al., 2014).

Most of the previous studies (Mensah et al., 2010; Nketiah-Amponsah & Sagoe-Moses, 2009; Wang et al., 2014) employed binomial techniques but the current study decomposed the delivery care into four hence multinomial technique was deemed appropriate. In Ghana, Nketiah-Amponsah and Sagoe-Moses, (2009) used data from three Districts (Lawra, Dangme West and Ejisu-Juaben) between October 2007 and January 2008, a sample of 531 women, with simple logistic regression where endogeneity was not addressed. Mensah et al. (2010) used 2007 data from four out of the 216 administrative districts with propensity score matching methods while Wang et al. (2014) relied on 2008 GDHS with propensity score matching methods. The current study used 2014 GDHS with multinomial treatment effect model estimated with maximum likelihood technique in the conditional mixed process.

Whatever approaches have been used by all these studies, it follows from the results that the NHIS has contributed to the increased use of institutional delivery care as shown in Figure 6. Examining the trends in the use of facility delivery services, one could realise that overall percentage of births delivered in health facilities increased from 42% in 1993 to 73% in 2014. It is however obvious that the increase in the utilisation was gradual before 2003 but became rapid after 2003. This rapid increase after 2003 could be explained by the national health insurance scheme policy which was passed into law in 2003 and fully implemented it in 2005 (Owusu-Sekyere & Chiaraah, 2014) coupled with

the introduction of Free Maternal Care Programme into the scheme in July, 2008 (NHIA, 2010).

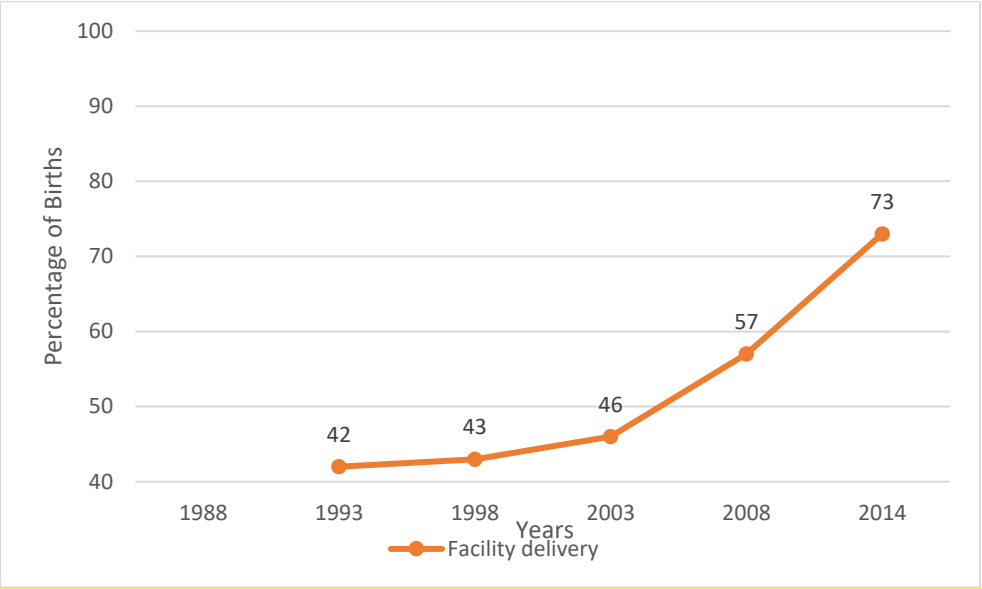

Figure 6: Trends in the use of facility-based delivery services, 1988-2014
Source: Adapted from GSS et al. (2015)

It is important to note that this study did not consider separating the effects of the NHIS from that of the Free Maternal Care Programme because the ownership of the national insurance is a prerequisite for the free maternal healthcare in the country.

From the results in Table 12, it can again be noted that the time trend is significant suggesting that the utilisation of facility-based delivery services improved significantly after 2008. The results indicate that a woman who was delivered after 2008 is about 6.3 percent more likely to be delivered at public hospitals instead of home relative to a woman who was delivered before 2008. Similarly, a woman who was delivered after 2008 is about 4.9 percent more likely to be delivered at public clinics instead of home relative to a woman who was delivered before 2008. Finally, a woman who was delivered after 2008 is

about 0.7 percent more likely to be delivered at private health facility instead of home relative to a woman who was delivered before 2008.

Given that after 2008 the use of delivery services from public hospital, public clinic and private health facilities increased approximately by 6.3 (p = 0.000), 4.9 (p = 0.000) and 0.7 (p = 0.022) percentage points respectively, we fail to accept the null hypothesis that the utilisation of facility-based delivery services did not increase after the year 2008.

Another key significant control variable is household wealth quintile. Household wealth quintile was expected to have positive effect on the utilisation of institutional parturition care services given that the concept reflects an enabling factor that mitigates against the cost of healthcare. Healthcare cost comes in different forms and is not fully covered by health insurance benefit packages. Some healthcare costs that are not usually covered under health insurance scheme are travel costs and opportunity costs of waiting time. The wealthy persons can more easily afford these costs compared to the poor counterpart. The expected effect of wealth quintile on maternal delivery services is realised in this study.

Wealth quintile has been found to have positive effect on delivery care services from all three types of facilities. The marginal effects of poorer household are 0.089 (p = 0.000) for public hospital. This implies that being in a poorer household increases the probability of being delivered at public hospital by 8.9 percent compared with another woman in the poorest wealth quintile. Similarly, the marginal effects of household with middle wealth quintile are 0.262 (p = 0.000) for public hospital. This also implies that being in a middle-

class household increases the probability of being delivered at public hospital 26.2 percent compared with another woman in the poorest wealth quintile.

Also, the marginal effects of household with richer wealth quintile are 0.351(p = 0.000), 0.191 (p = 0.000) and 0.088 (0.000) for public hospital, public clinic and private facility respectively. The implication is that being in a richer household increases the probability of being delivered at public hospital, public clinic and private health facility by 35.1 percent and 19.1 percent and 8.8 percent respectively compared with another woman in the poorest wealth quintile.

Finally, the marginal effects of households with richest wealth quintile are 0.362 (p = 0.000), 0.164 (p = 0.043) and 0.118 (p = 0.000) for public hospital, public clinic and private facility respectively. The suggestion is that being in a richest household increases the probability of being delivered at public hospital, public clinic and private health facility by 36.2 percent and 16.4 percent and 11.8 percent respectively compared with another woman in the poorest wealth quintile.

