INEQUITY IN MATERNAL AND CHILD HEALTH CARE UTILISATION IN NIGERIA

BY

RIFKATU NGHARGBU

B.Sc. Economics (ABU Zaria), M.Sc. Economics (Ibadan)

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ABSTRACT

The high maternal and child mortality rates of 500 per 100,000 and 128 per 1,000 live births are major research and health policy concerns often caused by inequity in utilisation of basic maternal and child healthcare in Nigeria. Although existing literature provided estimates of determinants of maternal and child healthcare utilisation, inequity in maternal and child healthcare utilisation has not been given adequate attention. This study, therefore, examined horizontal inequity in maternal and child health care utilisation in Nigeria.

Social welfare and demand theories of healthcare utilisation were adopted. Concentration curves and standardised concentration index were used to analyse need variables (age and pregnancy status) and non-need variables (education and wealth) in the estimation of horizontal inequity in maternal and child health care utilisation. Maternal healthcare status was measured by antenatal attendance and delivery by skilled personnel, while child healthcare status was measured by immunisation experience and bednets usage. Two-part models (logit, negative binomial), logit and multinomial logit were used to estimate determinants of antenatal care, skilled delivery, immunisation and bednets utilisation, respectively. Data were derived from five sets of Nigeria Demographic and Health Survey (NDHS). The survey covered 8,781, 8,918, 2,572, 34,596 and 39,902 women aged 15-49 for 1990, 1999, 2003, 2008 and 2013, respectively. Data were analysed at $p<0.05$.

The means were (0.7 ± 0.5), (0.1 ± 0.3), (0.7 ± 0.5) and (0.2 ± 0.5) for antenatal care, skilled delivery, immunisation and bednets, respectively. Concentration curve for antenatal and skilled delivery revealed a positive horizontal inequity index of 0.26 to 0.37 and 0.32 to 0.48 from 1999 to 2013; indicating pro-rich inequity in utilisation with standardised concentration index of need variable subtotal of 0.001 to 0.002 and -0.03 to -0.02 and non-need variable subtotal of 0.26 to 0.37 and 0.19 to 0.30. Poorest women with no education had lower probability of attending antenatal care and utilising skilled delivery compared to richest women with higher education. This was evident in 2003 and 2013 when 56.8% and 25.0% of the poorest women and 39.4% and 39.5% of uneducated women were less likely to use antenatal and skilled delivery. Distance to health facility negatively influenced antenatal and skilled delivery utilisation. This was highest in 2003 with (β= -0.42 and -0.37). Child immunisation also exhibited positive horizontal inequity index of 0.22 to 0.07 from 1999 to 2013

indicating pro-rich inequity. In contrast bednets usage exhibited negative horizontal inequity index of -0.30 to -0.08 from 2003 to 2008, but turned positive at 0.13 in 2013, revealing pro-poor and pro-rich inequity. Children with poorest and uneducated mothers were less likely to be immunised and utilise treated bednets. This was more pronounced in 1999 to 2003 as 36.8% of children with poorest mothers and 41.3% of children with uneducated mothers were less likely to be immunised and more likely to use treated bednets in 2013.

Education and wealth formed the basis of inequity in maternal and child healthcare utilisation in Nigeria. Empowerment programmes and improvement in education will enhance maternal and child healthcare utilisation by reducing mortality.

Keywords: Horizontal inequity, Antenatal care, Skilled delivery, Maternal and child healthcare, Bednets

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DEDICATION

This Thesis is dedicated to:

JESUS

My heavenly Father, Lord and Saviour
To him be the glory and honour forever and ever (Amen)
He has made all things beautiful in his time

And

LATE CHIEF SOLOMON D. NGHARGBU

My beloved father in-law

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CERTIFICATION

I certify that this work was carried out by Mrs Rifkatu Nghargbu in the Department of

Economics, University of Ibadan

………………………………………………………..
Professor Olanrewaju Olaniyan
Chairman, Thesis Supervision Committee
B.Ed. (Edu Mgt & Economics), M.Sc. (Economics), PhD (Ibadan)
Professor Department of Economics
University of Ibadan

…………………………………………………..
Dr Akanni O.Lawanson
Member, Thesis Supervision Committee
B.Ed. (Economics), M.Sc. (Economics), PhD (Economics), (Ibadan)
Senior Lecturer Department of Economics
University of Ibadan

………………………………………………………….
Dr Abiodun O. Folawewo
Member, Thesis Supervision Committee
B.Sc. (Economics) (Ogun), M.Sc. (Economics), PhD (Economics), (Ibadan)
Senior Lecturer Department of Economics
University of Ibadan

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CHAPTER ONE

INTRODUCTION

1.0 Preamble

Equity or inequity is a normative concept in welfare economics which centres on fairness and equal opportunities in resource distribution to individuals in the society, regardless of identity and socioeconomic status. Equity in health care is an important criterion for measuring the effectiveness of resource allocation in the health sector. The essential role of equity in policy objective in the health sector is based on the fact that health and health care use are integral parts to people's capability to function and their ability to flourish as human beings. Good health obtained through health care utilisation enhances labour productivity and economic growth in a country. Health care is also a human right and should be provided regardless of people's ability to pay (Wagstaff and Van Doorslaer, 1998). This implies that health care should not be allocated or distributed according to income and wealth of individuals as it is the case in the conventional economic theory of the market system. Equity in health care is classified into vertical and horizontal. Vertical equity relates to the issue of providing unequal treatment of health care need to individuals with unequal health care need (Wagstaff and van Doorslaer, 2000; Cuyler, 2001). Horizontal equity is the notion that persons with similar health conditions and needs should be given equal treatment irrespective of their income, and socioeconomic status (Cuyler and Wagstaff, 1993; Whitehead, 1985; Wagstaff and Van Dooslare, 2000).

Inequity on the other hand simply means when health care resources are unfairly distributed and utilised based on income and socioeconomic status. Inequity is also categorized into vertical and horizontal. Vertical inequity in health care resource allocation occurs when greater treatment of health care need is not provided to persons with more health care need, while horizontal inequity occurs when persons with similar health care needs are given unequal treatment and utilises health care on the basis of income and socioeconomic status. Horizontal inequity also means when utilisation of health care is affected by non-need variables so that individuals with the same level of needs consume different amounts of care (Wagstaff and van

Doorslaer, 2000; Gravelle et al, 2006). Need variables are those factors that predispose an individual to use a particular health care; this can be ill-health, age of an individual and other factors (Culyer and Wagstaff, 1993; Fluerbeay, 2006; Culyer and Wagstaff, 1993), while non-need variables are factors that influence the use of health care outside the need variables. The non-need variables include; socioeconomic factors such as wealth, education, region, residence, employment status.

Inequity is synonymous to inequality but they are not the same. Inequality in health care represents absolute differences in health care utilisation between individuals and populations, while inequity in health care utilisation represents inequalities considered unfair or unjust between different social groups in relation to their need for health care (Ong *et al*, 2009). For instance, it might be unfair if healthy and sick people are given the same amount of health care, also a health system is considered equitable when people with equal need for health care have equal access to equal utilization. Therefore, inequity is often defined with respect to inequality in relation to need for health care. This study is focused on estimating horizontal inequity which implies investigating the contributions of the need and the non-need variables to maternal and child health care utilisation in Nigeria. Although good health status of individuals is important to productivity and economic growth, there is more emphasis on maternal and child health care in this study due to its serious impact on mortality, poverty and labour supply decisions of households and individuals. The state of maternal and child health is one indicator of a society's level of development as well as an indicator of the performance of the health care system.

Maternal health care is the health-related caring for women at the productive age from 15 to 49 years. It encompasses the health care dimensions of preconception, conception and postnatal care utilised with the aim of reducing maternal morbidity and mortality. Child health care are health related services provided for infants, under-five children and children beyond five years of age utilised with the aim of reducing child mortality and morbidity (free encyclopedia 2014). The basic maternal health care services include antenatal care, postnatal care, skilled delivery, obstetric care and contraceptive care or family planning, while the basic child health care services include; immunisation, diarrhea treatment, treatment of acute respiratory infections, malaria treatment and prevention, bed nets use as well as treatment and prevention of other related childhood diseases. Maternal and child health care can be classified into preventive, curative and rehabilitative. Antenatal care and contraceptive use or family

planning are regarded as preventive care while skilled delivery and postnatal care are regarded as curative and rehabilitative health care. In child health care, immunisation and bed nets use are preventive care while diarrhea treatment, treatment of acute respiratory infection and malaria treatment are regarded as curative and rehabilitative care. The utilisation of basic maternal and child health care such as antenatal, skilled delivery, immunisation and bed nets is associated with improved maternal and child health outcomes through reduction in maternal and child mortality as well as morbidity. The importance of antenatal care, skilled delivery, immunisation and bed nets utilization on maternal and child health is reinforced by the millennium development goals (MDGs) four and five. Both goals four and five were aimed at reducing maternal and child mortality by two-third and one-third respectively through enhanced maternal and child health care utilisation. The World Health Organisation (WHO) defines maternal mortality as the death of a woman during pregnancy or within 42 days of termination of pregnancy, irrespective of the duration of the pregnancy for a specified year. It is also defined as the rate of annual number of female deaths per thousand live births (http://www.who.int/healthinfo/statistics/indmaternalmortality/en/) With respect to child or under-five mortality WHO defines this as the probability per 1,000 that a newborn baby will die before reaching age five subject to current age-specific mortality rates (http://data.worldbank.org/indicator/SH.DYN.MORT)

The drive to reduce maternal and child mortality in Sub-Saharan Africa (SSA) is on the increase. This is so because SSA has the highest maternal and child mortality rates in the world. A woman in SSA has a 1 in 16 chance of dying during pregnancy or childbirth compared to 1 in 4,000 risk of dying in other developing countries (UNICEF, 2010). The global under-five mortality and child mortality rate is highest in Sub-Saharan African countries as half of 8.8 million deaths of under-five children in 2008 took place in SSA (UNICEF, 2010). Maternal and child mortality is related to an overall low access and utilisation of basic maternal and child health care services in Nigeria, owing to insufficient level of overall funding of the health sector and inequitable composition of expenditure including heavy reliance on out-of-pocket expenditure (Babalola and Fatusi, 2009). The challenge of maternal and child mortality raises a growing concern on issues of inequity in utilisation of maternal and child health care services in Nigeria; the major concern of this study.

1.1 Statement of the problem

Preventable and treatable infectious diseases as well as pregnancy and childbirth remain the major causes of maternal and child mortality and morbidity in Nigeria. Nigeria is rated one of the ten most dangerous countries in the world for a woman to give birth, with 500 of every 100,000 live births resulting in maternal deaths (National Population commission, 2013). In 2010, an estimated 40,000 Nigerian women died during childbirth which accounted for an estimated 14% of maternal deaths worldwide (UNICEF, 2010). Nigeria also accounted for 10% of worldwide maternal deaths in 2013 (Oyedele, 2013). The MDG countdown report shows that Nigeria ranks second in maternal mortality with 1100 mortality rate per 100,000 live births. This accounts for more than two third of maternal deaths in SSA. Maternal mortality occur in Nigeria due to obstructed and prolonged labour, severe bleeding (hemorrhage) during childbirth, unsafe abortions as well as eclampsia and hypertensive disorder during pregnancy, accounting for 16, 25, 13 and 12 percent of maternal deaths, respectively (UNICEF 2009).

Nigeria also has one of the highest under-five mortality rates in the world at 128 out of 1000 live births, (National Population Commission, 2013). Although the under-five mortality rate decreased from 201 deaths per 1,000 live births in 2003 to 128 deaths per 1,000 live births in 2013, Nigeria could not achieve the MDG target of reducing the under-5 mortality to 64 deaths per 1,000 live births in 2015. The major causes of under-five mortality in Nigeria include malaria, measles, polio, diarrhea, acute respiratory infections and pneumonia which accounts for about 30, 22, 19, and 16 percent of under- five mortality (UNICEF, 2009). In cases where diseases and complications due to pregnancy and childbirth do not lead to mortality, women and children are often left with permanent disabilities. This has resulted in high burden of diseases, long time hospitalisation and increasing demand on available health facilities. High rate of mortality and morbidity among women and children thus constitute major economic problems due to their impact on productivity, labour supply decisions of households, income generation of families, poverty, human capital formation and consequently, economic growth and development.

It has been argued in the literature that lack or low level of utilisation of basic maternal and child health care services as well as inequity in utilisation among socioeconomic groups are factors that account for high mortality and morbidity among women and children. Poor women from rural areas and the north tend to utilise less of

maternal and child health care services compared to rich urban women. UNICEF (2009) report for Nigeria shows that only 14% of rural women in the poorest wealth quintile utilise antenatal care compared to 95% of the non-poor urban women. The 2008 NDHS report shows that less than half (38% and 48%) of pregnant women in the North East and North West respectively received any antenatal care compared to 96% in the South East and 91% in South West. Inequity in utilisation of maternal and child health care leads to poor health outcomes among the disadvantaged women and children, which is manifested in high rate of morbidity and mortality rate of women and children. Although few statistical evidences indicate that inequity in the utilisation of maternal and child health services exist, such evidences are not sufficient for efficient, well-structured, focused decision-making and policy formulation in dealing with the challenge of maternal and child mortality and morbidity in Nigeria thus, the study intends to answer the following questions:

  (i)   Is there horizontal inequity for need and non-need variables in maternal and child health care utilisation?

  (ii)   What are the determinants of maternal and child health care utilisation in Nigeria?

2.1 Objectives of the Study

The general objective of this study is to examine inequity in maternal and child health care utilization in Nigeria. The specific objectives are to:

  I.   Construct the profile of horizontal inequity for need and non-need variables in the utilisation of maternal and child health care services in Nigeria.

  II. Estimate the factors determining the utilisation of maternal and child health care services in Nigeria.

1.3 Justification for the Study

A number of studies exist on maternal and child health care utilisation in Nigeria, but the studies are more of public health origin that focused on determinants of maternal health care utilisation in Nigeria with much emphasis on antenatal care and skilled delivery. These studies include; Babalola and Fatusi (2009), Dairo and Owoyokun (2010), Adamu (2011), and Nwosu *et al* (2012), apart from Dairo and Owoyokun (2010) they used the NDHS for 2003 and/or 2008, while Dairo and Owoyokun (2010) conducted a survey using questionnaire to investigate the

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determinants of antenatal care utilization in two local governments in Ibadan. This study goes further by examining five sets of NDHS; the 1990, 1999, 2003, 2008 and 2013 NDHS to construct the profile of inequity and estimate the determinants of maternal and child health care utilization during these periods. This is important for policy formulation because past factors are often linked to the present.

Also, none of the previewed studies in Nigeria has attempted to analyse inequity in any of the maternal health care services. Related inequity studies on maternal health care are not from Nigeria. Existing studies on inequity in maternal and child health care in other countries did not apply the standardization method for estimating inequity in health economics (Houweling *et al*. 2007; Zere *et al*, 2010; and Bonfruer *et al*; 2012). The standardisation method entails the estimation of concentration curves and concentration index by standardising for the differences in need and non-need variables. Bonfruer *et al* (2012) estimated the concentration index for different countries without standardising for need and non-need variables. This method is considered appropriate because it provides a true picture of the profile of inequity due to need and non-need variables. Inequity due to need variables is considered to be justified and does not constitute a problem, while inequity due to non-need variables poses a great challenge to the health sector because individuals who need a particular health care do not have it due to factors beyond their control. This study attempts to fills this gap by employing the method in Health Economics by standardising and decomposing factors likely to contribute to total inequity into need and non-need variables via the concentration curve and the standardised concentration index or the horizontal inequity index.

Further, available studies on determinants of antenatal care utilisation in Nigeria used the logit or poisson model to estimate the determinants of antenatal care utilization. This study goes further by using the two-part model to estimate the determinants of antenatal care utilisation; the first part is the logit model which indicates the decision process of deciding to use antenatal care or not, while the second part indicates the frequency of antenatal care use, estimated using the negative binomial model. The two-part model approach has the advantage of showing the impact and role of the independent variable at each stage of decision; the decision to use antenatal care and the frequency of use.

The literature on child health care for Nigeria is quite scanty which is also centred on public health literature. These include the studies by Oresanya *et al* (2008)

and Antai (2011). Oresanya *et al* (2008) examined the determinants of insecticide treated nets (ITN) use in Nigeria while Antai (2011) investigated a persistent inequity in immunisation of children in Nigeria. Oresanya *et al* (2008) is centered on one type of bed net with no analysis on equity using the concentration curve and the concentration index. Antai (2011) focused on rural-urban inequities in immunisation using logistic regressions without looking at other dimensions of inequity such as the wealth, education, region, ethnicity and religious dimension. Considering these dimensions is important because they constitute some very important socioeconomic factors that affect child immunisation utilisation in Nigeria. The logistic regression employed by Antai (2011) is deficient in the analysis of inequity because the logistic regression does not estimate clearly the profile of inequity. This study goes further by estimating the profile of inequity in bed nets utilization using the concentration curve and the concentration index.

This study is also different from the existing studies as it examines access issues in the determinants of maternal and child health care. Existing studies in Nigeria examined the determinants of utilisation of maternal and child health care without examining access variables such as distance to health facilities, transport to health facilities, "no provider", no female provider", and no immunisation drugs. This study brings into fore some access variables in the analysis of the determinants of maternal and child health care services absent in reviewed studies relating to Nigeria. Although these access variables are not found in other studies in Nigeria, the important role they play in maternal and child health care utilisation is emphasised in this study. Accessibility of maternal and child health care in Nigeria especially in the rural areas is vital to utilisation. In addition, the study adds to the existing knowledge on the determinants of maternal and child health care by interacting the variables commonly found in the literature. The variables include; education, wealth, region and religion. The purpose of the interaction is to track the variables that have the most impact in the utilization model.

Also, this study contributes to theory by including the variable on the role of responsibility identified by Fleurbaey and Schokkaert (2009) in the welfare model by Gravelle *et al* (2006). Religion is represented as a variable that captures the role of responsibility in the model. Religion is important in the model because women can avoid utilising health care because of religious factors and not because they do not have access to it. Including this variable in the theoretical model is important because

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religion plays a major role in maternal and child health care utilisation especially in the northern part of the country.

In terms of policy relevance, the profile of horizontal inequity in maternal and child health care utilisation will reveal the major drivers of inequity. This will give the health policy makers direction on what to focus on in order to reduce inequity in maternal and child health care utilisation there by improving access and utilisation as well as reducing maternal and child mortality. Secondly, analysis using the five sets of NDHS data will provide insight to health policy makers on effectiveness of maternal and child health care utilisation policy over time. results on the second objective will provide information to health policy makers on determinants of maternal and child health care utilisation.

1.4 Scope of the Study

There are several maternal health care ranging from antenatal, postnatal, skilled delivery, intermittent preventive treatment for pregnant women, obstetric, contraceptives and family planning. Child health care include immunisation, treatment of diarrhea, malaria and acute respiratory infection as well as pneumonia. This study focused on two maternal and two child health care services: antenatal and skilled delivery for maternal, immunisation and bed nets use for child health care. The study focuses on these maternal and child health care services because they are the basic that have direct impact on the maternal and child mortality as well as morbidity.

This study is also focused on horizontal inequity in the utilisation of maternal and child health care services in Nigeria because it measures inequity in utilisation and health care delivery in the health system. The study focused on Nigeria with emphasis on the six geopolitical zones. The study covers the survey from 1990 to 2013 using NDHS data. There are five sets of NDHS data in Nigeria ranging from 1990 to 2013. The reason for analysing the five sets of data is to compare the results between each survey across the respondents over the years.

1.5 Organisation of the Study

This thesis is made up of six chapters; following this introductory chapter is, chapter two, which contains the background to the study while chapter three dwells on the literature review. Chapter four presents the methodology; chapter five gives the

results' presentation, interpretations and discussion while chapter six contains the summary, conclusions and recommendations.

CHAPTER TWO

BACKGROUND TO THE STUDY

Introduction

This chapter contains the background on the relevance and utilisation pattern of maternal and child health care in Nigeria. It provides a detailed background information over the years on the trend in antenatal care, skilled delivery, immunisation and bed nets utilisation; the focus of this study. It also provides information on access issues related to maternal and child health care. The information on child mortality rate is also provided in this chapter. The information in this section is useful to this study because it gives a clear picture on the state of antenatal care, skilled delivery, immunisation and bed nets utilisation in Nigeria as well as the problem of access and child mortality rate by socioeconomic factors.

2.1 Definition of maternal and child health care.

The health care of women during and after pregnancy and delivery is important for the overall health and survival of the mother and child. The health of the mother and child is an important indicator of the maternal and child health in a country. This also shows the level of development of the health sector of a country (National Population Commission, 2008). Maternal health care covers some basic health care such antenatal and postnatal care as well as family planning. The purpose of antenatal care is to detect any potential complications of pregnancy in women. Postnatal care issues are concerned with recovery from childbirth as well as newborn care, nutrition, breastfeeding and family planning. Child health care include immunisation, treatment of acute respiratory infection, diarrhea treatment, malaria treatment and prevention as well as other-related childhood diseases utilized, with the sole aim of reducing infant and under-five mortality and morbidity. The components of maternal health care services utilisation discussed in this section include; antenatal care and skilled delivery while the child health care services are immunisation and bed nets use.

2.1 Maternal health care utilisation

2.1.1 Antenatal care

Antenatal care is one of the vital maternal health care services. The major objective of antenatal care is to ensure optimal health outcomes for mother and child. Antenatal care in pregnant women is very crucial because it safeguards the life and the health of a woman and her unborn baby. It exposes pregnant women to counselling and education about their health and that of their children. Pregnancy complications are important source of maternal and child mortality and morbidity. Therefore, regular antenatal visit ensures proper monitoring of the health of the mother and child throughout pregnancy. Antenatal care can be more effective when it is sought early in pregnancy and continues until delivery. The advantage of starting antenatal care early especially within the first three months of pregnancy is that a woman's baseline health will be assessed (National Population Commission, 2008). This helps in detecting any abnormality and aids the health workers in taking necessary actions concerning the woman's health. Antenatal care provided by a trained provider is important to monitor the pregnancy and reduce mortality as well as morbidity risks for the mother and child during pregnancy and delivery (National Population Commission, 2008). .

Obstetricians usually recommend that antenatal visits by pregnant women should be carried out every month at the beginning of the pregnancy until the 7th month, fortnightly in the 8th month and weekly until birth (National Population Commission, 1990). Notably, the minimum standard of WHO for antenatal visits is at least four visits before delivery. By this standard, a woman is expected to attend antenatal sessions of at least four times before the day of her delivery. This is in line with the antenatal care policy in Nigeria; termed the focused antenatal care (FANC). FANC emphasises quality of care during each care instead of focusing on the number of visits (National Population Commission, 2008). The schedule for the four antenatal visits states that the first visit should occur by the end of 16 weeks of pregnancy, the second should be between 24 and 28 weeks of pregnancy, the third is at 32 weeks, while the fourth should be undertaken at 36 weeks of pregnancy. In cases where complications occurs and for women with basic needs, additional visits are expected to be undertaken, in Africa, most women do not meet this requirement. For antenatal care to cater for complications, signs of complications and test should routinely be included (National Population Commission, 2003). To achieve the essence of antenatal care, there are several contents included in the care ranging from tetanus toxiod injections,

test for complications, weight measurement, height measurement, urine and blood sample, anti-malaria drugs as well as iron tablets or syrup (National Population Commission, 2003). The essence of the antenatal care contents is to avert neonatal tetanus, malaria, and maternal anemia; the major causes of neonatal mortality (National Population Commission, 2003).

Table 2.1 shows the use of antenatal care services in percentage distribution of births in 1990 survey by source of antenatal care received during pregnancy.

Table 2.1 Antenatal Care Use by Percentage Distribution of Births Five Years Preceding the 1990 survey.

Socioeconomic characteristics	Doctor	T N/W	A M/A	VHW	TTBA	TBA	none	No of births
RESIDENCE								
Urban	**61.2**	**23.1**	0.5	0.4	0.7	1.3	**11.1**	**1,714**
Rural	**29.6**	**19.4**	1.4	1.9	0.9	4.2	**41.1**	**6,399**
REGION								
North East	**26.5**	**9.9**	0.3	1.3	0.2	3.7	**54.7**	**1,924**
North West	**31.2**	**14**	0.2	0.2	0.7	0.5	**52.4**	**2,242**
South East	**35**	**29.5**	2.7	3.8	1.7	7.6	**19.6**	**2,422**
south West	**58.1**	**27.4**	1.7	0.5	0.7	1.7	**7.7**	**1,525**
MOTHERS EDUCATION								
No education	**27.5**	**15.9**	0.9	1.7	0.7	3.4	**47.9**	**5,091**
Primary	**35**	**32.4**	4.2	1.9	1.2	4	**15**	**1,212**
Secondary	**47.8**	**26.4**	0.4	1.4	0.9	1.5	**8**	**459**
More than secondary	**60.6**	**18.2**	0.9	0.6	0.6	0.4	**2.6**	**521**

Key: (a)Trained Nurse/Midwife (TN/W), (b) Auxiliary Midwife/Assistant (AM/A), (c) Village health worker (VHW), (d) Trained traditional birth attendant (TTBA), (e) Traditional birth attendant (TBA).
Source: Extracted from NDHS report 1990

The table shows the use of antenatal care by residence, region and educational status of a woman, provided by trained and untrained health personnel; the doctors, nurses and midwives as well as the traditional birth attendants. Disparity in the use of antenatal care is observed by residence, region and educational status of women. Given a sample of 1,714 and 6,399 in the urban and rural areas respectively, about 61.2% and 23.15% of antenatal care visits were administered by doctors and trained nurses and midwives in the urban areas, while only 29.6% and 19.4% of antenatal visits to doctors and trained nurses were recorded in rural areas. Despite the larger number of births in the rural areas only about 40% received antenatal care. 41.1% received no antenatal care; while only 11.1% did not receive antenatal care in the urban areas. There are several reasons why rural women use less of antenatal services than the urban women, they may not have access to antenatal care providers and may not be aware of the importance of antenatal care compared to the urban women. They may also not be able to afford antenatal care fees in some private hospitals.

Differences in the utilisation of antenatal care are also observed regionally, women in the southern part of the country are more likely to go for antenatal visits compared to women from the northern part of the country. About 58% of women from South West are more likely to attend antenatal care provided by a doctor compared to 26% and 31% in the North East and North West respectively. Table 2.1 also shows that 54.7% of women in the North East and 52.4% of women in the North West did not attend antenatal care at all, while only 19.6% and 7.7% did not attend antenatal care in the South East and South West, respectively.

Table 2.1 also shows antenatal care utilisation by educational status, 60.6% women with higher than secondary education are more likely to receive antenatal care compared to 27.5% of women with no education. In addition, 47.9% of women with no education are not likely to receive antenatal care compared to 2.6 percent of women with more than secondary education. As the mothers' level of education increases, the likelihood of receiving antenatal care also increases. This may be so because educated women know the importance of antenatal care to their overall health, education is also associated with higher income and affordability of services.

Table 2.2 shows the antenatal care use by percentage distribution of live births in 1999 survey.

Table 2.2: Antenatal Care Use by Percentage Distribution of Births Five Years Preceding the 1999 Survey

Characteristics	Doctor	N/W	TBA	none	No of births
RESIDENCE					
Urban	**40.1**	43.4	3	**10.3**	**984**
Rural	**18.8**	37.1	4.2	**37.2**	**2,563**
REGION					
North Central	**21.1**	55.1	1.4	**20.2**	**788**
North East	**4.5**	21.4	4	**54.1**	**629**
North West	**6.9**	42.5	4.6	**65.1**	**649**
South East	**39**	38.3	8.3	**7.7**	**777**
south West	**50.9**	55.1	4.6	**3.5**	**704**
MOTHERS EDUCATION					
No education	**7.9**	30.7	3.6	**54.4**	**1,714**
Primary	**29.7**	51.9	5.4	**10.6**	**868**
Secondary	**47.3**	43.9	3.3	**3.4**	**827**
More than secondary	**66.5**	27.7	0.6	**0.8**	**138**

Key: (a) Nurse/Midwife (N/W) Auxiliary Midwife/Assistant (AM/A), (c) Village health worker (VHW), (d) Trained traditional birth attendant (TTBA), (e) Traditional birth attendant (TBA).
Source: Extracted from NDHS report 1999

The disparity in utilisation between the rural and urban women, region and education of women follows a similar dimension compared to the 1990 survey. Women in urban areas are more likely to use antenatal care compared to those in rural areas. About 10.3% of women in the urban areas do not use antenatal care at all, while 37.2% of rural women do not visit any of the health workers for antenatal care. In terms of region, the disparity in utilization increases as 4.5% and 6.9% of women in the North East and North West compared to 39% and 50.9% of births to women in the South East and South West, respectively received antenatal care. More women from North East and North West visit the nurses and midwives for antenatal care based on 1999 survey compared to 1990. About 65.1% and 54.1% of women in the North West and North East do not attend antenatal care compared to 7.7% and 3.5% of women in the South East and South West, respectively. Differences in utilisation are also observed among the educated and non-educated women as 66.5% of women with higher education are more likely to attend antenatal care provided by a doctor compared to 7.9% of women with no education. In addition, 54.4% of women with no education are not likely to attend antenatal care compared to 0.8 % of women with higher education.

Comparing the 1990 and the 1999 survey in terms of residence, there is a reduction in percentage number of women who do not attend antenatal care from 11.1 to 10.3% in the urban areas and 41.1% to 37.2% in the rural areas. This may be due to increased awareness of the importance of antenatal care. However, the number of women that do not attend antenatal care in the northern part of the country and women with little or no education increased between these periods.

Table 2.3 shows the percentage distribution of women and the level of antenatal care utilisation based on the 2003 survey by antenatal care provider.

Table 2.3 Antenatal Care Use by Percentage Distribution of Births Five Years Preceding the 2003 Survey

Socio economic characteristics	Doctor	NW/AW	CHEW	TBA	none	No of births
RESIDENCE						
Urban	**38.5**	**44.2**	0.3	1.5	**15**	**1,144**
Rural	**14.2**	**33.6**	2.8	2.9	**46**	**2,766**
REGION						
North Central	**23.8**	**50**	0.5	0	**25.3**	**575**
North East	**10.9**	**36.4**	5.3	0.2	**47.1**	**862**
North West	**5.4**	**31.5**	1.9	1.6	**59**	**1,341**
South East	**50.8**	**45.4**	0.2	0.9	**0.8**	**222**
south West	**56**	**35.9**	0.8	5	**2.3**	**544**
South South	**38.8**	**33.3**	0.7	10	**16.8**	**367**
MOTHERS EDUCATION						
No education	**8.2**	**27.7**	2.8	1.2	**59.6**	**1,989**
Primary	**22.3**	**49.7**	1.9	5.4	**20.3**	**918**
Secondary	**42.3**	**45.2**	1.1	2.9	**8.1**	**862**
More than secondary	**70.2**	**27.9**	0	0	**1.7**	**143**
WEALTH QUINTILE						
Lowest	**7.6**	**26.4**	3.2	2.9	**59.7**	**852**
Second	**9.2**	**28.1**	2.1	2.2	**58.1**	**846**
Middle	**15.4**	**41.1**	3.3	2	**37.2**	**808**
Fourth	**25.5**	**51.6**	1.1	3.6	**18**	**735**
Highest	**56.5**	**39.3**	0.4	1.8	**1.8**	**670**

Source: Extracted from NDHS report 2003

The table shows that there are socioeconomic differences in antenatal care use in terms of residence, region, education and wealth. In terms of residence, pregnant women residing in the urban areas are more likely to go for antenatal care than women residing in the rural areas. This assertion is buttressed by the fact that 15% of women in the urban areas do not attend antenatal care at all, compared to 46% of women in the urban areas. It is striking that rural women are three times less likely to receive antenatal care when compared with the urban women. This disparity may be because hospitals and health facilities are concentrated in the urban than the rural areas.

In terms of region, women from the southern part of the country are more likely to attend antenatal care compared to women from the northern part of the country. Women from the North Central are more likely to attend antenatal care than women from other parts of the north (North East and North West), but less likely to attend antenatal care than women from the Southern part of the country. Table 2.3 shows that about 47.1 % and 59% of women do not attend antenatal care at all in the North East and the North West respectively as compared to 0.8, 2.3 and 16.8 in the South East, South West and South South regions, respective. The disparity in utilisation between the north and south in terms of antenatal care use by women is quite high. Nonetheless, the number of women that do not attend antenatal care in the north and in the south based on 2003 survey declined by about 5 to 10% compared to the 1999 survey.

The 2003 survey also shows that women with higher education attended antenatal care (70%) compared to women with no education (8.2%), the gap is quite disturbing. Looking at the likelihood of a woman not attending antenatal care, 59.6% of women with no education did not attend antenatal care at all compared to 1.7% of women with higher education as indicated by 2003 survey. This difference in terms of ratio of women that do not attend antenatal care from one level of education is quite wide. For instance, given the information in Table 2.3, the gap ranges from 8% to over 30% for women with higher education and women with no education.

Table 2.3 also shows that six in ten women in households in the lowest quintile did not receive antenatal care from a health professional. About 59.7% and 58.1% of women in the two lowest quintiles did not attend antenatal care at all, compared to 1.8% in the higher wealth quintile; this implies that only 2 in 100 women in the highest wealth quintile did not attend antenatal care. Antenatal care utilisation in 2003 depended on affordability. The more income a woman has, the higher the tendency of

attending antenatal care. The level of utilisation of antenatal care is therefore determined by a woman's economic empowerment or whether or not she lives in urban area.

Table 2.4 also shows the percentage distribution of women who had live births in five years preceding the 2008 survey by social economic characteristics.

Table 2.4 Antenatal care use by percentage distribution of births five years preceding the 2008 survey

Socioeconomic characteristics	Doctor	N/W	A N/W	CH W	TBA	none	No of women
RESIDENCE							
Urban	**41.8**	37	5.1	1.1	2.2	**11.8**	**5,330**
Rural	**14.7**	26.9	4.8	2.6	3.4	**46.9**	**12,305**
REGION							
North Central	**23**	34.4	7.6	3.8	4.3	**26.2**	**2,525**
North East	**4.1**	32.4	6.5	5.1	0.4	**51.2**	**2,751**
North West	**6.6**	22.1	2.4	0.7	0.3	**67.1**	**5,372**
South East	**38.9**	36.2	11.9	2	3.1	**7.4**	**1,603**
south West	**51.7**	32.5	2.8	1.1	4.6	**5.7**	**2,310**
South South	**33.4**	32.8	3.6	1.8	9.1	**18.8**	**3,075**
MOTHERS EDUCATION							
No education	**7**	20.5	3.3	2.3	2.4	**63.7**	**8,017**
Primary	**22.2**	39.8	7	2.9	4.3	**23.1**	**4,012**
Secondary	**41**	38.9	6.1	1.6	3.7	**7.9**	**4,557**
More than secondary	**67.9**	25.7	3.7	0.4	0.5	**1.2**	**1,050**
WEALTH QUINTILE							
Lowest	**4.9**	15.5	3.1	2.7	2.2	**71**	**4,074**
Second	**9.9**	25.9	3.9	3.1	3.8	**52.7**	**3,916**
Midle	**17.7**	39.1	7.1	2.8	4.5	**27.9**	**3,350**
Fourth	**32.2**	43	6.7	1.2	2.7	**13.1**	**3,204**
Highest	**59**	30.8	4.1	0.4	2	**2.9**	**3,091**

Source: Extracted from NDHS report 2008.

The survey indicates similar social economic disparity in the use of antenatal care by women to other earlier surveys described in Tables 2.1 to 2.3. In fact, the table shows a greater disparity compared to Table 2.3. This implies that the challenges that prompted the differences in the use of antenatal care have not been resolved. Table 2.4 shows that women from urban areas are about four times more likely to use antenatal care compared to the women from rural areas. This is typical of the situation described in Tables 2.1 to 2.3. In terms of regional differences, women from the south are more likely to use antenatal care compared to women from the north. About 51.2% and 67.1% of women from the North East and North West respectively, do not use antenatal care at all compared to 7.4% and 5.7% of women in South East and the South West respectively. In terms of educational factor, the same pattern of disparity follows, as 63.7% of women with no education compared to 1.2% of women with higher education do not use antenatal care. In terms of income, 71% of women from the lowest wealth quintile compared to 2.9% of women from household with the highest quintile do not use antenatal care.