It is now clear that an improvement in wealth of households does not have the same effect on the use of delivery services across all health facilities. Specifically, the current study has found out that an improvement in household wealth is associated with preference for institutional delivery services from public hospitals, public clinic and private facility over delivery services at home. The study also reveals that when household wealth quintile improves, the probability of using government hospitals for childbirth relative to home is higher than that of public clinic and private health facilities.

The greater effect of wealth on public hospital delivery service relative to private facility services is consistent with some previous studies (Agbanyo,

2012; Nketiah-Amponsah & Arthur, 2013). The positive effect of wealth quintile on institutional delivery service relative to home delivery care services is also consistent with other previous studies (Agbanyo, 2012; Mensah et al., 2010; Nguyen et al., 2012; Nketiah-Amponsah & Sagoe-Moses, 2009; Rutaremwa et al., 2015; Wang et al., 2014, 2016) that used different methods, including a simple logistic regression, propensity score matching and difference-in-differences.

Other variables that were found significant in determining the use of maternal delivery services are education, age at birth, birth order, antenatal visits, orthodox and Pentecostal or Charismatic Christianity. However, since the focus is not on these variables, their discussion may not be very necessary here.

Conclusions

This chapter investigated the effects of NHIS on various kinds of facility-based delivery services relative to home delivery care and analysed such effect before and after the year 2008 in Ghana. Comparing results from binary and multinomial techniques as well as from endogenous and nonendogenous techniques, this study found that NHIS is endogenous and has varied effects on delivery services from different types of health facilities relative to home care. Relative to home delivery services, being insured increases the probability of using public hospitals, public clinics and private health facilities for delivery by 20.3 percent, 9.1 percent and 2.3 percent respectively.

Moreover, the utilisation of facility-based delivery services increased significantly after the year 2008. Relative to an insured woman who gave birth before 2008, her counterpart who gave birth after 2008 is 6.3 percent, 4.9

percent and 0.77 percent more likely to use public hospitals, public clinics and private health facilities respectively for delivery.

CHAPTER SEVEN

WOMEN'S AUTONOMY AND THE USE OF DESIRED MATERNAL HEALTHCARE IN GHANA

Introduction

This chapter presents results of an investigation into the effects of women's autonomy on the utilisation of what this study describes as "desired maternal healthcare" in Ghana. The relationship was examined by employing Structural Equation Modelling. Special attention is paid to the mediation of women's autonomy and the utilisation of desired maternal healthcare by NHIS coverage.

Characteristics of Respondents

The key demographic, social and economic characteristics of respondents considered in this chapter include selected maternal healthcare services, age, educational attainment, wealth quintile, employment status, media exposure and NHIS coverage. The distributions of these characteristics are illustrated in Table 14. The sample size remains at 6,319 as in the previous chapter. Here the representativeness of the sample was insured using the sample weight and checking the distribution of one of the variables of interest, NHIS.

It could be observed that similar to the previous chapter, out the 6,319 women in this section, 2065 (32.68 percent) gave birth before 2008 and were captured in the 2008 survey and the remaining 4,254 (67.32 percent) gave birth before 2008 and were captured in the 2008 survey.

Table 14: Characteristic of respondents in the autonomy models

Variable	Pooled Sample		2014 Subsample		2008 subsample	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
NHIS coverage						
Insured	3,783	59.87	2,938	69.06	845	40.92
Uninsured	2,536	40.13	1,316	30.94	1,220	59.08
Time trend						
2008	2,065	32.68				
2014	4,254	67.32				
Age of women in years						
≤ 20	477	7.55	301	7.08	176	8.52
21-25	1,326	20.98	855	20.10	471	22.81
26-30	1,576	24.94	1,075	25.27	501	24.26
31-35	1,342	21.24	921	21.65	421	20.39
36-40	1,023	16.19	715	16.81	308	14.92
41-45	438	6.93	296	6.96	142	6.88
≥ 46	137	2.17	91	2.14	46	2.23
ANC in first trimester						
Yes	3,979	62.97	2,786	65.49	1,193	57.77
No	2,340	37.03	1,468	34.51	872	42.23
Number of ANC						
≥ 8	1,786	28.26	1,242	29.20	544	26.34
≤ 7	4,533	71.74	3,012	70.8	1,521	73.66
Health facility-based delivery						
Home	2,248	35.58	1,303	30.63	945	45.76
Facility	4,071	64.42	2,951	69.37	1,120	54.24
Educational attainment						
No education	2,134	33.77	1,403	32.98	731	35.40
Primary	1,350	21.36	863	20.29	487	23.58
Secondary	2,619	41.45	1,819	42.76	800	38.74
Higher	216	3.42	169	3.97	47	2.28
Wealth quintile						
Poorest	1,896	30.00	1,303	30.63	593	28.72
Poorer	1,371	21.70	911	21.42	460	22.28
Middle	1,172	18.55	807	18.97	365	17.68
Richer	1,064	16.84	683	16.06	381	18.45
Richest	816	12.91	550	12.93	266	12.88
Employment status						
Not employed	1,153	18.25	882	20.73	271	13.12
Employed	5,166	81.75	3,372	79.27	1,794	86.88
Family planning on radio						
No	2,701	42.74	1,867	43.89	834	40.39
Yes	3,618	57.26	2,387	56.11	1,231	59.61
Family planning on television						
No	3,840	60.77	2,496	58.67	1,344	65.08
Yes	2,479	39.23	1,758	41.33	721	34.92
Observations	6,319		4,254		2,065	

Source: Author (2018)

In terms of facility delivery, it has been found that 54.24 percent of the women has facility-based delivery in 2008 whereas this percentage increased to 69.37 in 2014. Regarding the timing of the first ANC visit, it has been found that 57.77 percent of the women had their first ANC visit during the first trimester of their pregnancy but in 2014, this percentage increased to 65.49 in 2014. Similarly, women who gave birth after 2008 were able to achieve the recommended minimum eight ANC visit better (29.20 percent) compared to their 2008 counterparts (26.34 percent).

Other demographic, social and economic factors improved over the years from 2008 to 2014. Some of which are education, access to health information and wealth. However, these are not the focus of this study hence attention is given to women's autonomy in the next sections.

Women's Autonomy and Desired Maternal Healthcare

This section presents empirical results on the relationship between women's autonomy and desired maternal healthcare in two ways. In the first instance, the relationship was examined in the full sample and in the second instance, it was tested if there exist any difference between 2008 and 2014 subgroups in terms of the effect of autonomy on desired maternal healthcare.

The appropriateness of the structural equation modelling for the estimation was checked with several techniques. The findings for the evaluation of the measurement models in the aggregate sample also applies to the year-specific. The estimated indices for Dijkstra and Henseler's rhoA, composite reliability (CR), Cronbach's alpha (α) and the indicator reliability demonstrate the reliability of the constructs in each sub-sample as well as the overall model, given that all the test statistics were greater than 0.70. This suggests that there

is high level of internal consistency, implying that the measurement variables simultaneously load well when the latent variables increase. Refer to Table 15 for the results of the diagnostic tests.

Table 15: Measurement model evaluation.

Test statistic	Variable	Full model		2014 model		2008 model	
		Coef.	p-val	Coef.	p-val	Coef.	p-val
rhoA	Auto	0.77	0.000	0.750	0.000	0.753	0.000
	DMH	0.75	0.000	0.781	0.000	0.762	0.000
	Empnt	0.90	0.000	0.876	0.000	0.89	0.000
	NHIS	0.99	0.000	0.99	0.000	0.98	0.000
α	Auto	0.709	0.000	0.701	0.000	0.717	0.000
	DMH	0.727	0.000	0.739	0.000	0.661	0.000
	Empnt	0.870	0.000	0.832	0.000	0.847	0.000
	NHIS	0.999	0.000	0.999	0.000	0.999	0.000
CR	Auto	0.814	0.000	0.791	0.000	0.841	0.000
	DMH	0.801	0.000	0.820	0.000	0.742	0.000
	Empnt	0.913	0.000	0.892	0.000	0.899	0.000
	NHIS	0.999	0.000	0.999	0.000	0.999	0.000
AVE	Auto	0.599	0.000	0.570	0.000	0.643	0.000
	DMH	0.510	0.000	0.539	0.000	0.432	0.000
	Empnt	0.726	0.000	0.676	0.000	0.693	0.000
	NHIS	0.999	0.000	0.999	0.000	0.999	0.000
R^2	Auto	0.402	0.000	0.465	0.000	0.417	0.000
	DMH	0.364	0.000	0.318	0.000	0.322	0.000
	NHIS	0.306	0.000	0.301	0.034	0.311	0.045
Number of observations		6,319		4,254		2,065	

Notes: α= Cronbach's Alpha, CR = Composite Reliability and AVE = Average Variance Extracted.

Source: Author (2018)

In addition to the reliability tests, the results also suggest that the respective AVE coefficients were all above the minimum requirement of 0.50 (Ayeh, Au & Law, 2016) confirming convergent validity. The implication of this convergent validity is that the latent variables captured more measures of variance from their indicators relative to the amount due to measurement error.

Discriminant validity was also achieved as an inspection of the indicators' cross-loadings showed that none of the indicators loads higher on an opposing construct as captured in Table 16.

Table 16: Cross loadings for discriminant validity

	Auto	DMH	Empnt	NHIS
Autonomy	**(0.774)**			
DMH	0.218	**(0.714)**		
Empowerment	0.319	0.363	**(0.852)**	
NHIS	0.060	0.169	0.061	**(0.999)**

Note: Square root of AVE in parenthesis.

Source: Author (2018)

The Fornell-Larcker criterion was confirmed by the HTMT, an estimate for the factor correlation (precisely, an upper boundary) as shown in Table 17.

Table 17: Heterotrait-Monotrait ratio of correlations

Path	Beta	*t*	*p*
NHIS -> Desired Maternal Healthcare (DMH)	0.19	10.28	0.00
Autonomy -> Desired Maternal Healthcare	0.24	11.43	0.00
Autonomy -> NHIS	0.08	4.64	0.00
Empowerment -> Desired Maternal Healthcare	0.36	25.97	0.00
Empowerment -> NHIS	0.07	4.98	0.00
Empowerment -> Women's autonomy	0.35	24.00	0.00

Source: Author (2018)

In order to clearly discriminate between two factors, the HTMT should be significantly smaller than one. With the p-values of 0.000 in each case, the implication is that no indicator is incorrectly assigned to a wrong factor

(Henseler et al., 2016) and that the constructs were statistically different from each other.

The appropriateness of the structural models was assessed with the inference statistics including R-square, path coefficients, variance inflation factors and the p-values. The use of VIF suggested that the model was free from multicollinearity problems granted that the VIF values ranged from 1.00 to 1.113 (Henseler et al., 2016). Finally, the variance explained in each endogenous latent variable was examined using the *R*-squares. Even though the R-squares seem to be on the lower side (ranging from 0.301 to 0.465), they are all statistically significant hence the model was deemed to be appropriate.

For the fitness of the overall model, the study relied on standardised root mean square residual (SRMR), the only approximate model fit criterion implemented for PLS path modelling (Hu & Bentler, 1999). The SRMR is the square root of the sum of the squared differences between the model-implied and the empirical correlation matrix. The value obtained is 0.06 which is acceptable for an appropriate model fit. Though a value of 0 for SRMR indicates a perfect fit and generally, a value less than 0.05 indicates an acceptable fit (Byrne, 2013), a recent simulation study shows that even entirely correctly specified model can yield SRMR values of 0.06 and higher (Henseler et al. 2009, 2016) and a cut-off value of 0.08 appears to be more adequate for PLS path models (Henseler et al., 2016). Next is endogeneity issues and model selection as in Table 18.

Table 18: Results of endogeneity test in the women's autonomy model

Model/Path	Original Model	C Model 1 (AUTO)	C Model 2 (NHIS)	C Model 3 (EMPT)	C Model 4 (NHIS, AUTO)	C Model 5 (NHIS, EMPT)	C Model 6 (AUTO, EMPT)	C Model 7 (NHIS, AUTO, EMPT)
Path	*β*	*β*	*β*	*β*	*β*	*β*	*β*	*β*
Auto → DMH	0.207***	0.209**	0.217**	0.210***	0.211***	0.212**	0.220***	0.268***
Auto → NHIS	0.245**	0.248**	0.245**	0.246**	0.250**	0.252**	0.253**	0.272**
Empt → Auto	0.219***	0.222**	0.220***	0.220*	0.226***	0.232**	0.231***	0.267***
Empt → DMH	0.321**	0.327***	0.337**	0.338***	0.342**	0.351***	0.364*	0.373***
Empt → NHIS	0.246*	0.247**	0.248*	0.262**	0.263**	0.265*	0.268**	0.292**
NHIS→ DMH	0.344***	0.348**	0.364***	0.351**	0.366**	0.368***	0.359***	0.384***
C_{AUTO}		-0.012**			-0.024**		-0.042**	-0.028**
C_{NHIS}			-0.023***		-0.041**	-0.008**		-0.031***
C_{EMPT}				-0.051**		-0.029**	-0.022**	-0.051***

Source: Author (2018)

The results in Table 18 show that the Gaussian copula are significant in all the seven models. This means that all the three constructs are endogenous hence Model 7 is deemed the best. Having established that the models fit the data well in both the full and the sub-samples, the causal relationships captured in Tables 19 and 20 are worth interpreting.