Table 2.5 also shows socioeconomic differences in antenatal care utilisation for the 2013 NDHS

Table 2.5 Antenatal Care Use by Percentage Distribution of Births Five Years Preceding the 2013 Survey

Socioeconomic characteristics	Doctor	N/W	A N/W	CHW	TBA	None	No of women
RESIDENCE							
Urban	**44.4**	38.8	2.8	1.0	1.0	**10.6**	**7,278**
Rural	**14.7**	29.0	2.8	4.7	4.7	**46.7**	**13,189**
REGION							
North Central	**32.0**	33.5	1.5	5.1	5.1	**26.0**	**2,890**
North East	**9.7**	32.9	6.7	8.5	8.5	**40.8**	**3,434**
North West	**9.5**	30.2	1.3	2.5	2.5	**55.4**	**7,445**
South East	**39.7**	46.6	4.3	1.3	1.3	**4.2**	**1,719**
south West	**60.8**	26.5	3.1	0.7	0.7	**5.7**	**2,002**
South South	**35.5**	36.0	1.5	1.7	1.7	**20.6**	**2,977**
MOTHERS EDUCATION							
No education	**8.1**	25.5	2.7	4.5	4.5	**57.7**	**9,794**
Primary	**27.2**	41.0	3.4	4.3	4.3	**20.5**	**3,915**
Secondary	**43.8**	40.8	2.9	1.4	1.4	**8.4**	**5,475**
More than secondary	**71.4**	25.0	0.9	0.7	0.7	**1.1**	**1,283**
WEALTH QUINTILE							
Lowest	**4.4**	18.1	2.1	4.6	4.6	**69.4**	**4,699**
Second	**10.9**	30.1	3.8	5.4	5.4	**47.8**	**4,588**
Midle	**23.7**	40.8	3.3	3.9	3.9	**25.3**	**3,902**
Fourth	**36.0**	46.5	2.7	1.8	1.8	**10.3**	**3,674**
Highest	**61.5**	31.1	1.9	0.5	0.5	**3.1**	**3,604**

Source: Extracted from NDHS report 2013.

The table shows that rural women, women from the northern part of the country, women with no education and women from the lowest wealth quintile utilise less of antenatal care administered by the skilled health professionals (the doctors and nurses/midwives). The 2013 results show the same pattern of socioeconomic disparity. Given the information in tables 2.1 to 2.5, it is evident that socioeconomic characteristics are major factors that determine the use of antenatal care as presented by the 1990 to 2013 NDHS report.

2.1.2 Skilled delivery

Skilled delivery is an important aspect of maternal health care for pregnant women. Delivery is potentially a risky process in childbirth. Most maternal mortality occurs during delivery. The place of delivery and type of assistance during delivery are important components of reproductive health, which is crucial for safe motherhood (National Population Commission, 1999). The level of assistance received by a woman during delivery can reduce maternal and child deaths as well as related complications. Maternal complications may arise during delivery because of trauma sustained during labour, disorders of the circulatory system or psychological disorder. The presence of a trained assistant during delivery is important (National Population Commission, 2003). The skills and performance of the person providing assistance during delivery determine whether complications are managed and hygienic practices observed (National Population Commission, 2003).

Table 2.6 shows the percentage number of births delivered by the various assistances during delivery by 1990 survey.

Table 2.6 Assistance during delivery by percentage distribution of live births preceding the 1990 survey

Socioeconomic characteristics	Doctor	T N/W	A M/W	VHW	TTBA	TBA	none	No of births
RESIDENCE								
Urban	21.3	38.1	1.2	0.2	2.6	9.6	21.6	1,714
Rural	7.4	15.8	1.3	1.2	3.8	21.8	43.1	6,399
REGION								
North East	7.2	3.7	0.1	0.3	2.9	23.4	56.1	1,924
North West	5	0.2	0.1	2.2	21	2.6	63.5	2,242
South East	10.5	35.1	1.9	2.5	5.8	21.1	15.9	2,242
south West	21.7	41.4	3.3	0.7	2.7	8.3	15.7	1,525
MOTHERS EDUCATION								
No education	6.2	9.4	0.7	1	3.4	21.8	51.4	5,091
Primary	14.2	34.4	2.4	1.1	4.1	17.6	21.2	1,212
Secondary	21.6	3.1	0.5	3.4	9.4	4.8	9.3	459
More than secondary	21.6	47.4	3.1	0.5	3.4	9.4	9.3	521

Source: Extracted from NDHS report 1990

The table show that babies in Nigeria are delivered by doctors, trained nurses/midwife, auxiliary midwives/assistants, village health workers, trained traditional birth attendant s, community health extension workers as well as relatives. Other pregnant women deliver with no assistance during delivery. Table 2.6 shows that skilled delivery in Nigeria is majorly undertaken by doctors and trained midwives. In instances where there are no doctors, other delivery assistants are employed in delivery services. The assistance during delivery as described in Table 2.6 has socioeconomic dimension. About 21.3% women in the urban areas are likely to visit doctors during delivery and 38.1% are likely to visit midwives during delivery in urban areas. In rural areas, only 7.4% visit doctors and 15.8% visit nurses and trained midwives. The table also shows that a large percentage of women are not assisted by any of the delivery assistants during delivery. Table 2.6 shows that 43.1% of women in the rural areas are not assisted by skilled delivery assistant. This is quite high compared to "no delivery assistant" in the urban area of about 21.6% of women.

On the regional basis, women from the southern part of the country deliver through skilled delivery assistants compared to women in the north. In the South West about 21.7% of women are assisted by doctors and 41.4% by trained nurses and midwives. 10.5% are assisted in the south east by doctors and 35.1% are assisted by nurses. The opposite is the case in the northern part of the country as very low percentage of women are assisted by either doctors and nurses. In the North West only 5% and 0.2% are assisted by doctors and nurses respectively, 7.2% and 3.7% are

assisted by doctors and nurses in the North East. About 56.1% of women in the North East are not assisted by any of the skilled assistants, just as 63.5% of women in the North West are not assisted by any of the skilled delivery assistants. About 15.9% and 15.7 are not assisted by any of the skilled delivery assistants in the South East and South West respectively. Overall, more than half of babies in the North East and North West are delivered without assistance, while only 16% of babies in the South East and South West are delivered without assistance. The disparity in terms of delivery assistants is quite alarming, as this will affect the maternal and child health outcome.

Differences in skilled delivery assistance also has educational dimension. Women with no education are rarely assisted by skilled delivery assistance compared to women with higher education. Only 6.2% and 9.4% of uneducated women are assisted by doctors and midwives respectively compared to 21.6% and 47.4% of women with higher education who are assisted by doctors and trained nurses or midwives. About 51.4% of women with no education compared to just 9.3.7% of women with higher education are not assisted by any of the skilled delivery assistants. This implies that the higher the education a woman attains, the greater is the likelihood that she is assisted by skilled delivery assistants. However, women from rural areas, those from the north and those with no education are likely to give birth without skilled assistance. These features categorise women who are at greater risk of dying due to complications occurring during pregnancy and delivery.

Table 2.7 shows the percentage of women by socioeconomic feature that delivered by the various delivery assistants in 1999

Table 2.7 Assistance During Delivery by Percentage Distribution of live Births Preceding the 1999 survey

Socioeconomic characteristics	Doctor	N/W	TBA	Rel/other	none	No of births
RESIDENCE						
Urban	**14**	**43.9**	15.5	14.2	**9.6**	**984**
Rural	**5.5**	**29.8**	22.7	27.3	**12.1**	**2,563**
REGION						
North Central	**8.1**	**38.9**	9	38.1	**4.1**	**788**
North East	**1.3**	**11.4**	29	31.6	**23.2**	**629**
North West	**1.6**	**6.5**	38.7	25.5	**2.3**	**629**
South East	**9.9**	**55.4**	18.1	12.5	**2.3**	**649**
south West	**17.7**	**55.5**	10.5	2.4	**3.2**	**777**
MOTHERS EDUCATION						
No education	**2.1**	**12.8**	29.6	33.3	**19.1**	**1,714**
Primary	**8.4**	**47.3**	14.8	20.8	**6.3**	**868**
Secondary	**15**	**59.2**	11.1	9.8	**2.7**	**827**
More than secondary	**33.4**	**54.7**	4.4	5.2	**0.8**	**138**

Source: Extracted from NDHS report 1999

Table 2.7 shows a similar pattern of utilisation of skilled delivery with table 2.5. However, table 2.7 shows that most of the skilled birth delivery in 1999 was administered by nurses and midwives. It is possible that many of the women could not afford doctor's delivery fees. Nevertheless, it is a standard practice in Nigeria for normal deliveries to be performed by nurses and midwives rather than doctors. In comparing the 1990 survey, the number of women that delivered without skilled assistance reduced to about 20 to 25%, based on socioeconomic status. Though socioeconomic differentials still exist in skilled delivery utilisation, nurses or midwives assists higher percentage of women. For instance, only 12.1% of births in the rural areas are delivered with no skilled delivery assistantce compared to 21.8% in the 1990 survey. Births to women in the North East and the North West without delivery assistance is about 23.2% and 25.5% compared to 56.1% and 63.5% by 1990 survey. Women with no education who gave births without skilled delivery assistant also declined from 51.4% to 19.1%. Reduction in the percentage of women delivered with no skilled delivery may be due to an improvement in the health system; it may also be that women are aware of the importance of visiting skilled delivery assistants for delivery. However, Table 2.7 shows that many babies are delivered by relatives at home. Deliveries by women from the rural areas are mostly assisted by relatives compared to delivery from the urban areas. Deliveries by women from the North West, North East and North Central are more assisted by relatives compared to deliveries to in the south. This poses a great danger to the health of the women and their babies.

Tables 2.8 and 2.9 show the percentage distribution of live birth in 2003 and 2008 survey, the tables show socioeconomic disparity in the utilization of skilled delivery.

Table 2.8 Assistance During Delivery by Percentage Distribution of Live Births Preceding the 2003 Survey

Socioeconomic characteristics	Doctor	NW/AW	CHEW	TBA	Rel/other	None	No of births
RESIDENCE							
urban	14.1	44.4	0.3	11.6	17.9	10.6	1,795
rural	3.5	22.2	1.4	23.9	28.7	19.4	4,424
REGION							
North Central	9.6	39	1.5	6.1	34.7	9	897
North East	2.4	17.4	2.2	25.4	31.7	19.8	1,472
North West	0.8	11.5	0.7	24.3	31	30.5	2,161
South East	20.2	67.3	0.2	3.0	6.2	0.4	371
south West	23.9	57	0.7	9	8.4	0.9	789
South South	8.6	47	0.2	32.2	9.8	1.8	529
MOTHERS EDUCATION							
No education	2	10.7	1.2	26.3	32.1	26.8	3,224
Primary	5.3	38.6	1.1	19.6	24.3	10.2	1,465
Secondary	13.8	57.9	0.9	9.8	13.9	2.9	1,316
Higher	38.9	50	0	2.2	8.3	0.4	215
WEALTH QUINTILE							
Lowest	1.8	9.8	1.4	31.6	34.3	20.3	1,394
Second	1.5	16.2	1.3	25.4	31.1	23.3	1,379
Middle	3.8	22.5	1.3	21.7	29.5	20.6	1,255
Fourth	6.6	43.6	1	13.2	20.5	13.2	1,157
Highest	3	61.2	0.2	4.3	7.5	3.5	1,033

Source: Extracted from NDHS report 2003.

Table 2.9 Assistance During Delivery by Percentage Distribution of Live Births Preceding the 2008 Survey

Socioeconomic characteristics	Doctor	N/W	AN/W	TBA	Rela/ other	none	No of births
RESIDENCE							
urban	20.3	39.5	5.6	13.1	11.2	9	8,359
rural	4.4	19.3	4.1	25.2	22	23.7	19,741
REGION							
North Central	9.9	26.7	6.1	9.5	36.1	10.2	3,830
North East	1.4	11.7	2.4	33.6	31	18.6	4,575
North West	2.3	6.6	0.9	25.9	18.5	43.8	8,779
South East	12.2	53.2	16.5	8.4	5.5	3	2,730
south West	25	46.5	5	10.2	9.3	3.3	4,519
South South	12.3	38.5	5	10.2	7.6	3.1	3,667
MOTHERS EDUCATION							
No education	2	7.8	1.8	27.9	24.8	34	13,071
Primary	7.7	30.6	6	22.6	21.3	10.9	6,21
Secondary	17.1	48.3	8	12.9	8.8	3.6	6,997
Higher	40	47.2	6.8	2.8	1.8	1.2	1,511
WEALTH QUINTILE							
Lowest	1.1	5.8	1.4	26.2	29.7	34.5	6,525
Second	2.8	12.4	2.4	28.8	24.1	27.8	6,395
Middle	4.4	26.8	6.4	26.5	18.3	15.9	5,417
Fourth	10.7	44.7	7.7	15.9	11.8	7.9	5,003
Highest	32	47.3	6.4	6	4.5	2.9	4,760

Source: Extracted from NDHS report 2008

The pattern of disparity is similar to that in 1990 and 1999 survey. Tables 2.8 and 2.9 indicate that women from rural areas, women from the north and women with no education are likely not to utilise skilled delivery assistants compared to women from urban areas, the south, and women with higher education. Generally, doctors compared to nurses and midwives deliver fewer babies. Delivery in the rural areas, the north and delivery of babies by women with the low household wealth is carried out by their relatives compared to women from the south, urban areas as well as women with high household wealth.

In Table 2.8, 14.1% of women from the urban areas are assisted by doctors during delivery while only 3.5% of women are assisted by doctors during delivery in the rural areas. 44.4% of babies in the urban areas are delivered by nurses and midwives, while 22.2% and 20.3% of births are delivered by nurses and midwives in the rural areas. Table 2.9 shows that 20.3% of women are assisted by doctors during delivery in the urban areas and 4.4% are assisted by doctors in the rural areas. 39.5% of women in the urban areas are assisted by nurses and midwives while only 19.3% of women are assisted nurses and midwives during delivery. From Tables 2.8 and 2.9, deliveries administered by doctors increased by about 6% in the urban areas while deliveries by doctors in the rural areas increased by less than 1%. Delivery assistance by nurses however declined from 44.4% in 2003 to 39.5% for the urban women and 22.2% to 19.3% for the rural women. Skilled delivery by region improved, but the improvement is not significant. This is because regional disparity remains as women from the north are not likely to utilise skilled delivery compared to women from the south. Comparing the two surveys in terms of education, a great differential still exists

in utilisation of skilled delivery among women with education and those without education. It is also observed that more women with no education are not assisted by skilled delivery assistants during delivery in 2008 compared to 2003 although delivery assistance to women with higher education also declined from 1.2 to 0.4% in 2003.

Disparity in skilled delivery utilisation by household wealth also takes a similar dimension in 2008. About 1.8% and 1.5% of delivery of babies in the two lowest wealth quintiles were administered by doctors in 2003 as well as 1.1% and 5.8% in 2008, while delivery assistance administered by doctors for women with the highest wealth quintile was about 23.1% in 2003 and 32% in 2008. Compared to 2003 the disparity worsened in 2008 as skilled deliveries by doctors for women within the lowest wealth quintile reduced from 1.8% to 1.1% while deliveries by doctors to women from the highest wealth quintile increased from 23.1% to 32% in 2008. About 20.3% and 23.3% of deliveries within the two lowest wealth quintiles are not administered by the skilled births attendants, while only 3.5% of deliveries of women within the highest wealth quintile are not administered by skilled delivery attendants. The information in the table shows that disparity in terms of household wealth is far more than disparity in other factors.

Table 2.10 shows the socioeconomic differential in skilled delivery utilisation for the 2013 NDHS survey.

Table 2.10 Assistance During Delivery by Percentage Distribution of Live Births Preceding 2013 the Survey

Socioeconomic characteristics	Doctor	N/W	A N/MW	CHEW	TBA	Rel/Other	None
RESIDENCE							
Urban	19.0	43.4	4.6	1.2	11.8	12.5	6.5
Rural	5.5	15.2	2.0	2.9	27.5	28.2	17.0
REGION							
North Central	12.4	32.2	1.9	6.0	3.6	35.4	6.5
North East	3.3	14.3	2.3	3.9	26.0	39.0	9.7
North West	3.5	8.5	0.3	0.8	34.0	23.6	27.8
South East	13.7	60.0	8.5	2.1	7.4	5.1	1.5
south West	30.4	37.6	7.2	1.2	7.4	9.6	1.8
South South	13.7	44.9	4.0	2.0	29.7	7.1	1.3
MOTHERS EDUCATION							
No education	2.5	8.3	0.9	2.3	31.7	30.9	21.7
Primary	9.6	30.0	4.7	3.2	18.4	23.1	9.6
Secondary	18.9	47.2	5.6	2.0	10.8	11.3	3.1
More than secondary	39.7	51.7	1.8	0.8	2.2	2.8	0.4
WEALTH QUINTILE							
Lowest	1.4	3.8	0.5	1.7	33.4	32.3	25.5
Second	3.7	11.6	2.0	3.2	29.5	30.7	17.8
Middle	8.3	28.1	3.5	3.5	20.0	24.3	10.8
Fourth	12.5	44.3	5.2	2.2	14.6	14.5	5.1
Highest	31.4	49.6	4.3	0.9	5.7	5.4	1.8

Source: Extracted from NDHS report 2013.

The socioeconomic differential expressed in the table is similar to that of other surveys. Women from the urban areas are more likely to deliver their babies through assistance of doctors and nurses than women from the rural areas. The differential in utilisation also follows regional, educational as well as wealth dimensions. Details on the socioeconomic differentials are represented in Table 2.10.

2.2 Child health care utilization.
In this section, child health care services that are analysed in this study are discussed in details. The child health care services that is discussed in this section include immunisation and bed nets utilisation.

2.2.1 Immunisation

Immunisation is a basic health care service for children. Immunisation safeguards the new born children from being infected with various child hood diseases that threatens life. Such diseases include measles, tuberculosis, diphtheria, pertussis (whooping cough), tetanus, poliomyelitis (polio) and other related diseases (National Population Commission, 1999). BCG and polio vaccine should be given at birth, DPT and polio vaccine should be given at approximately 6, 10 and 14 weeks of age of a child. Measles vaccine should be given at or soon after the child reaches nine months of age, (National Population Commission,1990). Measles vaccine should be given at or soon after birth.

Childhood immunisation remains an important strategy for the reduction of morbidity and mortality as high immunization rate is associated with low level of diseases among children and even adults in the society. Immunization safeguard the new born from being infected with diseases. To be considered fully immunized by

world health organization (WHO) standard, a child should receive Basillus Calmette Guerin (BCG), measles, and three doses of Diphtheria Tetanus Pertussis(DPT) for the protection against measles, polio, diphtheria, pertussis, and tetanus, (National Population Commission report, 1990, 1999, 2003). The WHO recommends that children should receive the complete vaccination by 12 months of age, which is recorded on the health card given to their parents (National Population Commission, 1999).

Table 2.11 shows the percentage of children between 12 and 23 months who had received specific vaccines in 1990.