As shown in Table 19, all the six causal relationships in the model are supported for the original model. According to the results, women's autonomy predicts the use of desired maternal healthcare and it also enables woman to subscribe to the NHIS. As expected, empowered women are more autonomous and are more likely to get enrolled onto the NHIS and thereby consume more desired maternal healthcare.

Specifically, the results in Table 19 indicate that one standard deviation increase in women's autonomy increases the use of desired maternal healthcare by 0. 268 standard deviation. This effect is significant at one percent ($\hat{\beta}$= 0. 268, t = 6.31 and p = 0.000). Therefore, using the conventional significance level of 0.05, we failed to accept the null hypothesis that women's autonomy has no effect on the utilisation of desired maternal healthcare in Ghana.

Similarly, one standard deviation increase in women's autonomy increases NHIS subscription by 0.272 standard deviation. The effect of autonomy on health insurance subscription is significant at five percent ($\hat{\beta}$ = 0.272, t = 2.51 and p = 0.012). The empowerment of women expectedly has significant effect on women's autonomy with ($\hat{\beta}$ = 0.267, t = 25.33 and p = 0.000); on the use of desired maternal healthcare with ($\hat{\beta}$ = 0.373, t = 24.43 and p = 0.000) and on the subscription on the national health insurance with ($\hat{\beta}$ = 0.292, t = 2.41 and p = 0.016).

Table 19: Relationship among NHIS, women's autonomy and desired maternal healthcare – SEM outputs

Structural Paths	Direct Effects			Total Effects			Indirect effects		
	Coef. ($\hat{\beta}$)	*t*-value	p-value	Coef. ($\hat{\beta}$)	*t*-value	p-value	Coef. ($\hat{\beta}$)	*t*-value	p-value
Auto → DMH	0.268***	6.31	0.000	0.279***	6.552	0.000	**0.011****	2.41	0.016
Auto → NHIS	0.272**	2.51	0.012	0.272**	2.51	0.012			
Empt → Auto	0.267***	25.33	0.000	0.27***	25.33	0.000			
Empt → DMH	0.373***	24.43	0.000	0.38***	31.67	0.000	0.009***	7.17	0.000
Empt → NHIS	0.292**	2.41	0.016	0.30***	4.27	0.000	0.010**	2.55	0.011
NHIS→ DMH	0.384***	9.47	0.000	0.38***	9.47	0.000			
C_{AUTO}	-0.028**	2.42	0.016						
C_{NHIS}	-0.031***	4.21	0.000						
C_{EMPT}	-0.051***	5.12	0.000						
Observations	6,319								

Note: *** p<0.01, ** p<0.05, * p<0.1

Source: Author (2018)

Finally, the results in Table 19 suggest that one standard deviation increase in the subscription onto the NHIS can induce a significant 0.384 standard deviation increase in the use of desired maternal healthcare, ($\hat{\beta}$ = 0.384, t = 9.47 and p = 0.000).

As to whether NHIS mediates women's autonomy and desired maternal healthcare, the direct effect, indirect effect and the total effects are examined. It can be observed that autonomy's direct effect on DMH (0.268) is lees than the total effect (0.279) due to the indirect effect (0.011). Granted that the indirect effect is significant ($\hat{\beta}$ = 0.011, t = 2.41 and p = 0.016), it can be concluded that NHIS mediates women's autonomy and desired maternal healthcare.

The study further tested if there exist any differences between women who gave birth before and after 2008 in terms of the influence of women's autonomy on the use of desired maternal healthcare. This was done through Multi-Group Analysis (MGA). Table 20 presents the group-specific results.

Table 20: Year-specific multi-group analysis results – SEM outputs

Hypotheses	2008 Group			2014 Group			Group difference ($\Delta\beta$)		
	β	t-val	p-val	β	t-val	p-val	$\hat{\beta}_2 - \hat{\beta}_1$	t-val	p-val
Auto→DMH	**0.124*****	6.22	0.000	**0.295*****	3.147	0.000	**0.171*****	4.89	0.000
Auto →NHIS	0.030**	2.51	0.012	0.177***	2.73	0.0064	0.147***	3.41	0.001
Empt →Auto	0.254***	14.80	0.000	0.342***	16.96	0.000	0.088***	3.30	0.001
Empt→ DMH	0.215***	11.22	0.000	0.296***	11.32	0.000	0.083***	2.88	0.004
Empt→ NHIS	0.007	0.58	0.562	0.046**	2.00	0.046	0.057**	2.26	0.024
NHIS → DMH	0.200***	9.55	0.000	0.051**	2.09	0.037	0.149***	4.62	0.000
Observations	2,065			4,254					

Note: *** p<0.01, ** p<0.05
Source: Author (2018)

From the results in Table 20, all the six causal relationships are significant in both the 2008 and the 2014 models. The results indicate that women's autonomy predicts the use of desired maternal healthcare irrespective of the time period and that autonomy enables woman to subscribe to the NHIS in both periods. As expected, empowered women are more autonomous and are more likely to get enrolled onto the NHIS and thereby consume more desired maternal healthcare in both periods.

More definitely, the results suggest that one standard deviation increase in women's autonomy increases the use of desired maternal healthcare by 0.124 standard deviation in 2008 at one percent level of significance ($\hat{\beta}$= 0.124, t = 6.22 and p = 0.000). However, among women who gave birth after 2008, one standard deviation increase in women's autonomy increases the use of desired maternal healthcare by 0.295 standard deviation also at one percent level of significance ($\hat{\beta}$= 0.295, t = 3.15 and p = 0.00).

As to whether there is a difference between 2008 and 2014 subgroups in terms of the influence of women's autonomy on the use of desired maternal healthcare, the significance of the difference in the coefficients, $\Delta Coef$, was ascertained. The results in Table 20 show that there is significant difference in the effect of women's autonomy on desired maternal healthcare between the subgroups ($\Delta\hat{\beta}$ = 0.171, t = 4.89 and p = 0.000). Similarly, the study found significant difference in the effect of autonomy on health insurance subscription between 2008 and 2014 subgroups of expectant mothers ($\Delta\hat{\beta}$ = 0.147, t = 3.41 and p = 0.001).

Since women's autonomy has significant indirect effect ($\hat{\beta}$= 0.011, t = 2.41, p = 0.016) on desired maternal healthcare through NHIS, Using the

conventional significance level of 0.05, we fail to accept the null hypothesis National Health insurance coverage does not mediate women's autonomy desired maternal healthcare in Ghana and conclude that NHIS favourably mediates women's autonomy and the utilisation of desired maternal healthcare.

Conclusions

The focus of this chapter is to analyse the effects of women's autonomy on the uptake of desired maternal healthcare in Ghana. Women's autonomy was found to be a significant predictor of the use of desired maternal healthcare and it enables woman to subscribe to the national health insurance.

Moreover, national health insurance mediates women's autonomy and the use of desired maternal healthcare. That is an autonomous woman who subscribes to NHIS is more likely to use desired maternal healthcare relative to another autonomous woman who does not register with the scheme.

CHAPTER EIGHT

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This final chapter summarises the entire thesis and highlights the major findings of the empirical study undertaken on national health insurance, women's autonomy and the utilisation of maternal healthcare in Ghana. The chapter has six sub sections including summary, conclusions, recommendations, limitations of the study, directions for future research and contribution to knowledge.

Summary

The main objective of the study is to analyse the effects of NHIS ownership and women's autonomy on the uptake of maternal healthcare in Ghana, using a more recent data. Specifically, the study analysed the demand for national health insurance among expectant mothers before and after the year 2008; investigate the effects of NHIS on various kinds of facility-based delivery services relative to home delivery care and analyse such effect before and after the year 2008; and finally the study composed women's autonomy and "desired maternal healthcare", establish the effects of the former on the latter, and test whether NHIS mediates the two concepts in Ghana.

The study is quantitative and cross sectional in nature. It is therefore rooted in the positivist paradigm and thereby dovetailed into economic positivism and neoclassical economics. The analysis in this study is based on data pooled from the 2008 and the 2014 Ghana Demographic and Health Surveys. The study used multivariate logistic regression models to analyse

demand for national health insurance among expectant mothers and compared the demand before and after 2008. The effect of NHIS on place of delivery was analysed using multinomial endogenous treatment effect model estimated in the CMP framework with maximum likelihood technique. Finally, study adopts structural equation modelling with partial least squares to study the effects of women's autonomy on the use of desired maternal healthcare.

Regarding the demand for national health insurance among expectant mothers, the study found that there was significant increase in the demand for NHIS after 2008 and that a woman who gave birth after 2008 is 30.1 percent more likely to enrol on the NHIS relative to a woman who gave birth before 2008. Moreover, household wealth had greater effect on enrolment before 2008 compared to afterwards.

The second objective investigated the effects of NHIS on various kinds of facility-based delivery services relative to home delivery care and analysed such effects before and after the year 2008 in Ghana. Comparing results from binary and multinomial techniques as well as from endogenous and nonendogenous techniques, this study found that NHIS is endogenous and has varied effects on delivery services from different types of health facilities relative to home care. Relative to home delivery services, being insured increases the probability of using public hospitals, public clinics and private health facilities for delivery by 20.3 percent, 9.1 percent and 2.3 percent respectively. Moreover, the utilisation of facility-based delivery services increased significantly after the year 2008. Relative to an insured woman who gave birth before 2008, her counterpart who gave birth after 2008 is 6.3 percent, 4.9 percent and 0.77 percent more likely to

use public hospitals, public clinics and private health facilities respectively for delivery.

Finally, the study assessed the effects of women's autonomy on desired maternal healthcare and tested if NHIS mediates women's autonomy on desired maternal healthcare. It was found that one standard deviation increase in women's autonomy increases the use of desired maternal healthcare by 0.268 standard deviation, everything else remaining constant. In addition, women's autonomy has significant indirect effect ($\hat{\beta}$= 0.011, t = 2.41, p = 0.016) on desired maternal healthcare through NHIS.

Conclusions

Based on the results and the findings, the study concluded that the enrolment on NHIS and its effects on maternal healthcare increased significantly after 2008 in Ghana. Therefore, the 2008 GDHS data did not fully cover the phenomena.

It is again concluded that national health insurance ownership is a strong predictor of the utilisation of desired maternal healthcare in Ghana. however, the NHIS variable is endogenous and has varied effects on delivery services from different types of health facilities relative to home care.

Finally, the study concludes that women's autonomy is a significant predictor of the use of desired maternal healthcare and it also enables woman to subscribe to the national health insurance. Moreover, national health insurance mediates women's autonomy and the use of desired maternal healthcare. That is an autonomous woman who subscribes to NHIS is more likely to use desired maternal healthcare relative to another autonomous woman who does not register with the scheme.

Recommendations

Following the analysis and conclusions of this study, it is recommended that:

The NHIA should intensify its registration of pregnant women onto the scheme. The NHIA should also provide means of registration at health facilities for expectant mothers. By 2014, about 30 percent of expectant mother were not registered with any health insurance scheme (GSS et al., 2015). But given that the increase in registration after 2008 is associated with increased utilisation of maternal healthcare, any measure to have more expectant mothers registered with the national health insurance scheme will be favourable to maternal health in the country.

When assessing the effects of health insurance on maternal healthcare, researchers need to separate types of health facilities and consider the endogeneity of the health insurance variable. The assumption that professional care from all service providers are the same has led to the measurement of delivery services as binary variable. This measurement tends to blur the perceived difference in quality of services which is key to the choice of services. For instance, services provided at teaching hospitals in Ghana cannot be equated to those provided at Community Health Planning and Service compounds.

The Ministry of Women, Children and Social Protection in collaboration with religious bodies should intensify public education on women's autonomy especially in terms of decision making and freedom of movement to enable women decide and use maternal healthcare. The Ministry should also educate women especially those in the reproductive age on free registration on the NHIS as a requirement on the free maternal healthcare policy.