Table 2.11 Percentage of Children 12-23 Months Who Had Received Specific Vaccines by 1990 Survey

Socioeconomic characteristics	BCG	DPT			POLIO			M	None	A	N
		1	2	3	1	2	3				
RESIDENCE											
Urban	**81.3**	80.8	74.5	58.9	81.6	74.8	59.1	**68.8**	**16.3**	**52.5**	295
Rural	**55.1**	53.4	39.2	26.4	53.7	39.5	26.4	**39.8**	**42.4**	**23.3**	1,086
REGION											
North East	**41.2**	40.8	32.1	17.3	42.6	32.7	17.3	**31.6**	**54.5**	**15.9**	359
North West	**52.6**	51.7	35.1	18.7	51.7	35.1	18.7	**39.7**	**45.4**	**17.7**	373
South East	**73**	70.2	58.8	50.4	70.2	59	50.4	**53.9**	**25.6**	**43.3**	408
South West	**81.6**	79.8	66.5	51	79.8	66.5	51.3	**64**	**15.9**	**45.3**	240
MOTHERS EDUCATION											
No education	**46.2**	44.8	32.6	19.1	45.3	32.7	19.1	**33.8**	**19.3**	**16.6**	845
Primary	**81.2**	79.9	62.7	39.3	80.7	63.4	49	**62.7**	**18.1**	**43.5**	198
Secondary	**88.2**	86.6	17	49	86.6	71	61.4	**67.4**	**6**	**55.1**	89
more than secondary	**94.8**	94.4	93.7	83.4	94.4	93.7	84.1	**85.9**	**5.2**	**80.3**	111

KEY: (a) Measles (M), (b) All immunisation (A), (c) Number of children (N)
Source: extracted from NDHS report 1990

The table shows that majority of children received vaccination before the 1990 survey. However, there is a great disparity in the rate of children immunisation. About 81.3% of children in the urban areas are immunised with BCG while 55.1% are immunised with BCG in the rural areas. For all the categories of vaccination there exists a disparity in utilisation between the urban and the rural areas as children from the urban areas are twice more likely to be immunised than those in the rural areas. In terms of region, children from the South West are twice more likely to be immunised compared to those from the North East and the North West, respectively. More than half (54.5%) of children from North East are not immunised according to 1990 survey, While only 15.9% of children from the Southwest are not immunised.

The likelihood of children being immunised also follows educational status of mothers as children whose mothers have education beyond secondary school are more likely to be immunised compared to those whose mothers have no education. The disparity is so wide that only 5.2% of children whose mothers have higher education are not immunised and 19.3% of all the children whose mothers are not educated are not likely to be immunised. Therefore, there exists a strong association between education, region and area of residence with the rate of immunisation of children in Nigeria. This is buttressed by the percentage of children that had access to all immunisation; about 52.5% of children from the urban areas have the likelihood of receiving all immunisations compared to 23.3% of children from the rural areas that received all sets of immunisation.

Table 2.12 shows that, disparity in utilisation of immunisation still exists given the 1999 survey.

Table 2.12: Percentage of Children 12-23 Months Who Had Received Specific Vaccines by 1999 Survey

Socioeconomic characteristics	BCG	DPT 1	DPT 2	DPT 3	POLIO 0	1	2	3	M	A	None	N
RESIDENCE												
urban	75	70	60.1	45	41.7	76	65	42	61.5	**31.7**	**19.6**	310
rural	66.1	39	31.7	20	20.5	50	37	19	32.8	**11.3**	**45**	850
REGION												
North East	26	27	19.6	12	9.7	36	24	11	19.7	**7.5**	**60.9**	241
North West	21.6	20	16.2	9	8	30	20	10	19.9	**4.3**	**67.3**	245
South East	73.3	67	59.7	41	29.5	78	63	37	54.3	**24.9**	**17.6**	194
South West	83.7	72	61.3	41	49.7	78	69	41	64.8	**28.6**	**13.8**	256
North Central	67.9	55	42.9	31	33.8	65	49	26	45.3	**19.6**	**27.7**	224
MOTHERS EDUCATION												
No education	29.9	24	18.2	11	12.8	36	23	11	20.7	**6.3**	**59.8**	581
Primary	67.7	60	49.3	32	33.8	67	56	30	49.5	**18.1**	**23.7**	285
Secondary	86.8	81	69.5	48	44.2	87	74	45	67.5	**33.0**	**9.8**	249
more than secondary	90.8	83	80.5	61	50.5	90	85	66	87.2	**52.9**	**9.2**	46

Source: extracted from NDHS report 1999

The table shows a similar level of disparity in utilisation of immunisation among children. Children from the urban areas are almost three times more likely to be fully vaccinated than children in the rural areas. This difference may be because women from the urban areas are more aware of the importance of immunisation of their children. It may also be that children from the urban areas have access to vaccination/immunisation compared to children from the rural areas.

Disparity in children being immunised also follows regional as well as educational dimension. Children from the southern part are more likely to be fully immunised just as children from educated mothers are more likely to be fully immunised than children from the North and children from the non educated. From observation, Tables 2.11 and table 2.12 show that the number of children that are not likely to be immunised increased given the 1990 and the 1999 survey this however may be due to deterioration in the supply of health facilities related to children immunisation. The number of children that received full immunisation by 1990 survey decreased given the statistics for the 1999 survey. Only 31.7% of children from the urban areas in 1990 received full immunisation compared to the 52.5% given by 1990 survey. The number of children that received full immunisation in the rural areas also decreased from 23.3% to 11.3%.

Regionally, the number of children in the North West and North East that received full vaccination were just 7.5% and 4.3% by 1999 survey compared to 15.9% and 17.7% respectively in 1990. Also in terms of educational status of women, only 6.3% of women with no education compared to 52.9% of women with higher education received all category of immunisation by 1999 survey compared to 16.6% and 80.3% of children of mother with no education and mothers with higher education given the statistics for 1990 survey. Given this information, it is obvious that there is deterioration in the level of immunisation utilisation based on 1990 and 1999 survey.

Table 2.13 shows the percentage of children, 12 to 23 months who received specific vaccines prior for the 2003 survey.

Table 2.13: Percentage of Children 12-23 Months Who Had Received Specific Vaccines by 2003 Survey

Socioeconomic characteristics	BCG	DPT 1	DPT 2	DPT 3	POLIO 0	POLIO 1	POLIO 2	POLIO 3	M	A	None
RESIDENCE											
urban	**70**	64	51.3	40	40	75	64.4	42	52.1	**25.1**	**17**
rural	**38**	33	22.9	13	22	64	46.4	23.7	28.5	**7.4**	**31**
REGION											
North Central	**63**	54	33	24	36	70	52.6	36.8	44.6	**12.4**	**21**
North East	**31**	24	14	9.1	19	62	41.7	24.8	22.5	**6.0**	**31**
North West	**28**	21	13.5	5.8	12	54	39.9	16.4	15.6	**3.7**	**41**
South East	**83**	83	66.3	59	40	81	16.4	57.4	64.1	**44.6**	**15**
South West	**85**	84	80.2	68	65	93	40	44.8	73.1	**20.8**	**5.1**
MOTHERS EDUCATION											
No education	**23**	19	9.8	5.6	13	55	38.9	18.7	15.5	**3.8**	**41**
Primary	**58**	49	37.6	21	27	78	58.5	34.2	64.1	**13.0**	**19**
Secondary	**84**	49	68.1	54	53	80	70.9	46.8	66.9	**32.4**	**8.4**
more than secondary	**97**	78	52.1	29	76	78	69.9	30.8	73.1	**11.3**	**2.4**
WEALTH QUINTILE											
Lowest	**23**	22	15.3	7.1	13	62	43.9	20	15.9	**3.4**	**36**
Second	**30**	27	17.5	7.7	17	62	41.3	23.6	22.9	**3.9**	**35**
Middle	**43**	34	20.8	13	19	61	47	25.1	32	**8.9**	**32**
Fourth	**60**	49	35.3	22	37	67	57.2	26.3	41.9	**11.0**	**23**
Highest	**91**	87	74.6	61	58	87	74.7	54.4	70.7	**39.9**	**4.3**

Source: extracted from NDHS report 2003

The table shows that similar trend in socioeconomic disparity in the likelihood of children being immunised exists over time. This disparity does not show any decrease as a greater percentage of children from the rural areas, children from the north and children of the non-educated are far less likely to receive immunisation compared to children from the urban areas, from the south and children of mothers with higher education. Table 2.13 also shows that disparity in terms of wealth quintiles is also very high as children with mothers in the lowest wealth quintile are less likely to be immunised.

Given the 1999 survey in Tables 2.12 and Table 2.13, the number of children without full immunisation decreased drastically, this may be due to increased awareness and a deliberate policy by the ministry of health to improve the number of children with full immunisation. It may also be that, the impact of the MDG in eradicating infants and under-five mortality have reduced the number of children without immunisation. In terms of children who received full immunisation, socioeconomic disparity was also observed in the 2003 survey, as children from the urban areas are likely to receive full immunization compared to children from the rural area. It is also evident that many children do not receive full immunization during this period. In fact a reduction is further observed in the percentage number of children that have received full immunisation in 2003 compared to 1999. The number of children that have received full immunisation in 1999 dropped from 31.7% in the urban areas and 11.3% in the rural areas to about 25.1% in the urban areas to 7.4% in the rural areas in 2003. This is also the case for disparity in children being immunised in terms of region, education and wealth quintile. The disparity in terms of wealth quintile in Table 2.13 is worse than the disparity in terms of other factors, as only 3.4% and 3.9% of children from the two lowest quintiles were likely to receive full immunisation.

Similarly, Tables 2.14 and 2.15 show the percentage of children 12 to 23 months who received specific vaccines at a time before the 2008 and 2013 surveys.

Table 2.14: Percentage of Children 12-23 Months Who had Received Specific Vaccines by 2008 survey

Socioeconomic characteristics	BCG	DPT 1	2	3	POLIO 0	1	2	3	M	A	None
RESIDENCE											
urban	71.4	71.3	64.5	55	57	78	68.4	52	59.1	38	**17.9**
rural	40.2	43.7	36.1	27	27	64	27.8	33	33	16	**33.3**
REGION											
North Central	62.4	63.9	54.5	43	43	73	59.9	41	51.8	26	**23.4**
North East	27.2	27.2	30.5	19	18	61	45.5	29	24.8	7.6	**33.3**
North West	19.1	19.1	23.9	17	11	49	38.5	24	19.5	6	**48.5**
South South	75.3	74.5	65.6	54	56	87	74.9	54	55.5	36	**10.2**
South West	80.3	81.7	77.8	67	63	83	76	53	65.5	43	**12.9**
MOTHERS EDUCATION											
No education	20.2	24.4	17.6	11	12	50	38.7	24	19	6.5	**47.2**
Primary	58.2	61	50.1	39	40	74	62.5	39	47.4	23	**21.5**
Secondary	83.6	83.1	76.4	66	66	89	78.9	57	65.7	41	**8**
Highest	87.7	87.5	83.5	76	75	88	81.6	75	74.9	53	**8.8**
WEALTH QUINTILE											
Lowest	18.2	22.6	14.9	8.2	11	51	39.2	22	17.3	4.8	**46.2**
Second	33.6	37.9	30.2	21	21	59	48.3	30	28.1	12	**37.6**
Middle	50.3	54.8	43.8	33	35	68	56.2	38	40.5	20	**28.2**
Fourth	73	72.7	64.7	53	53	81	69.1	49	57.9	33	**14.5**
Highest	87.7	87.5	83.5	76	75	88	81.6	63	74.9	53	**8.8**

Source: extracted from NDHS report 2008

Table 2.15: Percentage of children 12-23 months who had received specific vaccines by 2013 survey

Socioeconomic characteristics	BCG	DPT			POLIO				M	A	None	N
		1	2	3	0	1	2	3				
RESIDENCE												
Urban	76.3	73.8	69.8	62.2	70.0	83.3	77.9	58.2	61.9	42.5	**13.5**	2,113
Rural	37.1	37.6	32.0	24.9	33.9	72.7	65.5	51.0	31.0	15.8	**24.7**	3,787
REGION												
North Central	62.7	62.0	55.0	43.9	57.0	79.1	68.9	45.5	48.1	26.9	**17.3**	812
North East	35.1	34.7	28.4	20.6	27.7	51.5	44.4	34.8	26.8	14.2	**45.3**	1,023
North West	21.7	22.2	18.1	13.9	26.4	77.2	71.8	61.1	22.3	9.6	**20.8**	2,100
South East	90.4	88.9	86.7	80.7	82.9	90.6	87.2	62.3	72.2	51.7	**7.2**	550
South West	84.5	81.5	76.3	65.5	74.9	85.1	77.4	52.1	62.5	40.9	**10.3**	823
South South	84.7	84.5	79.1	69.8	65.8	88.6	82.3	77.4	74.0	52.0	**9.4**	591
MOTHERS EDUCATION												
No education	20.7	20.8	16.9	12.0	22.4	66.2	59.8	48.4	18.0	6.9	**31.8**	2,807
Primary	63.2	61.7	52.6	40.0	52.4	78.0	68.8	48.9	47.9	26.3	**16.2**	1,062
Secondary	84.3	83.4	78.1	69.9	74.1	88.5	82.6	61.7	68.2	46.6	**9.1**	1,608
More than secondary	96.9	95.3	94.4	87.1	91.1	95.7	91.8	69.0	88.2	64.1	**2.4**	423
WEALTH QUINTILE												
Lowest	14.0	14.2	10.9	7.0	15.4	61.2	54.8	45.0	13.2	3.6	**37.1**	1,350
Second	31.4	32.4	26.4	18.5	29.9	73.8	65.0	51.7	26.6	11.5	**23.6**	1,330
Middle	57.3	56.6	49.5	39.7	49.4	77.0	69.8	50.5	43.9	24.0	**19.9**	1,100
Fourth	75.8	74.0	68.5	60.0	66.9	83.5	78.2	56.4	60.6	39.3	**12.2**	1,060
Highest	92.3	90.0	45.6	79.5	85.3	91.9	87.4	67.4	77.9	57.7	**5.4**	1,060

KEY: (a) Measles (M), (b) All basic vaccination (A), (c) Number of children (N)
Source: extracted from NDHS report 2013

The tables also show that socioeconomic disparity exists in the utilisation of immunisation. The trend in disparity does not show any sign of diminishing in relation with the previous survey. The number of children that do not receive immunisation are more from the rural areas and from the North compared to those from urban areas and the South.

2.2.2 The use of bed nets

Malaria is one of the major causes of deaths in children in Sub-Saharan Africa particularly in Nigeria. It accounts for about 25% of the causes of under-five mortality. High risk of deaths associated to malaria is mostly attributed to under -five children. The use of insecticide-treated nets (ITN) is one of the most cost effective methods of malaria control and prevention. In some parts of Nigeria, ITN is distributed free especially to women and children. ITN is important in safeguarding the children from being infected with malaria.

Table 2.16 shows the percentage number of children who slept under a bed net the night before the survey by residence and by region in 2003.

Table 2.16: Use of mosquito nets by children, 2003 survey

Socioeconomic characteristics	Any net	ITN	Number of children
RESIDENCE			
Urban	**3.6**	**0.6**	1,787
Rural	**7**	**1.4**	4,074
REGION			
North Central	**8.9**	**2.7**	854
North East	**6.8**	**0.4**	1,349
North West	**5**	**1.7**	1,965
South East	**4.4**	**1.3**	365
South South	**8.6**	**0.5**	774
South West	**0**	**0**	554

Source: extracted from NDHS report 2003

The table shows that children from the rural areas slept under any net and ITNs compared to children from urban areas. By region, children from the north and children from the south-south are more likely to sleep under any mosquito net or ITN compared to children from the Southwest and Southeast. In fact no child in the Southwest slept under mosquito nets as of the time of the survey. The utilisation of ITN is more biased toward the north compared to the south with the exception of children from South South. The use of mosquito nets in the north and in the south-south region may be due to the fact that the distribution of mosquito nets may be biased towards these regions due to prevalence of mosquito and malaria parasites compared to other regions.

Table 2.17 shows the percentage of under-five children who slept under bed nets, treated and untreated before the 2008 survey.

Table 2.17: Use of mosquito nets by under-five children, 2008 survey

Socioeconomic characteristics	Any net	ITN	Number of children
RESIDENCE			
Urban	**10.5**	**6.5**	1,396
Rural	**12.6**	**5**	1,740
REGION			
North Central	**9.7**	**3.8**	314
North East	**12.8**	**3.6**	358
North West	**11.6**	**4.1**	661
South East	**14.3**	**10.5**	456
South South	**16.3**	**9.4**	598
South West	**8.8**	**5**	439
WEALTH QUINTILE			
Lowest	**10.8**	**2.5**	269
Second	**12.6**	**4.3**	468
Middle	**13.2**	**6.3**	607
Fourth	**11.8**	**7.1**	675
Highest	**11.4**	**8**	806

Key: insecticides treated nets (ITN)

Source: extracted from NDHS report 2008

The table shows that more children in the north are likely to use any mosquito net compared to children from the south. Children from the North Central region are also likely to use any mosquito net but are less likely to use ITN compared to children from the South West. However, the highest usage of any net and ITN is found in the South-South and South-East compared to other parts of the region. Similarly, rural children are more likely to use any type of mosquito net but less likely to use the ITN.

In terms of wealth quintiles, children from the middle wealth quintiles are more likely to utilise mosquito nets of any kind compared to children from the lowest and the highest wealth quintiles. In general, the utilisation of any kind of mosquito net is far more than the utilisation of ITN. This means that less of ITN is used compared to any other net as shown by the 2003 and 2008 survey. Table 2.18 shows the opposite of the 2003 and 2008 NDHS data. The 2013 survey shows that more treated bed nets are being utilised by under-five children compared to the untreated bed nets. Despite the change in utilisation pattern, there still exists socioeconomic differential in the same manner like other surveys. In conclusion, the use of bed nets is biased towards children from the rural areas and biased towards the north as well as the south-south and the south-east.

Table 2.18: Use of mosquito nets by under-five children, 2013 survey

Socioeconomic characteristics	Any net	ITN	Number of children
RESIDENCE			
Urban	**19.9**	**34.9**	5,699
Rural	**17.3**	**25.4**	11,965
REGION			
North Central	**18.9**	**29.3**	2,411
North East	**12.6**	**17.5**	3,609
North West	**16.6**	**26.1**	6,239
South East	**26.5**	**38.9**	1,701
south West	**21.2**	**37.6**	1,474
South South	**20.9**	**37.5**	2,229
WEALTH QUINTILE			
Lowest	**12.6**	**19.8**	4,146
Second	**19.5**	**28.4**	4,164
Middle	**21.9**	**33.0**	3,495
Fourth	**18.4**	**33.2**	2,783
Highest	**19.6**	**28.4**	17,664

Source: extracted from NDHS report 2008

2.3: Access issues in maternal and child health care in Nigeria

The problem of accessibility to health care has been a major constrain to utilisation of maternal and child health care in Nigeria. Access is also central to the performance of the overall health care system in Nigeria. One of the problems of access to maternal and child health care in Nigeria is geographical accessibility, as most women especially from very remote rural areas do not have medical facilities at their reach. Most women from rural areas will have to travel very long distances before they can access any health care facility. Geographical accessibility in rural areas is a major constrain to health care utilisation as many women resort to utilising any available traditional method. For delicate issues of maternal concern like pregnancy and child delivery, the attention of medical experts is needed to avert complications and to ensure sound health of the mother and child.

The problem of accessibility of maternal and child health care in Nigeria is also associated with women's ability to seek for care. Many women in Nigeria lack education and therefore lack the ability to know which health care is important for their wellbeing and that of their children. The problem of access to health care in Nigeria also has to do with the ability to pay for health care. Most households in Nigeria are poor. In most instances women do not have the economic power to seek for health care. The ability to pay is a major access issue in the utilisation of health care in Nigeria.

Table 2.19 shows some problems in accessing health care faced by women in Nigeria. The table shows the percentage number of women with age 15-49 who reported that they have serious problems in accessing health care given by the 2008 survey. The problems identified from the survey ranges from getting permission to go for treatment, getting money for treatment, distance to facilities, having to take transport, not wanting to go alone, concerned no female provider available, and concerned no drugs. These problems ranges from geographical accessibility, problem of ability to pay, problem of distance, personal perception, as well as problem of supply of health care facilities like drugs and other health care in the health system.

Table 2.19 shows that women in Nigeria are actually faced with one problem or the other in accessing health care.

Table 2.19 problems in accessing health care

Socioeconomic characteristics	GPT	GMT	DIS	TP	Comp	NFP	NP	ND	one p	No of women
RESIDENCE										
urban	9.8	**44.1**	**21.1**	18.9	10.4	14.1	26	32.4	**61.4**	11,934
rural	15.7	**63.2**	**44.6**	42.4	20.9	24.1	37.6	46.2	**80.5**	21,451
REGION										
North Central	14.3	**65.4**	**40.6**	36.5	19.5	15.2	25.8	35.2	**75.8**	4,748
North East	20.5	**63.2**	**47.8**	47.6	31.6	26.1	47.4	58.4	**87.3**	4,262
North West	20.4	**57.8**	**37.7**	37.4	18.7	39.4	48.6	57	**80.3**	8,022
South East	16	**65**	**42.3**	42.6	16.3	13	30.2	40.1	**74.5**	4,091
South South	6.9	**50.7**	**32.2**	26.8	10.7	11.7	31.6	37.6	**69.1**	5,473
South West	4.8	**43.8**	**23.8**	20.3	10.4	10.1	15.5	19.9	**59.1**	6,784
MOTHERS EDUCATION										
No education	21.5	**64.6**	**45.9**	45	24	32.7	44	52.9	**84.3**	11,942
Primary	11.9	**62.3**	**39.9**	36.6	16.5	17.3	32	39.8	**77.4**	6,566
Secondary	8.6	**50.3**	**28.8**	26	13.1	12.9	26.4	33.6	**66.2**	11,904
more than secondary	5.9	**35.1**	**18.6**	16	7.9	9.4	22.3	28.5	**52.8**	2,974
WEALTH QUINTILE										
Lowest	21	**71.8**	**59.3**	57.8	29	32.6	45.4	54.4	**89.6**	6,194
Second	17.8	**66.2**	**46.1**	43.6	21.5	28	40.2	40.2	**83**	6,234
Middle	14.5	**60.4**	**36.9**	35	17.2	19	33.8	33.8	**76.4**	6,341
Fourth	10.1	**51.2**	**25.7**	23	12.2	14.4	28.5	28.5	**68.2**	6,938
Highest	6.7	**37.7**	**18.4**	16.1	8.6	11.4	22.4	22.4	**55.9**	7,678

Key: (a) Getting permission to go for treatment (GPT), (b) Getting money for treatment (GMT), (c) Distance to health facilities (DIS), (d) Having to take transport (TP), (e) Not wanting to go alone (Comp), (f) Concerned no female provider available(NFP), (g) concerned no provider available (NP), (h) Concerned no drugs available (ND), (i) At least one problem accessing health care (one p).
Source: extracted from NDHS 2008

About 80.5% of women in the rural areas indicated that they have at least one problem in accessing health care. More than half of women (61.4%) from urban areas have at least one problem in accessing health care. The problem of accessibility does not only cut across residential but also regional factors as well as education and wealth status of women. More women from the north reported having problems of accessing health care compared to women from the southern part of the country. About 80.3% of women from the North West, 87.3% of women from the North East and 75.5% from north central reported having at least one problem accessing health care. In the south, more women in the southeast reported having at least one problem of accessing health care, followed by women from south-south region and women from the south west, 74.5%, 69.1% and 59.1% respectively. In terms of education, more women without education are reported to have problem in accessing health care compared to women with higher education. This implies that the more educated a woman is, she is less likely to have problem accessing health care.

The problem of access to maternal and child care also has a wealth dimension. There is a high likelihood that women who are from the highest wealth quintile are less likely to have problems accessing health care compared to women from the lowest wealth quintile. Table 2.19 shows that 89.6% of women from the lowest wealth quintile are reported to have at least one problem in accessing health care compared to 55.9% of women from the highest wealth index. Over all, the problem of accessibility is a major problem which cuts across all socioeconomic classes because more than half of women from the advantaged group are said to encounter at least one problem or the other. However, more women from the rural areas, from the north, women with no education and women with the lowest household wealth are reported to suffer from at least one problem of accessibility to health care.

Looking at the problem of accessibility in detail, more women from rural areas are reported to have problem of getting permission for treatment (15.7%), getting money for treatment (63.3%), problem of distance and transportation, and so on. Table 2.19 shows that the problem of ability to pay for health care is the greatest as more women are reported to have problem in getting money for treatment, followed by lack of drugs, then distance to health facility, transportation to health facility problem and lack of health care providers or health personnel. The problems of accessibility observed in the survey are problems related to ability to pay, supply of health facility in the health care system, distance, and so on. Though there are other problems, these

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are more prominent and require the intervention of the ministry of health in making sure that adequate health facilities are supplied, more health professionals are employed and barrier of ability to pay is removed.

In comparing regions, educational status and wealth status of women, the type of problem of accessibility follows a similar pattern with that of residence. Among all, the problem of getting money for treatment takes the lead. The problem of getting money for treatment is more common among women of the lowest wealth index as 71.8% are reported to have the problem of getting money for treatment.

2. 4 Trends in infant and child mortality in Nigeria

This section examines the health outcomes measured by maternal and child mortality and also established the relationship between utilisation of maternal and child health care as well as the rate of mortality among children by socioeconomic and other factors. It is important to note that the NDHS reports for the surveys available has no records on maternal mortality, also getting information on maternal mortality for several periods is quite difficult. This section therefore, focuses on infant and child mortality as health outcomes. The rate of infant and child mortality reflects a country's level of socioeconomic development and quality of life (DHS report, 2003). Infant and child mortality is measured using neonatal mortality, post-neonatal mortality, child mortality, under-five mortality and infant mortality. Neonatal mortality is the probability of a child dying within the first month of life. Post-neonatal mortality is the difference between infant and neonatal mortality. Infant mortality is the probability of dying before the first birthday. Child mortality is the probability of dying between the first and fifth birthday. Under-five mortality is the probability of dying between the first birthday and the fifth birthday ((National Population Commission report, 1990 and 1999, 2003, and 2008). Deaths are expressed per 1,000 live births and child mortality is expressed per 1,000 children surviving to the first birthday.

Table 2.20 shows the level of infant and child mortality by 1990 survey;

Table 2.20: Infant And Child Mortality Rates for the Ten-years Period Preceding the 1990 Survey

Socioeconomic characteristics	NN	PNN	Infant M	Child M	Under-5 M
RESIDENCE					
urban	40.4	35.1	75.4	58.9	129.8
rural	46.7	49.1	95.8	123.8	207.7
REGION					
North East	39.2	48.5	87.7	139.2	214.6
North West	57.8	52	109.8	151.2	244.4
South East	38.6	44.1	82.7	66.5	143.7
South West	46.3	38.3	84.6	90.3	167.2
MOTHERS EDUCATION					
No education	48.4	47.5	95.9	126.4	210.1
Primary	38.5	54.1	79.8	103.7	137.7
Secondary	42.7	41.2	92.9	62.9	149.8
more than secondary	30	18.7	48.6	30.2	77.3

Key: neonatal mortality (NN), post neonatal mortality (PNN), infant mortality (infant M), child mortality (child M), under-five mortality (under-5 M)
Source: extracted from NDHS report 1990

The table shows that urban areas experienced 40.4% of neonatal mortality per 1,000 live births, 35% of post-neonatal mortality per 1,000 live births and 58% of child mortality. This is quite lower compared to the rural areas. Regionally, incidence of neonatal, post neonatal, infant and child mortality as well as under-five mortality is highest in the north, particularly in the North West and the North East. The South West is also observed to have high rate of infant and child mortality compared to southeast. There is also socioeconomic differential in mortality among children by educational status. Mortality rate is high among children belonging to women with no education compared to women with higher education. However, neonatal and post neonatal mortality is higher among women with secondary education compared to women with no education. Table 2.21 shows the incidence of infant and child mortality for the 1999 survey;

Table 2.21: Neonatal, Post Neonatal, Infant, Child and Under-five Mortality for Ten-year Period Preceding the 1999 Survey

Socioeconomic characteristics	NN	PNN	Infant M	Child M	Under-5 M
RESIDENCE					
urban	36.2	23.1	59.3	51.6	107.8
rural	34.6	40.4	75	73.4	142.9
REGION					
North East	44.5	34.9	79.4	104.1	175.2
North West	25.1	57.5	82.6	115.1	188.2
South East	37.1	37.1	74.3	65.6	135
South West	42.6	27.3	69.9	33.9	101.5
North central	23.8	26.9	50.7	35.5	84.4
MOTHERS EDUCATION					
No education	35.4	41.5	76.9	86.6	156.8
Primary	36.1	35.1	71.2	54.5	121.8
Secondary	34.5	24.5	59	39.3	95.9
more than secondary	25.3	15.2	40.5	13	53

Source: extracted from NDHS report 1999

The table shows that though neonatal mortality is higher in the urban areas, other aspects of infant and child mortality are higher in the in the rural areas. Regionally, the lowest incidence of mortality among children is found in the North Central, while the highest incidence of mortality among children is found in the North East and the North West. The South West is rated the second highest in neonatal mortality though with the second lowest rate of other categories of mortality in children. The rate of mortality given by 1999 survey also has an educational dimension; as mortality prevalence is quite high among children of mothers with no education compared to children of mothers with higher education. Child mortality rate in Nigeria described in Tables 2.20 and 2.21 is quite high. This may be because the rate of access and utilisation of maternal and child health care is quite low among women especially in the rural areas, in the north, and among women with no or low education.

There is a strong relationship between utilisation of maternal and child health care services and mortality rate in Nigeria. Information from sections 2.1 and 2.2 show that women and children in the rural areas and those from the north utilise less of maternal and child health services compared to women and children from the urban areas and from the south. The implication of low utilisation of maternal and child health care is shown by the high rate of mortality prevalence among children from these regions. It therefore means that a greater utilisation of child and maternal health care services will lead to a reduction in the incidence of mortality among children. Table 2.22 illustrates a similar trend of the incidence of mortality among children. High prevalence of mortality rate is reported among children in the rural areas in the 2003 survey compared to the 1990 and 1999 surveys.

Table 2.22: Neonatal, Post Neonatal, Infant, Child and Under-five Mortality for Ten-year Period Preceding the 2003 Survey

Socioeconomic characteristics	NN	PNN	Infant M	Child M	Under-5 M
RESIDENCE					
urban	17	44	81	78	153
rural	60	61	121	139	243
REGION					
North Central	53	49	103	70	165
North East	61	65	125	154	260
North West	55	59	114	176	269
South East	34	32	66	40	103
South South	53	68	120	63	176
South West	39	30	69	47	113
MOTHERS EDUCATION					
No education	60	64	124	166	269
Primary	53	58	111	85	186
Secondary	37	35	71	45	114
more than secondary	39	22	61	20	80
WEALTH QUINTILE					
Lowest	59	74	133	143	257
Second	70	70	140	178	293
Middle	56	54	110	118	215
Fourth	48	39	87	101	179
Highest	23	30	52	29	79

Source: extracted from NDHS report 2003

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Rural children are twice more likely to die than children from the urban areas. This is also true with the situation in the north and among children of women with no education. In terms of wealth quintile, children within the two lowest wealth quintiles have the worse cases of child mortality. The second lowest wealth quintile has the worst case of child mortality compared to the lowest wealth quintile. This implies that there is a strong association between house-hold wealth and child mortality incidence since children from poor homes are more likely to die before their fifth birthday compared to children from rich homes. This may be because children from poor homes are less likely to utilise some of the important health care services discussed in section 2.2. Tables 2.22 and 2.23 are similar to Table 2.24; it shows the incidence of mortality among children by 2003, 2008, and 2013 surveys.

Table 2.23: Neonatal, Post Neonatal, Infant, Child and Under-five Mortality for Ten-year Period Preceding the 2008 Survey

Socioeconomic characteristics	NN	PNN	Infant M	Child M	Under-5 M
RESIDENCE					
urban	38	29	67	58	121
rural	49	46	95	106	191
REGION					
North Central	41	37	77	62	135
North East	53	56	109	126	222
North West	47	44	91	139	217
South East	51	44	95	64	153
South South	48	37	84	58	138
South West	37	22	59	32	89
MOTHERS EDUCATION					
No education	49	49	97	124	209
Primary	48	40	89	77	159
Secondary	40	30	70	49	116
more than secondary	33	15	48	22	68
WEALTH QUINTILE					
Lowest	50	49		132	219
Second	51	52	100	121	212
Middle	45	40	103	87	165
Fourth	40	34	73	60	129
Highest	39	20	58	31	87

Source: extracted from NDHS report 2003

Table 2.24: Neonatal, Post Neonatal, Infant, Child and under-five mortality for Ten-year Period Preceding the 2013 Survey

Socioeconomic characteristics	NN	PNN	Infant M	Child M	Under-5 M
RESIDENCE					
Urban	34	26	60	42	100
Rural	44	42	86	89	167
REGION					
North Central	35	31	66	36	100
North East	43	33	77	90	160
North West	44	46	89	105	185
South East	37	45	82	54	131
South South	32	26	58	35	91
South West	39	21	61	31	90
MOTHERS EDUCATION					
No education	44	45	89	100	180
Primary	42	33	74	57	128
Secondary	34	24	58	35	91
more than secondary	30	20	50	13	62
WEALTH QUINTILE					
Lowest	45	47	92	108	190
Second	45	49	94	103	187
Middle	39	31	71	61	127
Fourth	37	28	65	38	100
Highest	30	18	48	26	73

Key: neonatal mortality (NN), post neonatal mortality (PNN), infant mortality (infant M), child mortality (child M), under-five mortality (under-5 M)

Source: extracted from NDHS report 2003

There is a socioeconomic dimension to mortality incidence going by the 2008 survey. The table shows that although mortality rates are still very high among children, it decreased over time. (see 2008 survey). This may be due to increased utilisation of child health care services during the period. Increase in the utilisation of child health care may be due to the effort by the ministry of health at reducing infant and child mortality by one-third in 2015 to meet up with the MDG goal four. Although mortality rate has slightly declined as revealed by the 2008 survey, socioeconomic disparity in the incidence of child and infant mortality is still very high. There is therefore the need to narrow the gap in the utilisation of these basic maternal and child health services in order to achieve a substantial reduction in mortality rate among the disadvantaged group. This reason among others informs the objective of this study.

2.5 Policies and programmes for maternal and child health care utilisation in Nigeria

Great effort in policy formulations has been made to increase utilisation of maternal and child health care services with the sole aim of reducing infant and child mortality rate in Nigeria. First among these policies which was aimed at tackling health issues in women and children is the Bamako initiative sponsored by UNICEF and WHO and adopted by African ministers of health in 1987. The Bamako initiative was aimed at examining government commitment to universal accessibility of primary, maternal and child health care, equity of access and provision as well as the exemption of the poor from health care charges (Omololu *et al* 2012). In 1988 the national policy and strategy to achieve health for all Nigerians was developed. This was reviewed in 1998.

In addition, Prominent among the policies and programmes is the formation of MDGs by the United Nations in 2000. In 2001, 147 heads of states collectively endorsed the (MDGs) four and five. Goals four and five are set to reduce by two-third and three quarter the under-five and maternal mortality between 1990 and 2015. By 2002, the national reproductive health strategy framework developed by ministry of health was formed, while the national guideline for women's health sector reform in 2003 was developed. In 2004, the national family planning and reproductive health policy was developed. Also, in 2007 the integrated new born and health strategy designed to ensure continuum of care for pregnant women in antenatal care was formed. The Integrated Maternal, Newborn and Child Health Strategy (IMNCH)

formed in 2007 has antenatal care, post natal care, prevention of malaria as well as immunisation of children as its priority areas.

Insurance policy is also one of the most important policies aimed at increasing maternal and child health care access and utilisation. The National Health Insurance Scheme (NHIS) of Nigeria was established through Act 35 of 1999 constitution to provide health insurance for all Nigerians. The National Health Insurance Scheme – Millennium Development Goals/Maternal and Child Health (NHIS – MDGs/MCH) Project is formed to address Nigeria's critical problem of poor access to health care services for pregnant women and children.

Recently, the federal government of Nigeria created a programme to improve maternal and child health care through the Subsidy Reinvestment and Empowerment Programme (SURE-P). The aim of the SURE-P intervention in maternal and child health care is to reduce maternal, Newborn Morbidity and Mortality through the utilization and cost effective demand and supply interventions. The SURE-P is also meant to increase access to maternal and child health care so as to ensure the achievement of the targeted MDG goals 4 and 5. The SURE-P programme identified and selected 500 primary health centres (PHCs) and 125 general hospitals across the 36 states of the federation and the federal capital Territory (FCT). More health facilities and drugs were supplied to the selected 500 PHCs and general hospitals. The hospital maternal sections are upgraded to provide a comprehensive intervention for complicated maternal and child health cases. In addition, pregnant women are encouraged to utilise maternal health care especially antenatal and skilled delivery by providing free services and cash transfer to address the problem of accessibility. To solve the problem of insufficient skilled health workers, the SURE-P programme employed more skilled health workers, midwives and community health workers to meet the increasing demand for health workers.