Limitations of the Study

A major limitation of the study is its failure to link the health interventions (maternal healthcare and national health insurance) to the ultimate health outcome (maternal mortality).

Secondly, though the study recognised freedom of physical movement as an important dimension of women's autonomy, data constraint hindered the inclusion of the dimension in the construction of the overall autonomy scores. Inclusion of such information could have given more insight into the decisions investigated.

Again, the reduction in sample size is acknowledged as a limitation of the study. Though the subsamples proved to be valid representatives of the original sample, the reduction is likely to cause slight changes in the findings from the full sample be used.

Finally, the study is limited in its retrospective mode of data elicitation. Data was collected from women who gave birth within five years preceding the data collection period. Difficulties associated with recollection of fact or memory lose is likely to affect the reliability of the data.

Directions for Future Research

Studies in this area can focus on the effect of health insurance and maternal healthcare on health outcomes especially maternal mortality. Again, from literature review, it was concluded that there is a gap in the literature on the classification of maternal healthcare service providers when assessing the demand for their services. The classification was improved upon as shown in the conceptual framework and helped teased out the effects of NHIS on the use of delivery services of the various providers in this study. This conceptual

framework is recommended for further studies on the utilisation of maternal healthcare. The study also provided a model for the study of women's autonomy and the use of maternal healthcare with emphasis on the concept of desired maternal healthcare.

Contribution to Knowledge

The contributions of this study are mainly methodological. The study categorised maternal healthcare providers into four categories (home, public hospitals, public clinics, private health facilities) hence applied multinomial techniques and at the same time accounted for endogeneity. This was done by estimating the effect of NHIS on place of delivery with multinomial endogenous treatment effect model estimated with maximum likelihood technique using conditional mixed process estimator. Hitherto, these services have been classified as home and institutional facilities, where all forms of institutional health facilities were lumped together hence binary techniques have been used.

Again, in estimating the effects of women's autonomy on maternal healthcare, the study employed SEM, accounted for endogeneity and at the same time tease out the effects of intermediate variables. The study also introduced a concept to be known as desired maternal healthcare and provided a model for its study with women's autonomy.

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APPENDICES

A: Available dimensions and indicators of women's autonomy

S. N.	Author and year	Dimension/Indicators
1	Woldemicael, 2010	- Making large household purchases, - Making household purchases for daily needs, - Visits to family or relatives
2	Ghuman et al., 2006	- Freedom of movement - Decision making regarding children - Household tasks and decision making
3	Saleem and Bobak, 2005	- Decision making autonomy - Movement autonomy
4	Bloom et al., 2001	- Financial autonomy, - Decision-making autonomy, - Movement autonomy
5	Mahapatro, 2012	- Decision-making on large household purchases - Decision-making on daily household purchases - Decision on mobility - Control overspending - Decision on own healthcare
6	Mistry et al, 2009	- Decision-making autonomy - Permission to go out - Financial autonomy
7	Jejeebhoy & Sathar 2001	- Mobility: Can go out unescorted? - Economic decision making - Access to and control over economic resources - Freedom from threat
8	Shroff et al, 2011	- Household decision making, - Decisions regarding child care, - Mobility autonomy, - Actual mobility, - Financial autonomy, and - Non-acceptance of domestic violence.

9	Thapa & Niehof 2013	- Economic autonomy, - Domestic decision making, - Movement autonomy, and - Spousal communication.
10	Gunasekaran, 2010	- Sex segregated interaction - Freedom of movement - Participation in social and political activities - Financial management - Household decisions - Freedom of choice - Violence against women - Decision about contraceptives use
11	Bhandari, 2015	- Decision-making autonomy - Movement autonomy - Financial autonomy

B: Factors that influence NHIS enrolment among expectant mothers in Ghana – Regression output (coefficients)

	Pooled sample				2014				2008			
Variables	Coeff	RSE	Z	*p*-value	Coeff	RSE	Z	*p*-value	Coeff	RSE	Z	*p*-value
Time trend (1=2014)	1.249***	0.099	12.67	0.000								
Age of expectant mothers (ref = ≤ 20 years)												
21-25 years	0.298**	0.143	2.09	0.037	0.182	0.182	1.00	0.319	0.560**	0.232	2.41	0.016
26-30 years	0.625***	0.144	4.33	0.000	0.584***	0.185	3.15	0.002	0.817***	0.246	3.32	0.001
31-35 years	0.703***	0.167	4.22	0.000	0.583***	0.213	2.74	0.006	1.076***	0.267	4.03	0.000
36-40 years	0.679***	0.187	3.64	0.000	0.602**	0.234	2.58	0.010	0.992***	0.298	3.33	0.001
41-45 years	0.512**	0.215	2.38	0.017	0.388	0.260	1.49	0.137	0.893***	0.338	2.65	0.008
≥ 46 years	0.324	0.281	1.15	0.249	0.298	0.364	0.82	0.412	0.467	0.482	0.97	0.332
Level of education (ref = no education)												
Primary	0.155	0.101	1.54	0.124	0.0942	0.132	0.72	0.474	0.277	0.184	1.50	0.133
Secondary	0.271***	0.103	2.64	0.008	0.231*	0.134	1.72	0.085	0.355**	0.175	2.03	0.043
Higher	0.387*	0.204	1.90	0.057	0.625**	0.264	2.37	0.018	0.0439	0.433	0.10	0.919
Household wealth (ref = poorest)												
Poorer	0.166**	0.082	2.03	0.043	0.443**	0.176	2.58	0.010	0.328*	0.188	1.74	0.082
Middle	0.016***	0.004	3.33	0.001	0.257**	0.108	2.38	0.017	0.444**	0.212	2.09	0.036
Richer	0.026***	0.006	4.22	0.000	0.446***	0.146	3.06	0.002	0.869***	0.235	3.71	0.000
Richest	0.075***	0.019	3.91	0.000	0.340***	0.128	2.65	0.008	0.886***	0.287	3.08	0.002
Birth order (ref = first child)												
Second-third	-0.337***	0.074	-4.54	0.000	-0.249***	0.0930	-2.68	0.007	-0.469***	0.120	-3.91	0.000
Fourth-fifth	-0.544***	0.127	-4.27	0.000	-0.537***	0.163	-3.30	0.001	-0.602***	0.170	-3.53	0.000
6th and more	-0.602***	0.140	-4.30	0.000	-0.684***	0.170	-4.01	0.000	-0.502**	0.238	-2.11	0.035
Religious denomination (ref = no religion)												
Orthodox Christians	0.293**	0.140	2.09	0.036	0.230**	0.096	2.38	0.017	0.303**	0.117	2.58	0.010
Pentecostal/charismatic	0.0985	0.155	0.63	0.526	0.171	0.196	0.87	0.382	-0.0831	0.301	-0.28	0.783
Islam	0.493***	0.183	2.70	0.007	0.681***	0.222	3.06	0.002	0.208**	0.092	2.26	0.024