2.6 Effects of policies and programmes on maternal and child health care utilisation in Nigeria

The programmes and policies has improved maternal and child health care utilisation slightly over the years as shown by the tables in section 1 to 3 of this chapter. Also the number of women and children that did not utilise maternal and child health care reduced over the years. Although within 1990 to 2013,utilisation fluctuated depending on the health care. Even though there was improvement in utilisation, the improvement

is below the expected impact of the policies and programmes. For instance, given that antenatal care utilisation in most public hospital are free, there are still few charges women pay before they can have access to it. To illustrate this, the Leadership Newspaper in 2014 tried to X-ray antenatal care utilisation in public hospitals. They found that in some states especially in the north, free antenatal care was administered including skilled delivery. However, in some situations, health providers extort women who came for antenatal care. As such, few charges were collected before a women can access free antenatal care. The following statements from Leadership News paper attests to that fact.

> In Kano, it is the policy of the State Government that antenatal services are free in public hospitals. Investigations revealed that since 1999 every public hospital in Kano has been providing free antenatal services. In an interview, Hajiya Maryam Abba Dambatta said she attended Murtala Muhammad Hospital for antenatal care and that at no time was she asked to pay for the serv ices rendered to her. She described the antenatal care as effective a nd comparable with that of private hospitals. Howeve, a housewife, Maijidda Maigari Jaen, told LEADERSHIP Weekend that the maj or problem pregnant women encounter in the State is the attitude o f the health personnel towards them. She alleged that some of the h ealth personnel were also corrupt, extorting illegal fees from patien ts. (http://leadership.ng/features/377591/pregnancy antenatal exper ince public-hospitals)

Others in Abuja and some part of the south attest to the fact that they pay some few charges to gain access to antenatal care

> Kelechi Amanfor, an expectant first-time mother-to-be says she has registered at a federal hospital in Abuja. "I was advised by my mum and my mother-in-law to register for my antenatal at a federal hospital because of their expertise and general experience as they handle more medical cases than private hospitals. It cost me about N20,000 to register for antenatal and that sum covers three ultra-sound scans for the duration of the pregnancy, vagina delivery and free consultation with the doctors and specialist" At the Imo State general hospital, Umugwuma some of the pregnant women who spoke with leadership Weekend under condition of anonymity alleged that some members of staff of the hospital operate as touts and demand extra money to speed up access and dispense drugs to them. "If you want quick service, you have to part with N200 and another N100 for urine sample. If you don't pay this extra charge for urine, then it's as good as you did not come," one pregnant woman stated. It is better to get a bed space at the private hospitals than the public ones because

the charges are almost the same. Some of them now charge between N2,000 and N3,000. (http://leadership.ng/features/377591/pregnancy -antenatal-experinces-public-hospitals)

Given this assertion, despite the programmes for free antenatal care utilisation, utilisation is still wealth related. Due to improvement in child health care utilization due to free immunization and free bed nets distribution, neonatal, post neonatal, infant, child as well as under-five mortality decreased over the years as shown in table 2.20 to 2.24. The decrease however fluctuated as under-five mortality rates increased in the urban and rural areas from 107.8 and 142 to 153 and 245 from 1999 to 2003 but reduced to 121 and 191 in 2008 respectively. This was further reduced to 100 and 167 in 2013.

2.7 Recent innovations to improve maternal and child health care utilisation in Nigeria

Apart from free antenatal and free immunization administered in public hospitals, there are also other innovative practices which have improved the utilisation of maternal and child health care utilisation. Mobile immunization by public health workers is one of them. Health workers travel to some rural areas for immunisation. The others are the non-government organisations such as Churches, charity organisations and philanthropist who provide free access to immunisatiotion for children in churches, schools and rural areas. This innovations augment the supply of maternal and child health care to especially the less privileged people. This explains why immunisation utilisation improved especially in 2013

CHAPTER THREE
LITERATURE REVIEW

Introduction

This chapter contains the literature review. It is made up of four sections; section one articulates the conceptual issues of equity/inequity, section two contains the theoretical literature, three is on the empirical literature while section four presents the methodological literature. Sections two, three and four are written to address theoretical, empirical and methodological issues on the two objectives stated in Chapter one.

3.1 Conceptual Literature

3.1.1 Concept of equity and inequity

Equity is a normative concept in economics with a moral and ethical dimension rooted in the principle of distributive justice, egalitarianism, altruism, fairness, justice and human right. Equity is defined in different ways by different people, some literatures define equity as an expression of social justice which fundamentally has to do with a fair distribution of benefits from health and social development in accordance with the needs of individuals in relation to the needs of all. The basic concern of equity from the view point of health is based on supply equity which relate to equal resources spent for each individual and for each case of a particular condition, demand equity which has to do with equal access to health services, equal status of health for all and health care utilisation according to needs. Whitehead (1985) defines equity in health care as equal access to available care for equal need, equal utilisation for equal need and equal quality of care for all. Wagstaff and Van Dooslaer (2000) define equity in health care utilisation as allocation of medical care that is based on medical need rather than on the basis of income and race.

The British dictionary defines inequity as an unjust or unfair act; lack of no equity, injustice and unfairness. Inequity in health care therefore means when health care resources are unfairly or unjustly distributed and utilised based on income and

socioeconomic status as well as demographic or other factors and not based on the need for the health care. Whitehead (1985) define inequity as differences which are unnecessary and avoidable but considered as unfair and unjust. In defining equity, Whitehead (1985) describes inequity in the following way;

> In order to describe a certain situation as inequitable, the cause has to be examined and judged to be unfair in the context of what is going on in the rest of society. The crucial test of whether the resulting health differences are considered unfair seems to depend to a great extent on whether people chose the situation which caused the ill health or whether it was mainly out of their direct control. For example, through lack of resources, poorer social groups may have little choice to live in unsafe and overcrowded housing, to take dangerous and dirty work, or to experience frequent bouts of unemployment. The higher rates of ill health resulting from such environmental factors are clearly inequitable. The sense of injustice is heightened in such cases as problems tend to cluster together and reinforce each other, making some groups very vulnerable to ill health. Similarly, a section of the population may freely choose not to use a particular health service because of religious beliefs, for example, and any resultant excess in sickness in that group would not normally be classed as unfair (Whitehead; 1985).

Equity/inequity is therefore synonymous to equality/inequality but they are not the same. Inequality in health care represents absolute differences in health care utilization between individual populations while inequity in health care represents inequalities which are considered unfair or unjust between different social groups (Ong *et al*; 2009). For instance, it might be unfair if healthy and sick people are given the same health care just to achieve equal utilisation. However, equity is often defined with respect to equality and inequality. For instance, equity exists if people with equal need for health care have equal access to it.

3.1.2 Types of equity in health care
Equity in health care is categorised into horizontal and vertical equity.

Horizontal equity in health care utilisation
Studies on equity in health care delivery have a unanimous definition on the subject matter of horizontal equity. Most common among these studies is Wagstaff *et al* (1991), they define horizontal equity to mean that persons in equal need of medical care ought to receive the same treatment irrespective of whether they are poor or rich, old or young, black or white. Similarly, Wagstaff and Van Doorslaer (2000) define horizontal equity to mean persons in equal need of care should on the average be treated the same irrespective of their income. Other studies like Cisse *et al* (2007)

define horizontal equity in health care service delivery as the requirement that persons with equal needs be treated equally irrespective of their income. Allin (2006) and Ong *et al* (2009) define horizontal equity in health care as equal treatment of equals. This entails "deriving health gain equally irrespective of whom it accrues or their preference for it".

Gravelle et al (2006) define horizontal inequity as when use is affected by non-need variables so that individuals with the same level of needs consume different amounts of care. According to Allin (2006) equal utilisation for equal need implies a different set of conditions and depends upon a wide array of demand and supply side variables. Therefore, inequity in utilisation may not solely reflect inappropriate or unfair differences in health service consumption as utilisation may be affected by personal characteristics such as individual preferences, expectations and beliefs as such; observed inequity may not be wholly unfair. It is important to note that most of the empirical studies on equity in delivery of health care have been directed at the issue of horizontal inequity. This is because according Wagstaff *et al* (1991), it is undesirable for persons with the same need of care to be treated differently just because one is rich and the other poor. Therefore establishing the extent of such income and socioeconomic related inequity is acceptable as one of the principal objectives of empirical research in health care delivery and utilisation.

Vertical equity in health care utilisation

Cuyler (2001) defines vertical equity as giving appropriate unequal treatment to individuals with unequal need. According to Gravelle *et al* (2006), there is vertical equity when individuals with different levels of need consume appropriately different amount of health care. Allin (2006) defines vertical equity as a situation where individuals in different need for health care are treated differently while Ong *et al* (2009) views vertical equity as unequal but equitable access to health care for unequal need. Based on these definitions, vertical equity entails preferential treatment that is given to those who are assumed to be worse off to enable them improve access to health services. Vertical equity in health care is however used exclusively in relation to its financing rather than utilisation.

Equity in access

Harkin et al (2001) define equity in access to health care as distribution of health care services based on actual need for services rather than ability to pay or geographic location. Oliver and Mossialos (2004) define equity in access in terms of horizontal and vertical equity. They define equity in access as a condition whereby those with equal needs have equal opportunities to access health care (horizontal equity), and, those with unequal needs have appropriately unequal opportunities to access health care (vertical equity). However, for some reasons, those in equal need and with equal opportunities to access health care may not make an equal *use* of those opportunities.

Levesque et al (2013) define access as the use of health care qualified by need for care. They also define access as describing the costs incurred in receiving health care. Therefore access to health care is the ease with which consumers or communities are able to use appropriate services in proportion to their needs.

However, utilisation is often used as a proxy for access. Levesque et al (2013) refer to utilisation as realised access which is easier to measure than potential access. This is supported by Frenz and Vega (2010) who emphasised that "the proof of access is use of service, not simply the presence of a facility" although, "service availability is a necessary step for potential access, realised access is the major objective". Equity in utilisation is therefore the realised access and the most studied aspect because it is easier to measure. In the same vein, Levesque et al (2013) also conceptualise access to health care as having five dimensions; these include approachability, acceptability, availability, accommodation affordability as well as appropriateness. These concepts of access according to Levesque et al (2013) simply means that access to health care is the ability to perceive, seek, reach, pay; and engage.

3.1.3: Definition of need in health care utilisation

The definitions of vertical and horizontal equity as well as equity in access in section 3.1.2 shows that horizontal and vertical equity are defined in terms of equal need for equal treatment and unequal need for unequal treatment. The issue here is how need ought to be defined when looking at the concept of equity in health care utilisation. Academia and policy makers usually encounter the problem of defining what need is and the notion that health care ought to be distributed according to need. Many empirical studies however define need in terms of ill health that is people who are relatively ill are said to have relatively high need for health care services. Others

define need in terms of morbidity and individual's ability to function in physical, psychological and mental aspect. Culyer and Wagstaff (1993) however gave four important definitions of need. They define need as (1) initial health (2) capacity to benefit (3) expenditure a person ought to have (4) expenditures required to exhaust capacity to benefit.

The definition of need as initial health is in line with empirical studies that defined need in terms of ill-health which is found in many economic literatures mostly associated with empirical work on equity in health care utilisation. In this definition, it is assumed that persons with similar health status usually referred to as ill-health have the same need, while persons with dissimilar health status have different need. This definition was also anchored by Wagstaff and Van Doorslare (1998). However, the definition is characterised by some difficulties as noted by Culyer and Wagstaff (1993). The difficulty lies in the fact that it is difficult to see why someone who is sick can sensibly be said to need health care more than the other irrespective of the latter's ability to improve his/her health.

This definition came about because of the deficiency in the first definition of need. Need as capacity to benefit relates to the general improvement in health. This stems from the moral force of the goals associated with health (Fluerbeay 2006; Culyer and Wagstaff 1993) that is, there must be an expected capacity to benefit from the consumption of health care. It also relates to the implication that the marginal productivity of health care must be positive, as inefficient health care use is not desirable. For instance, an individual may be ill but not need health care because the consumption of that health care will not bring about any benefit or gain in health. It may also be that an individual with ill health may not benefit from the use of type "A" health care but benefit from type "B" of the same category of health care. Also, an individual may not be ill but need a particular health care for preventive measures. Therefore, need is defined based on ability of someone to benefit from the consumption of health care irrespective of whether the person has ill-health or not.

This introduces a normative element to the assessment of need and is concerned about how much health care a person ought to have in relation to what he/she spends. In defining needs this way, a person with higher need ought to have more health care than the person with less need. This definition stems from the fact that the previous definitions of need leaves unanswered the question of how much health care a person need.

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This definition relates health care utilisation and its principal output which is improvement in health. This, according to Culyer and Wagstaff(1993) is the most superior definition of need as the expenditure required to effect the maximum possible health improvement or its equivalent is the expenditure required to reduce the individual's capacity to benefit to zero. That is, where marginal capacity to benefit is positive, assessment of need requires an assessment of the amount of expenditure required to reduce capacity to benefit to zero.

Culyer and Wagstaff (1993) as noted earlier explicitly define need in terms of capacity to benefit. Based on this definition, high priority needs are those where return to marginal additional expenditure is high. When needs are ranked according to priority, equity is then achieved in allocation of resources where marginal met need is equalised, "that is, the pay off of marginal expenditure is equalised across regions, clients, programmes and groups (Culyer and Wagstaff 1993)". This implies that health status is being equalised. The principle of equalising marginal met need however is better viewed as efficiency rather than an equity principle.

3.1.4 Why equity in health care?

Access to health care is a human right that promotes good health through health carre utilisation. Good health determines labour productivity and economic growth in a country, therefore, inequity in health care utilisation hampers not only the health system but also the economic growth of a country. Inequity in health and health care is seen as more dangerous for a country than inequity in other aspects of human endeavour, this is so because "there is consistent evidence that disadvantaged groups have poorer survival chances, dying at a younger age than the more advantaged groups" (Whitehead, 1985). For instance, a child born to a rich family and to educated parents in Nigeria can expect to live over five years more than a child born to a poor family with little or no formal education. In addition, there are great differences in the experience of illness between the disadvantaged and the advantaged groups; the disadvantaged groups tend to suffer heavier burden of diseases than the advantaged groups as such higher morbidity and mortality is prevalent among the disadvantaged groups. Also inequity in the provision and utilisation of health care also offends many people's sense of fairness and justice compared to inequity in other aspects of human endeavour. These reasons rises deep concern on equity related to health and health care utilisation in designing an effective and efficient health policy.

3.2 Theoretical Literature

3.2.1 Economic theory relating to equity/inequity

This section tries to find the place of equity/inequity as a concept in economic theory. Equity issues in economic theory are normative issues of resource allocation and distribution. The foundation of economic thought is scarcity. Economic decisions as regards scarcity are manifested in determining what to produce, how to produce, for whom to produce and the distribution of resources. The distribution of resources is concerned with who gets what and in what quantity? And how efficient is the production and distribution of goods and services to maximise the society's utility. The orthodox economics finds solution in the existence of a competitive market equilibrium which satisfies the first and second fundamental welfare theorem which yields a pareto optimal and efficient outcome. However, the theorem of competitive equilibrium evokes many questions in health care services. For instance, can a competitive market be achieved in health care? Is the context of this theorem appropriate for health care? Will the competitive market be equitable or will it leave too many people with or without adequate health care? (Folland *et al* 2010). However, issues of resource allocation and distribution in economic theory are discussed within the framework of the social welfare theory.

3.2.1.1 The social welfare theory

Welfare economics is concerned with the evaluation of alternative economic situation from the view point of society's wellbeing. It is a part of the general body of economic theory which is concerned primarily with policy that relates to the general welfare of the society (Koutsoyianis 1979; Jhinghan 2008). The focal point in welfare economics is the general welfare of the people. General welfare refers to all economic and non-economic goods and services that provide utilities or satisfaction to the individuals in the society. To measure welfare of the people in the society, ethical standard and interpersonal comparison of utility levels of the various members of the society is required. This however involves subjective value judgment. It entails knowing whether a change from which an individual gain or lose is desirable or not (Henderson and Quandt 2003).

Jeremy Bentham, an English economist argues that welfare is improved when the greatest good for the greatest number is achieved. Based on this definition, social

welfare is the sum of utilities of the individuals of the society (Koutsoyianis, 1979). Similarly, the cardinalist welfare theorist maintains that social welfare would be maximised if income were equally distributed to all members of the society. However, other economists opposed the idea of equal income distribution by pointing out that an equal distribution of income has the tendency to reduce social welfare as incentive to work may reduce thereby leading to an allocation of resources that produces a smaller total output (Koutsoyianis, 1979).

Another prominent school of thought in the theory of welfare is the pareto optimality criterion named after a famous Italian economist, Vilfredo Pareto (1848-1923). According to this criterion, societal welfare is maximised when it is impossible to make any one better off without making some one worse-off at the same time. This theory is based on the assumption that three conditions are satisfied. The first is that, there must be an efficient distribution of commodities among consumers. Second, there must be an efficient allocation of factors among firms and finally there must be an efficient composition of output or product mix (Koutsoyianis, 1979; Jehle and Reny 2001; Mas-colell et al 1995). This school of thought is however characterised by shortcoming. The short coming is that the pareto criterion cannot evaluate a change that makes some individuals better off without making others worse off. It also does not guarantee the maximisation of social welfare. The use of pareto principle in health economics has been controversial as noted by Fleurbaey (2006), Culyer and Wagstaff (1993) as well as Wagstaff and Van Doorslaer (2000). Some health economists reject the pareto principle on the ground that policy makers commonly ignore it. On the other hand, Monney et al (1991), Monney (1994) firmly use the authority of the pareto principle in order to favour access against utilisation in the measure of health equity, (Fleurbaey 2006).

3.2.2 Theories of resource distribution and equity in social welfare theory (theories of fairness)

The conventional social welfare theories in economics are not very explicit on the subject matter of equity and inequality. This is so because; equity issues are seen to be normative and ethical in nature. However most early works on equity and inequality in economics are associated with the utilitarian and the maximin theory of resource distribution known as the theory of justice by Harsanyi and Rawls. Later on, in the 19th and 20th century, many economists developed interest on the subject matter due

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to the problems posed by the existence of inequity and income inequality in the society. The ethical nature of inequity in health and health care also led to the development of health economic literature to address this problem. Other ethical theories and theories of justice in the literature include the entitlement and the libertarian theory, the egalitarian theory, the deontological theory, the envy theory as well as the theory of virtues and rights. However this study will examine the economic related theories of equity or fairness which is the utilitarian and the maximin theory. Other theories developed after the maximin and the utilitarian theories are also examined as well as other health economic related literatures.