Traditional African	-0.209	0.182	-1.15	0.250	-0.0002	0.227	-0.00	0.999	-0.591	0.361	-1.64	0.102
Distance problem (not big)	0.0501	0.086	0.58	0.559	0.0245	0.112	0.22	0.827	0.112	0.137	0.81	0.417
Married	0.555***	0.112	4.97	0.000	0.602***	0.139	4.33	0.000	0.407**	0.196	2.08	0.038
Female household head	-0.208**	0.092	-2.26	0.024	-0.155	0.121	-1.28	0.199	-0.317**	0.139	-2.28	0.023
Employed	0.0632	0.093	0.68	0.497	0.179*	0.109	1.65	0.100	0.203	0.190	1.07	0.285
Family planning on radio	0.0457	0.087	0.52	0.600	0.131	0.112	1.17	0.242	-0.181	0.134	-1.35	0.177
F. Planning on Television	0.0647	0.092	0.71	0.479	0.126	0.114	1.10	0.269	-0.114	0.160	-0.71	0.476
Rural resident	-0.0160	0.119	-0.13	0.893	-0.0659	0.147	-0.45	0.655	0.0464	0.189	0.25	0.806
Body mass index	0.312*	0.180	1.73	0.083	0.022**	0.011	2.09	0.036	0.541**	0.236	2.29	0.022
Awareness of Tuberculosis	0.194**	0.095	2.04	0.042	0.109***	0.022	4.97	0.000	0.520***	0.169	3.08	0.002
Constant	-1.591***	0.296	-5.37	0.000	-0.012**	0.006	-2.03	0.043	-2.373***	0.468	-5.07	0.000
_hat	1.09***	0.145	7.48	0.000	1.056***	0.134	7.90	0.000	1.048***	0.079	13.32	0.000
_hatsq	-0.0583	0.083	-0.70	0.485	-.0364	0.078	-0.47	0.640	0.056	0.062	0.91	0.363
Observations	8,805				5,859				2,946			
Wald $chi^2(30)(29)$	374.34				142.09				161.01			
Prob > chi^2	0.0000				0.0000				0.0000			
Pseudo R^2	0.0997				0.0428				0.0875			
Log pseudolikelihood	-5239.63				-3425.81				-1737.13			
Mean VIF	1.41				1.43				1.43			
Condition Number	28.42				28.81				28.92			
Hosmer-Lemeshow chi^2	2.03(1)				1.58(1)				2.32(2)			
Prob > chi^2	0.1545				0.208				0.3134			

RSE is robust standard errors. *** p<0.01, ** p<0.05, * p<0.1

C: Appendix C: Correlation matrix with p-value for variables in the HIS and place of Delivery and ANC models

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Delivery care	1.0000												
2. NHIS	0.0854	1.0000											
	0.0000												
3. Birth order	-0.1601	-0.0595	1.0000										
	0.0000	0.0000											
4. AGE	-0.0412	-0.0334	0.3598	1.0000									
	0.0016	0.0000	0.0000										
5. Education	0.2441	0.0602	-0.2365	-0.1444	1.0000								
	0.0000	0.0000	0.0000	0.0000									
6.spousal edu.	0.2176	0.0474	-0.1743	-0.0541	0.6109	1.0000							
	0.0000	0.0000	0.0000	0.0000	0.0000								
7. Wealth level	0.2429	0.0247	-0.2064	-0.0191	0.5709	0.5800	1.0000						
	0.0000	0.0002	0.0000	0.0036	0.0000	0.0000							
8. Television	0.1251	0.0528	-0.1430	-0.0525	0.3758	0.3492	0.5019	1.0000					
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						
9. Radio	0.1346	0.0625	-0.0623	-0.0085	0.1987	0.1981	0.1859	0.1937	1.0000				
	0.0000	0.0000	0.0000	0.1941	0.0000	0.0000	0.0000	0.0000					
10. Married	-0.0272	0.0867	0.0766	-0.0200	-0.1120	-0.0553	-0.0925	-0.0489	-0.0048	1.0000			
	0.0376	0.0000	0.0000	0.0024	0.0000	0.0000	0.0000	0.0000	0.4669				
11. Religion	-0.0307	0.0346	0.0437	0.0063	-0.1814	-0.1837	-0.0653	-0.0256	-0.0108	0.0802	1.0000		
	0.0188	0.0000	0.0000	0.3367	0.0000	0.0000	0.0000	0.0001	0.1004	0.0000			
12. ANC visits	0.2693	0.1083	-0.1365	0.0516	0.2633	0.2715	0.3402	0.2411	0.1324	0.0315	-0.0204	1.0000	
	0.0000	0.0000	0.0000	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0397	0.1832		

D: Factors Influencing Facility Delivery — Conditional Mixed Process and Multinomial Probit Regression outputs – (coefficients)