3.2.2.1 The maximin theory (theory of justice as fairness)

The maximin theorem is associated with Locke, Rouseau, and Kant. Their ideas were later articulated by Rawls (1971). The basic argument of the maximin theory is that for justice, fairness and equity to be achieved in the distribution of resources, decisions regarding resource allocation should be taken in favour of the worse-off members of the society. In other words the maximin principle states that policies as regard resource allocation must be evaluated in the interest of the least advantaged or the poorest. The maximin principle in the original position would lead to a concept of justice based on the difference principle which evaluates every possible institutional arrangement in terms of the interest of the least advantaged or the poorest or otherwise, the worse off individuals. Rawls advocated for equality of primary social goods which are sufficient to equalise certain inputs into welfare. Individuals may not attain the same satisfaction in welfare if their taste and life plan are expensive and requires great wealth than the average. He therefore, held the individuals responsible for their life plans in terms of expensive taste that requires great wealth beyond the average. Individuals with expensive taste will not receive at par with the Rawlsian justice, more resources than someone who constructs a more modest plan. In this sense, individuals in the Rawlsian theory are held responsible for their own expensive taste. The society does not compensate them with more resources should they develop plan of life which are more expensive than the average, therefore, equity and distributive justice according to Rawls entails compensating persons only for the disadvantages they suffer due to factors in their environment which are morally arbitrary and beyond their control.

The maximin theorem is based on two strong assumptions. The first is that individuals are assumed to be strongly risk averse. Secondly, it is based on the

assumption that as a decision rule, fair and equitable resource allocation decisions are taken in the "original position" under the "veil of ignorance". The original position is a hypothetical scenario where no one knows his/her place, class position or status in the distribution of natural assets and abilities. It corresponds to the state of nature in the traditional theory of the social contract. The original position according to Rawls is the appropriate initial status quo which ensures that the fundamental agreement reached as regards resource distribution are fair and just. The veil of ignorance according to Rawls simply means individuals are supposed to choose social states they prefer without knowing which members of the society they will become. This allows them take decisions with an unbiased mind. Persons in the initial position will choose based on the principle of equality in the assignment of basic rights and duties as such inequality are just only if they result in compensating benefits for the least disadvantaged in the society. The theory concludes that inequality is just and fair (equity) only if it results in compensating benefits for the least disadvantaged in the society as such, the cause of unfair inequality (inequity) should be the focus of policy makers in compensating the disadvantaged.

The maximin principle in theory of income distribution finds great application in the theory of optimal income distribution and taxation and also finds application in equity in health care delivery and utilisation which is the focus of this study. However, the maximin principle leads to highly irrational conclusions due to the strongly risk averseness assumptions in health care. In addition, Rawls difference principle has unacceptable moral implication in health economics. For instance, if there are two individuals with different health states, the individual with the worse health state should be given the utmost attention even if his/her chances of survival is small compared to the individual with a better health state and better chances of survival. The difference principle always requires that absolute priority in the interest of the worse-off individual be given no matter what, even if his/her interest is affected in a minor way and all other individuals in society had opposite interests of the greatest importance. The need of each individual in relation to other people's needs is not taken into consideration at the same time, as such Rawls principle does not satisfy the requirements for horizontal equity.

Following Rawls theorem, Dworkin (1981) also constructed a "thin veil of ignorance" where more than one individual takes decision behind the veil of ignorance. This assumption is made because; the decision problem is extended from one individual to

a market system of many individuals. Dworkin's model is centered on insurance where each individual is given the same purchasing power with which to purchase insurance against a bad draw in the birth lottery which allocates those resources. He assumes the individuals behind the veil of ignorance know the preferences of those individuals whom they represent but do not know these individuals resource endowments. Dworkin views equality of resources as a state in which transferable resources, principally, money that individuals have provide them with appropriate compensation for the shortfalls they sustain in their endowments of non transferable resources. However, unlike the Rawlsian model, there is no information as per giving priority to the worse-off in Dworkinian insurance scheme.

Arneson (1989) built on Rawls and Dworkin's theories to stress the need for equalising opportunity instead of welfare outcomes which is the focus in the Rawlsian and Dworkinian model. Equal opportunity implies that the effect of disadvantageous circumstances beyond the individual control on the pursuit of welfare be neutralized so that the outcome a person eventually achieves is due only to his/her effort and not based on factors beyond his/her control.

3.2.2.2 The Utilitarian theory of welfare and equity

The proponents of the utilitarian theorem include Hume, Smith, Benthern, and Mill. Their ideas were refined and articulated through the work of Harsanyi 1953, 1955, and 1975. Harsanyi's utilitarian theorem states that there exists a social welfare function which is unique to linear transformation. It is a single value function and a weighted sum of the individual utilities. The social welfare function is maximised by the choices of individuals which is conformable to the social preference. The basic argument about the utilitarian theorem is that, based on the principle of insufficient reason, a rational person in the original position which he referred to as an impartial observer assigns equal probability to the prospect of being in any other person's position within the society. The impartial observer is a utilitarian who takes resource distribution decision to maximise the average and expected utility of the society under the veil of ignorance. Expected utility maximisation under the veil of ignorance by an impartial observer is an egalitarian principle that promotes equality, fairness and equity.

The utilitarian theory is based on the assumption that the social preferences are consistent, transitive, can be represented by a Von Nueman Morgenstern (VNM) utility function. It is also assumed that, individuals have independent evaluation of

utility distribution among each pair of individual. This allows for individualistic value judgment giving room for social choice that is dependent solely on individual interest that is directly affected. The theory concludes that based on the principle of insufficient reason, a rational person in the original position which he refers to as an impartial observer assigns equal probability to the prospect of being in any other person's position within the society. The impartial observer is a utilitarian who takes resource allocation decisions to maximise the average and expected utility of the society under the veil of ignorance. This meets the egalitarian principle that promotes equality, fairness and equity. The utilitarian theory is generally applicable because it takes into cognisance the welfare of every member of the society. Health economist found the theory useful because the concentration index was found based on the utilitarian principle. However, the Rawls and Utilitarian theorem do not have explicit and detailed conceptualisation of equity in health care.

The strengths of the utilitarian theorem over the maximin theorem lie on the fact that, the utilitarian theorem takes into cognisance the welfare of every member of the society. This implies that the needs and interest of every member of the society is considered. One of the basic shortcomings of the utilitarian theory according to Rawls (1971) is that the principle of utility is incompatible with the concept of social cooperation among equals for mutual advantage. Based on the individual rationality, a rational man will not accept the resource distribution decision merely because it maximises the societal welfare function irrespective of its permanent effect on his own basic rights and interests. The utilitarian theory is also criticized for focusing only on how utility affects the overall wellbeing of the members of the society. There is no information about source or quality but only how their satisfaction would affect the total wellbeing. Social welfare therefore depends solely upon the level of satisfaction or dissatisfaction of individuals. Thus if individuals are selfish, there is tendency for discrimination in resource distribution.

Romer (2006) built on Harsanyi's theory of the impartial observer as a solution to a representative soul's decision problem in a simple environment where he included information and welfare levels of individuals. According to Romer (2006), the veil of ignorance argument stressed by the utilitarian and the maximin theorem if properly modeled contravenes the fundamental egalitarian or equity principle. "Given the standard sorts of preferences, the recommended resource distribution contravenes the

egalitarian principle of transferring wealth. The principle states that the disable individuals should receive more wealth than the able. Disability in this respect simply means the requirement of a greater wealth increment than others to achieve a given status in welfare. This is because, in his model, the able receives more wealth at the chosen distribution than the disable. This claim contradicts the maximin principle as well as the utilitarian. His theory is based on the assumption that individuals have different but constant relative degrees of risk aversion. His argument on the veil of ignorance is based on the assertion that it is better to make decisions ex-post, that is after we know which preference order and welfare functions is associated with several positions because we cannot be sure that the decision makers drawn from the society in question are not simply making recommendations based on selfish interest. Also, decisions are made with shortcomings as important information about real world is massively discarded. However, the veil of ignorance construct has the benefit of enforcing objectivity or impartiality.

One thing is certain from the equity related theories of welfare, the idea of equality, giving attention to the worse off and the concept of individual responsibility in determining what is just and unjust, fair and unfair, equitable and inequitable. However, these theories do not have explicit and detailed conceptualisation of equity in health care. In the next section, an attempt is made to review the health care related equity issues.

3.2.3 Equity/inequity theories in health care utilisation
3.2.3.1 The social welfare model for equity in health care utilisation

Theories of equity in health care are concerned with health care delivery and health care utilisation. Health care delivery is related to the supply side which has to do with policy analysis about health care allocation and distribution. While health care utilisation relates to the demand side which measures health care usage in the health care system. There are few theoretical models that have attempted to address issues of equity in health care delivery and utilisation within the context of social welfare. The literature has established a broader connection between health system and the social welfare in general. It is argued that any good principle for the health system should be consistent with a broader criterion of social welfare. The welfare model by Gravelle et al (2006) has attempted to demonstrate the concept of equity in social welfare context.

3.2.3.2 The social welfare model for inequity analysis by Gravelle *et al* (2006)

The model is similar to the utilitarian model in section 3.2.2.2 due to its assumptions. Gravelle et al (2006) demonstrated equity in health care and the social welfare by establishing a welfare maximisation model which yields horizontal and vertical equity as a necessary condition for an optimal allocation of health care. The model is based on the following assumptions;

- The model is based on value judgment that the utilisation of health care by individuals matters only because of its effect on individual welfare and general state of health.
- The welfare function is assumed to be additive. The additive nature of the welfare function reflects a judgment that the marginal welfare for each individual from increased utilisation is independent of the level of utilisation or welfare of other individuals in the society.
- The welfare function is also assumed to be neutral between individuals. This implies that each individual's welfare receives the same weight in the welfare function.
- The model also assumes that the values of the coefficients are non negative.
- The model is based on the assumption that the utilisation of health care by individuals affects the individual welfare and the social welfare has the same functional form across the individuals.

The model

Given a simple welfare maximisation model with an objective function;

$$V = v(y_i, x_i, c_i) = (\alpha_0^0 + \alpha_1^0 x_{1i} + \alpha_2^0 x_{2i} - \alpha_3^0 c_i)y_i - \tfrac{1}{2}\theta y_i^2 \dots\dots\dots\dots\dots(1)$$

Where V_i is the welfare that accrues to an individual from his/her utilisation of health care, and V_i also represents the health of individual due to the consumption of health care. The independent variable y_i shows the utilisation of health care by individual i and x_i is a vector of individual morbidity and non-morbidity socioeconomic characteristics that affect the social value of health care while c_i is the cost of accessing the service which may also depend on the individual's characteristics as well as the pattern of supply of health care. The welfare function vi reflects the value judgment that the welfare of individual depends only on their characteristics not their identities, so that two persons with the same y_i, x_i and c_i characteristics generate the same welfare.

To analyse the welfare model, we assume that the health policy problem is to choose levels of individual utilisation so as to maximise an aggregate welfare function given as;

$$W = \sum V(y_i, x_i, c_i) \text{ subject to } \sum yi \leq S \text{ .... (2)}$$

This represents the policy maker's maximisation problem of the aggregate welfare function given the individual level of utilisation which is subject to the constraint that total utilisation of health care of the individual agents cannot exceed the supply of health care resources. Optimal utilisation of health care in the aggregate social welfare function by each individual is depicted by the equality of the society's marginal value of utilisation across all individuals. This is represented in equation 3 as;

$$\frac{\partial W}{\partial y_i} = \frac{\partial V_i}{\partial y_i} = \lambda(S, x, c) = (\alpha_o{}^o + \alpha_i{}^o X_{1i} + \alpha_2 X_{2i} - \alpha_3 c_i :) - \phi y_i \text{ .... (3)}$$

The λ in equation 3 is the langrage multiplier of the welfare maximisation problem which shows the marginal value of utilisation of the welfare optimisation. The λ depends on total supply of health care S, the distribution of individual characteristics x and access costs c. To know the individual utilisation level, we solve for optimal use of health care resources of each individual, which is given as;

$$y_i^* = \alpha_o + \alpha_1 x_1 + \alpha_2 x_{2i} - \alpha_3 c_i - \lambda(S, x, c) + \text{................................(4)}$$
$$\alpha_j = \alpha_j^0 / \phi, \lambda = \lambda^0 / \phi$$

x_i and c_i are characteristics of individual i which affect the amount of health care he/she ought to have as need variables. The optimal consumption is therefore determined by the need characteristics of individuals and via λ on the needs characteristics of all other individuals as well as the total S which is the total supply of available health care. If the optimal consumption of health care is determined by the need characteristic, it means the optimal allocation of the health care resources is characterised by horizontal equity in health care utilisation; that is individual with the same levels of needs received the same treatment or equal share of health care resources in the process of utilisation.

If it is assumed that access cost c affects the marginal welfare from utilisation due to the reason that $\alpha_3 \neq 0$. Then, individuals with the same need characteristics will receive different treatment, meaning that the optimal allocation implies vertical equity or the appropriately different treatment of those with different needs.

The differences in utilisation between individuals *i* and *j* with different levels of needs variables is given as;

$$y_i^* - y_j^* = \alpha_1 \left(x_{1i} - x_{1j}\right) + \alpha_2 \left(x_{2i} - x_{2j}\right) - \alpha_3 \left(c_i - c_j\right) \dots\dots\dots\dots\dots (5)$$

Suppose however that the true model of actual rather than optimal utilisation is

$$y_i = \beta_o + \sum \beta_j X_{ji} - \beta_3\, c_i + \sum_{j=1}^{2} \gamma_j Z_{ji} + e_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(6)$$

e_i is the random error. The Z_{ji} are the non–need characteristics of the individuals that affect their consumption of health care but ought not to that is, income, education, gender and ethnicity. If $e_i \neq 0$ it means X_{ij} are the only needs variables then individuals with the same needs variables receive different amount of care. If $\gamma_i \neq 0$, it means utilisation of health care is affected by non-need variables and this implies horizontal inequity. If $\beta_j \neq \alpha_j$ it means utilisations does not vary appropriately with need variables, and this implies vertical inequity. Gravelle et al (2006) conclude that inequity exists when utilisation of health care is determined by non-need variables such as socioeconomic factors.

The social welfare model for equity analysis by Gravelle et al (2006) is a ground breaking model for the analysis of horizontal and vertical equity in health care. The model gives a comprehensive description of welfare optimisation by policy makers in the utilisation of health care by each member of the society. The model is in line with previous models of welfare by the utilitarian theory given the assumption of additivity, neutrality and same marginal utilisation values. However, these assumptions may not hold in real life as some individuals will not deliberately utilize the services even though they are available due to religion, and other factors such as acceptability, perception, preferences, life style and culture. As such, the marginal value of utilisation will not be equal. This raises the question of responsibility and access issues in determining inequity (unfair inequality) in utilisation of health care services. The direct measure of inequity based on Gravelle et al (2006) model is indicated by differences in utilisation that is based on income and other socioeconomic factors. The model is deficient because, differences in utilisation due to preferences, perceptions, acceptability, life style and other issues of responsibility are not reflected in the model.

3.2.3.3 The social welfare model for equity by Fleurbaey and Schokkaet (2009)

Recent developments in equity/inequity analysis inculcate the role of life style and responsibility in determining what is fair and unfair, just and unfair in the analysis of inequity in health care within the social welfare perspective. The essence of examining the role responsibility is to give a clear definition of what is just and unjust or fair and unfair in defining equity in health care utilisation. One of these ground breaking studies is by Fleurbaey (2006) as well as Fleurbaey and Schokkaet (2009). The role of responsibility according to Fleurbaey (2006) requires drawing a distinction between what an individual should be held accountable for and what he should not be held accountable for. There are two ways of defining the issues of responsibility; the control and the preference approaches. The control approach stipulates that individuals are responsible for their genuine choices made out of free will over which they had full control. This may include decisions made in the past or present out of pure negligence. Such decisions made out of pure negligence commit the person to bear the consequences independent of any later change in mind. For instance, a heavy smoker who has not taken health insurance is not treated for lung cancer when it is ascertained that his smoking and insurance decisions were fully controlled. The preference approach defines responsibility as letting individuals have what they want when they are put in good condition of choices. It raises delicate issues about soundness of individual preference and the characterisation of good condition of choice. In Fleurbaey and Schokkaet (2009) equity is defined in relation to the role of responsibility and lifestyle, an equitable situation is defined as a situation without unfair inequalities. Inequalities are defined as unfair when they follow from causes which do not belong to the sphere of individual responsibility. The individual socioeconomic background is one of the causes but not the only cause of unfair inequality. Fleurbaey and Schokkaet (2009) made a distinction between ethically legitimate and illegitimate inequality. Ethically legitimate inequality is inequality that is justified because it occurs within the sphere of individual responsibility and outright negligence; therefore it is not regarded as inequity, while ethically illegitimate inequality is the inequality that is unfair and unjust because it occurs outside the control of an individual, therefore it is regarded as inequity. The ethically legitimate inequality is associated with lifestyle choices which lead to inequality in health and health care while the ethically illegitimate inequality is associated to differences in

income and socioeconomic as well as demographic background which is outside the control of individual.

Fleurbaey and Schokkaet (2009), proposed methods of estimating socioeconomic and other causes of unfair inequalities using three steps; in step one they constructed a structural model to estimate the relative importance of the different causes of inequality and to get a better insight into their possible interactions. Step two shows the normative aspect where one decides which of the causes of inequality lead to legitimate and which leads to the illegitimate or unfair inequalities. The third step involves the measurement of these unfair inequalities. Given these three steps, the overall policy objective is to minimise unfair inequalities (inequity) in welfare. In achieving this, Fleurbaey and Schokkaet (2009) formulated a structural model of welfare maximisation which minimises unfair inequality (inequity) in health and health care using the outlined steps.

The structural model

The structural model by Fleurbaey and Schokkaet (2009) is developed on the premise that an individual has a health function;

$$h_i = h(y_i, l_i) \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (1)$$

y_i is the income of individual and l_i is the lifestyle. The model assumes that the health level hi of individual i is produced by a health technology H (.), which is written as;

$$h_i = H(m_i, c_i, e_i, \varepsilon_i, o_i, s_i) \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (2)$$

Where mi is a vector of medical care utilisation which can be measured by number of visits, c_i is a vector of consumption of other goods including lifestyle goods (smoking, drinking, and other physical activities). o_i is a vector of job characteristics and si a vector of social economic background characteristics of the individual. e_i is the genetically determined health endowment and ϵi is a stochastic health stock. It is assumed that the individual behaviour has influence on health through the choices of m_i, c_i and o_i and y_i is endogenously determined given the choice variables.

$$y_i = Y(c_i, o_i, h_i, a_i, s_i) \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (3)$$

Where a_i is the innate productive capacity of the individual, for which she/he can be held responsible. To model the individual choices of m_i, c_i, and O_i, we assume that individuals maximise a utility function given as;

$$U_i = (m_i, c_i, o_i, h_i) \quad\text{.. (4)}$$

Individual choices of mi is restricted by the decisions of the policy makers and health professionals as well as the health care system and interregional variation in health care availability, therefore, health care utilisation function can be stated as;

$$m_i \in M(z_i, e_i, \varepsilon_i, r_i, s_i) \quad\text{.............................. .... (5)}$$

Equation (5) implies that the individual makes his/her choice of consumption of mi from a restricted choice set; the restriction is majorly from the supply side zi. The ei is the health endowment; the ϵ is the stochastic health stock, the ri is a variable that represents insurance coverage.