Variables	Public Hospital		Public Clinics		Private Facilities		NHIS
	Mprobit	CMP	Mprobit	CMP	Mprobit	CMP	
Insured (NHIS)	0.474***	1.649***	0.342***	1.278***	0.223***	1.019***	
	(0.0586)	(0.333)	(0.0608)	(0.273)	(0.0773)	(0.263)	
Time trend (2014)	0.441***	0.576***	0.535***	0.441***	0.147***	0.392***	0.742***
	(0.0620)	(0.0812)	(0.0646)	(0.109)	(0.0207)	(0.090)	(0.0367)
Age of expectant mothers (ref = ≤ 20 years)							
21-25 years	0.0992	0.0121	0.0802	0.151	0.0785	0.0660	0.168**
	(0.120)	(0.116)	(0.121)	(0.117)	(0.163)	(0.150)	(0.0727)
26-30 years	0.253*	0.0903	0.0009	0.131	0.185	0.0746	0.300***
	(0.131)	(0.131)	(0.132)	(0.130)	(0.178)	(0.169)	(0.0777)
31-35 years	0.498***	0.261*	0.0115	0.179	0.463**	0.0898	0.392***
	(0.144)	(0.153)	(0.146)	(0.147)	(0.192)	(0.189)	(0.0855)
36-40 years	0.771***	0.525***	0.119	0.0779	0.657***	0.260	0.346***
	(0.155)	(0.163)	(0.158)	(0.159)	(0.206)	(0.203)	(0.0920)
41-45 years	0.822***	0.582***	0.159	0.0333	0.621**	0.241	0.325***
	(0.177)	(0.183)	(0.181)	(0.179)	(0.242)	(0.234)	(0.108)
≥ 46 years	0.613***	0.413*	0.0973	0.259	0.756**	0.420	0.254*
	(0.233)	(0.232)	(0.237)	(0.236)	(0.322)	(0.286)	(0.143)
Level of education (ref = no education)							
Primary	0.280***	0.290***	0.206***	0.217***	0.311***	0.308***	0.103**
	(0.0770)	(0.0745)	(0.078)	(0.0764)	(0.117)	(0.106)	(0.0485)
Secondary	0.539***	0.415***	0.348***	0.249***	0.593***	0.376***	0.115**
	(0.0774)	(0.0857)	(0.079)	(0.083)	(0.116)	(0.111)	(0.0502)
Higher	0.920***	0.688***	0.608*	0.412	1.148***	0.775***	0.280**
	(0.300)	(0.266)	(0.313)	(0.281)	(0.325)	(0.297)	(0.118)
Household wealth (ref = poorest)							
Poorer	0.386***	0.390***	0.0804	0.0868	0.641***	0.590***	0.107**
	(0.0775)	(0.0753)	(0.0761)	(0.0745)	(0.128)	(0.120)	(0.052)

Middle	0.921***	0.853***	0.0614	0.0108	0.992***	0.811***	0.080**
	(0.087)	(0.091)	(0.091)	(0.090)	(0.136)	(0.137)	(0.035)
Richer	1.687***	1.528***	0.498***	0.364***	1.681***	1.365***	0.128*
	(0.104)	(0.122)	(0.111)	(0.117)	(0.151)	(0.156)	(0.092)
Richest	1.938***	1.692***	0.478***	0.265*	2.304***	1.874***	0.140***
	(0.141)	(0.151)	(0.155)	(0.155)	(0.178)	(0.196)	(0.043)
Birth order (ref = first child)							
Second-third	-0.441***	-0.331***	-0.326***	-0.236**	-0.276**	-0.110	-0.154***
	(0.0903)	(0.0909)	(0.0938)	(0.0931)	(0.116)	(0.111)	(0.0526)
Fourth-fifth	-0.738***	-0.557***	-0.463***	-0.315***	-0.600***	-0.322**	-0.240***
	(0.115)	(0.121)	(0.117)	(0.119)	(0.147)	(0.145)	(0.0672)
6th and more	-0.911***	-0.644***	-0.594***	-0.378**	-0.792***	-0.361*	-0.384***
	(0.137)	(0.153)	(0.140)	(0.147)	(0.186)	(0.189)	(0.0822)
Religious denomination (ref = no religion)							
Orthodox Christians	0.485***	0.271*	0.468***	0.300**	0.409*	0.0520	0.371***
	(0.141)	(0.153)	(0.141)	(0.148)	(0.224)	(0.206)	(0.0869)
Pentecostal/charismatic	0.308**	0.203	0.222	0.143	0.436**	0.234	0.138
	(0.136)	(0.134)	(0.137)	(0.135)	(0.218)	(0.198)	(0.0840)
Islam	0.432***	0.197	0.446***	0.265*	0.417*	0.0156	0.417***
	(0.141)	(0.156)	(0.142)	(0.150)	(0.227)	(0.212)	(0.0875)
Traditional African	-0.176	-0.143	-0.482**	-0.453**	-0.172	-0.134	-0.0531
	(0.194)	(0.186)	(0.194)	(0.189)	(0.317)	(0.280)	(0.109)
Distance not a big problem	0.199***	0.162***	0.364***	0.333***	0.314***	0.250***	0.0136
	(0.059)	(0.059)	(0.062)	(0.061)	(0.087)	(0.080)	(0.0371)
Married	0.0959	0.221**	0.103	0.0009	0.192	0.376***	0.332***
	(0.0929)	(0.0941)	(0.0969)	(0.0978)	(0.120)	(0.113)	(0.0561)
Female household head	-0.0929	-0.0465	0.106	0.140*	-0.162*	-0.0837	-0.102**
	(0.072)	(0.070)	(0.075)	(0.0721)	(0.09)	(0.089)	(0.0435)
Employed	0.0246	0.007	0.0135	0.0378	0.154	0.092	0.0586
	(0.0743)	(0.071)	(0.0775)	(0.0745)	(0.0965)	(0.0911)	(0.0449)
Family planning on radio	0.0156	0.0423	0.0537	0.0755	0.0255	0.0616	0.0397

	(0.0634)	(0.0613)	(0.0642)	(0.0621)	(0.0864)	(0.0783)	(0.0388)
Family planning on television	0.0472	0.0370	0.0996	0.105	0.0399	0.0579	0.0311
	(0.073)	(0.070)	(0.0769)	(0.0743)	(0.0983)	(0.089)	(0.046)
Rural Resident	0.025	0.007	0.014	0.0378	0.154	0.092	0.098
	(0.074)	(0.07)	(0.078)	(0.075)	(0.097)	(0.091)	(0.090)
Antenatal care visit	0.150***	0.131***	0.159***	0.142***	0.136***	0.108***	
	(0.0124)	(0.0133)	(0.013)	(0.0130)	(0.0150)	(0.0141)	
Body mass index							0.160***
							(0.0516)
Awareness of tuberculosis							0.250***
							(0.0414)
Constant	-2.53***	-2.535***	-2.284***	-2.313***	-3.440***	-3.137***	-0.884***
	(0.199)	(0.195)	(0.198)	(0.191)	(0.305)	(0.318)	(0.128)
Observations	6,319	6,319	6,319	6,319	6,319	6,319	8,805
Atanhrho		-0.579***		-0.442***		-1.082***	
		(0.208)		(0.147)		(0.277)	
Wald $chi^2(87)/(117)/(30)$	2056.71	4025.90					407.56
Prob > chi^2	0.000	0.000					0.000

Home delivery is the base outcome; Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1