The individual utility function in equation 5 is assumed to be maximised under a budget constrain;

$$Pc_i + B(M_i, r_i) = y_i - T(y_i, c_i) - p(r_i, e_i) \quad\text{..(6)}$$

The resulting maximisation behaviour can be expressed as a function of the exogenous individual characteristics as follows

$$m_i = m(s_i, a_i, e_i, \varepsilon_i, z_i, I_i, R_i, u_i) \quad\text{...(7)}$$

$$o_i = o(s_i, a_i, e_i, \varepsilon_i, z_i, I_i, R_i, u_i) \quad\text{...(8)}$$

$$c_i = c(s_i, a_i, e_i, \varepsilon_i, z_i, I_i, R_i, u_i) \quad\text{..(9)}$$

The values of health, income and actual welfare are endogenously determined. When we introduce the decision variables in the utility function in equations (2) and (3) we get the following reduced form expressions.

$$h_i = H^R(s_i, a_i, e_i, \varepsilon_i, z_i, I_i, R_i, u_i) \quad\text{......................................(10)}$$

$$y_i = y^R(s_i, a_i, e_i, \varepsilon_i, z_i, I_i, R_i, u_i) \quad\text{......................................(11)}$$

$$u_i = U^R(s_i, a_i, e_i, \varepsilon_i, z_i, I_i R_i, u_i) \quad\text{......................................(12)}$$

The fairness and the unfairness gap is estimated by grouping the exogenous characteristics of the reduced form equation into five groups; the health endowment which indicate characteristics of needs $N = (e, \epsilon)$, the socioeconomic background characteristics $S = (a, s)$, the individual preferences $P = (R, U)$, the available information I and supply side variables z. It is assumed that for a given N, P, I, and z differences in S should not lead to differences in health care utilisation. Therefore,

differences in *S* accounts for inequity in health care utilisation which is unfair and illegitimate. If we assume that inequity is estimated beyond the socioeconomic level, it implies that given, *N, P, I,* and *S*. *z* is considered as the supply factor, individuals should not be held responsible for *z*. but if z is interpreted as differences in regional distribution, it implies that there exists regional inequity in health care utilisation. *N* however shows the legitimate source of differences that is due to the need variable. The variable *P* and *I* boils down to whether we are considering equality of access, equality of use and equality of informed access. Equality of access holds individuals responsible for *P* and *I*, equality of use rejected responsibility for *P* and *I*. while the intermediate which is equality of informed access held individuals responsible for their personal choices if these are based on good information. Equality of informed access therefore holds individuals responsible for *P* but not for *I*.

To compute the degree of direct unfairness, the legitimate source of difference is removed and then the Lorenz curve is used to measure the unfair inequality. Unfair inequalities or horizontal inequity in health care delivery then relates to the distribution of m in the population. In analysing horizontal inequity in this model, it is assumed that m is a scalar variable.

The model of unfairness/inequity by Fleurbaey and Schokkaet(2009) is a ground breaking model of how inequity is estimated capturing individual responsibility. Given the Nigeria situation, the model by Fleurbaey and Schokkaet(2009) is applicable because most women especially in the northern part of the country do not utilise maternal health care because of the problem of access but due to preference and religious belief. Based on this notion, unfairness/inequity in maternal and child health care utilisation caused by these factors are within the individual's control and therefore utilisation may not be unfair/inequitable. This however raises the question on the soundness of the decisions made by the women on the basis of religion and preferences. Some of the women due to religion may not utilise maternal and child health care services due to religious indoctrination and poverty. Making decisions on the basis of religious, cultural indoctrination and poverty means the individual is not in the right frame of mind to make appropriate decisions that the person will be held responsible for. Therefore differences in utilisation due to religious and cultural beliefs in this respect is not due to individual responsibility as such its influence on health care utilisation will lead to unfair inequality or inequity.

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The issue of information which may be a supply problem raises so many questions about the issue of unfairness in utilisation of maternal and child health care in Nigeria. In most cases, women from the rural areas do not have information about the availability of health facilities to utilise maternal and child health care services even if they are freely provided. In such situations, there is unfairness/inequity in utilisation. However, the application of this model is limited in Nigeria as information on variables which determines fairness and unfairness inequality or inequity in utilisation may not be readily available in most health survey data.

3.2.4 Theoretical literature on the determinants of health care utilisation

Theoretically, health care utilisation is also referred to as health care consumption; health care consumption is captured within the theory of demand. Many economics text books define demand as the quantity of a good or service that consumers are willing and able to buy at a given price in a given period. Whelan and Msefer (1996) state that economic theory of demand consists of two factors: taste and ability to buy. Taste is the desire for a good, which is determined by the willingness to buy the good at a specific price. The ability to buy a good or services is determined by the individual wealth or income. The law of demand expresses a relationship between the quantities demanded and its price. Assuming other things being equal, quantity demanded of a good or service has an inverse relationship with its own price. The theory of demand in economics is a major subject in microeconomics which is described as the theory of consumer behaviour. Individual demand is derived through utility maximisation subject to the income constraint due to the fact that demand reflects individual taste and preferences backed up by the ability to pay, and it is a reflection of individual utility. The equation derived after utility maximisation is known as the demand function which is also called the Marshallian demand function.

However, the nature of demand for health care services differ to a large extent from the Marshallian demand function because health care is a derived demand. Health care as a derive demand means individuals demand for health care to obtain good health. An individual may not derived direct utility from the consumption of health care except the consumption of health care leads to good health. For instance, some treatment options and medications may not be pleasant for the individual although this will eventually lead to good health. The theory of demand for health care has been examined in health economic literature. Prominent and notable among these theories is the Grossman human capital mo

3.2.5 The Grossman model (1972)

The Grossman model is a human capital model of demand for health and health care developed by Grossman (1972) based on the neoclassical framework. The model is constructed within a human capital framework where health is seen as a durable capital stock, which depreciates over the life time. The Grossman model assumes that an individual has an inter-temporal utility function which is derived from health care consumption (to improve health stock) and the consumption of other commodities under certainty. In the Grossman model, the demand for health care inters the health production function because the demand for health care services is a derived demand for health. Health care services are not demanded for their own sake, but rather as a means to achieve good health through improvement in health status. Health is therefore seen as the outcome of productive processes and choices are made to maximise utility subject to the life time discounted income. The health status can be improved upon through investment in inputs such as a healthy lifestyle, health care utilisation, exercise, good diet and recreation.

The Grossman model assumes a reduced form demand model where health is demanded as a consumption and investment good. Health as a consumption good improves utility and overall welfare of individuals while health as an investment good increases the number of healthy days used for market and non-market productive activities to earn income since sound health enables an individual to participate in economic activities to earn income, therefore, an individual will continue to demand for health care so as to increase the stock of his/her health given the condition that the marginal cost of investment in health is lower than the marginal returns derived from the consumption of health care. Consumption will continue until the marginal cost of investment is equal to the marginal rate of returns and death occurs when health stock declines beyond a certain minimum point.

The Grossman model and its theoretical and empirical extensions (Muurinen, 1982; Wagstaff, 1986; Van Doorslaer, 1987; Wagstaff, 1993 and Erbsland et al., 1995) provides important insights into the individual's decision to seek health care but provides little or no idea on the of broader socioeconomic, demographic and cultural determinants of demand for health care which are vital in explaining the determinants of health care utilisation in developing countries like Nigeria. The Grossman model is said to relate the demand for health care to the health production function of an

individual without looking at the determinants of health care utilisation. However, the model provides the basis for the analyses of the determinants of health care utilisation.

3.2.6 Other health care utilisation models

There are other health care utilisation theories and models although not directly related to health economics; these models include the Parson's (1951) sick role model, Mechanics (1978) general theory of heath seeking and Suchman's (1965) stages of illness and medical care. Others include the Rosenstock's (1994) health believe model, Andersen's (1968) and revised Andersen(1970, 1980, 1990) health behaviour model, and Young's (1981) choice making models. All the theories except that of Anderson do not discuss clearly the determinants of health care utilisation.

The Parson's model (1951) is directly related to individuals who seek for health care when they are ill. The model describes the sick role which a person takes when ill and his/her decision to seek health care. The model though useful in terms of explaining issues pertaining to health care utilisation does not identify the direct factors that determine health care utilisation. The Mechanic's (1978) general theory incorporates decision points which determine illness behaviour as well as the response of patients in seeking health care. The theory states that autonomy and heteronomy influence health care utilisation. However, this theory is centred on psychological approach to health care utilisation rather than the determinants. Suchman's (1965) stages of illness and medical care is related to Parson's (1951) model, the theory indicates five stages of individual decision to seek care when ill from the time the individual feels pain and has the symptoms of illness to the time of recovery. This theory is also focused on psychological aspects of health care utilisation without outlining clearly the determinants. Rosenstock (1994) health beliefs model state that the individual action to treat and prevent disease depends on the perception the person has about the severity of illness and the perceived cost as well as benefit of treatment and prevention. This model also does not bring out clearly the determinants of health care utilisation. Young's (1981) model incorporates four components that are most essential to the individual's health service choice; this include the perception of gravity of illness, knowledge of a home treatment option, the faith in remedy option and the accessibility of treatment. The theory shows that accessibility of treatment has the most important influence on health care utilisation. Young's (1981) model of health

care utilisation reveals important reasons why some people do not seek for health care although it also did not point out the determinants of health care utilisation.

3.2.7 The Andersen model

Andersen (1968) and Andersen and Newman (1995) health care utilisation model related health care utilisation to its determinants. they categorised the determinants of health care utilisation into three; the predisposing, the enabling and the need based factors. The predisposing factors shows the likelihood to utilise health care based on sociocultural and demographic characteristics of the individual; these include, education, occupation, ethnicity, social networks, social interactions (religion), age, gender as well as the beliefs of health care benefits and knowledge that people have concerning the health care system. The enabling factors consist of the logistical aspects of obtaining health care, these include; individual/family and community resources. Family resources comprise of economic status and location of residence; it involves the means and knowhow of access to health care such as income, health insurance, travel and quality of relationships. The community resources incorporates access to health facilities and availability of persons for assistance, these include availability of health personnel and facilities as well as waiting time. The need factors are those factors that predisposed an individual to seek for care due to individual, societal or clinically evaluated perception of need for the health care. This involves needs that come about due to functional or health problems that necessitates health care utilisation.

Andersen (1995) incorporated health care system into the model as a determinant of health care utilisation; the health care system based on the model is made up of health policy, health resources and organisation as well as their changes over time. Health resources includes the availability of health care providers and their level of education and available facilities while the health system organisation reflects how the health system manages it resources and this affects access and structure of health care. The volume of health personnel and their quality as well as how health care resources are distributed therefore affects health care utilisation. The 1995 model also included the issue of consumer satisfaction which has to do with convenience, quality financing and provider characteristics. Andersen (1968) and Andersen and Newman (1995) provide details on the determinants of health care utilisation. The model shows that health care utilisation is determined by income, education, health

insurance, travel such as distance to a health facility, availability of health care providers, ill health or morbidity.

3.3 Empirical literature

Most of the studies in Nigeria and other countries are centred on the determinants of maternal and child health care utilisation carried out by the public health and medical research namely, Babalola and fatusi (2007), Adamu (2011), Okech *et al* (2011), Oresanya *et al* (2008), Dairo and Owoyokun (2010) and Nwosu et al (2012) and Goland *et al* (2012). Few are related to inequity in utilization of one or two maternal and child health care services but are not studies for Nigeria. They include; Zere et al (2011), Bonfruer *et al* (2012), and Schellenberg *et al* (2003). Only one study on child health care in Nigeria is equity related; the study by Antai (2011). Others are related to inequality in one or two maternal and child health care utilisation namely; Houweling *et al* (2007) as well as Say and Raine (2007). In this section, studies on inequity and determinants of maternal and child health care services utilisation will be discussed.

3.3.1 Inequity in maternal and child health care utilisation
Inequity in maternal health care

Houweling *et al* (2007) describe pro-rich inequality in use of skilled delivery and antenatal care for 45 developing countries and compared these with inequity in the use of child health care. Results show that the use of the services is low among poor women, therefore, wealth and maternity care are linked across the entire wealth hierarchy within countries. They observe that pro-rich inequalities in skilled delivery care are larger than those in antenatal care. Skilled delivery among poor women is below 30% in most developing countries while antenatal care is at least 30%. They found that antenatal care is high and skill delivery is low among the poorest women compared to child hood immunisation and treatment of respiratory infection. Houweling *et al* (2007) though related to this study is centred on inequality measurement which is not the focus of this study. Inequality when standardised for the differences in need and non-need variables becomes inequity.

Zere *et al* (2010) observe high level of socioeconomic inequity with pro-rich bias in the antenatal care and delivery in the private health facilities as well as skilled

delivery by doctors in Namibia. They found that skilled delivery utilisation in the richest quintile is about 70% more than that of the poorest quintile. They observe that, skilled delivery is 47% and 39% higher among those with higher education and among those in the richest quintile.

Bonfruer *et al* (2012) find out whether health care utilisation matches needs, in 18 Sub-Saharan Africa countries. Their study was only focused on antenatal care and skilled birth attendants since the mothers of all children should receive these health care interventions. They found that despite the homogenous need across sample, irrespective of income and education, pro-rich inequity in all countries was observed with estimated concentration indices for antenatal care ranging from 0.07 in Zambia to 0.39 in Comoros and skilled birth attendants ranging from 0.17 in Ethiopia to 0.66 in Senegal. Wirth *et al* (2008) observe that in some cases urban dwelling shows the strongest and significant in utilization of maternal health care. Bonfruer *et al* (2012) has a shortcoming of estimating the concentration index without standardising for the differences in need and non-need variables using the standard health economics approach.

Inequity in child health care

Studies on child health care use also show similar dimensions of socioeconomic inequity in child health care utilisation. Schellenberg *et al* (2003) conducted a study on inequity among the very poor in terms of health care utilisation for rural southern Tanzania. Results suggest that the main differences between the poor children and those from rich parents is not in the likelihood of child falling ill, but in the probability of obtaining suitable treatment once ill. Mothers of children from wealthy families were more informed about the health risks of their children and as such take their children to health care centres when ill than poorer women. Children from wealthy homes were more likely to have received anti-malaria and antibiotics for pneumonia and were more frequently admitted to a hospital and children from poor families were more likely to be prescribed ORS at a health facility than children from rich families.

Antai (2011) establishes a persistent inequity in immunisation within and between rural-urban inequities in immunisation in Nigeria. Rural children were disadvantaged in the proportion of receiving full immunisation and individual vaccines. Children in rural areas have 42% lower likelihood of receiving full immunisation compared to children residing in urban areas. Results from the analysis show that out of 937

children that have received full immunisation, only 9% were rural and 641 (34%) urban children. A higher proportion of rural children in comparison to urban children had not received BCG, DPT_1, DPT_2, DPT_3 and OPV_3 and measles vaccines. In terms of ethnicity, children of mothers from Igbo origin have greater likelihood of receiving immunisation than children of mothers from Hausa/Fulani/Kanuri ethnic groups. He also found variation in children immunisation that is accounted for due to age, as mothers who were 34 years or older had 56% likelihood of receiving full immunisation compared to children of mothers between 24 and 28 years. Antai (2011) also observes education of mothers as having a significant effect in the likelihood of children being immunized. Children of mothers with no education had 31% likelihood of receiving full immunisation than children with mothers that have secondary school or higher education.

Oresanya *et al* (2008) find that the possession of ITN do not differ significantly by wealth index. The fact that the possession of any net varied by household wealth with the rich more likely to own any net than the poor may be a better indication of the relationship between wealth and net ownership. Their findings high lights poverty as a potential barrier to scaling up ITN use in Nigeria, they also found education as a determinant of bed net ownership

Note that these studies on inequity in maternal and child health did not measure horizontal inequity which is the standard way of estimating inequity in health economics because, inequity is analysed in the context of what is fair and unfair in determining differences in utilisation, this is achieved by standardising factors that are the contributors to inequality into need variables and non-need variables The studies reviewed in this section did not follow this approach, some of the studies used regressions without standardisation, some used only the concentration curves, others used the concentration index only, while others use descriptive statistics to analyse inequity which is actually not the standard form and does not give the true picture of inequity. This study however fills this by analysing horizontal inequity which is obtained through standardisation for differences in need and non-need variables.

3.3.2 Determinants of maternal and child health care utilisation

Maternal and child health care utilisation is reported to vary in developing countries with most findings showing differences in utilisation between the rich and the poor, and between women living in the urban and the rural areas. The literature shows that

factors relating to the place of residence and socioeconomic status may account for variation in the use of maternal and child health care. Some of the factors outlined in the public health literature include women's age, ethnicity and educational status of women, religion, culture, clinical need for care and the decision power of women. Evidence from cross sectional studies shows that the use of maternal health care varies within and between countries (Say and Raine, 2007). Within countries, urban or wealthy women are usually more likely to deliver with the help of a skilled personnel and medical place of delivery than the rural poor women. Say and Raine (2007) find that in some countries like the Guatemala and Tajistan, economic status did not affect the use of maternal health care. Other studies show that wealthy women were more likely than the poorer ones to receive early antenatal care. The literature categorises factors that affect maternal and child health care utilisation into **socioeconomic** factors and the **demographic** factors. Socioeconomic factors are factors that account for differences in utilisation due to income or wealth status and educational status of women, while demographic factors are differences in utilisation as a result of women's age, their ethnic groups and their location or area of residence.

Socioeconomic factors

Socioeconomic factors according to Babalola and Fatusi (2007) is a consistent significant predictor of utilisation at the household level that is positively related to the use of antenatal care. Socioeconomic factors in the literature is related to income and education as it affects utilisation of maternal and child health care services. According to Babalola and Fatusi (2007), education is noted as the only individual level variable that is consistently a significant predictor of maternal health care utilisation in antenatal care. Adamu (2011) also identifies educational status of women as a strong predictor of maternal health care utilisation. The literature identifies the place of education as being associated with socioeconomic position as well as knowledge and skills affecting the ability to understand health risks and access health care (Babalola and Fatusi (2007).

Zere et al (2011) find a significant difference favoring the educated in the utilisation of skilled birth attendants among educated women at the post secondary level. Utilization of skilled birth attendants is almost twice for the educated than that of women with no education. Therefore an increase in a woman's education from each level to the higher

level is associated with an increase in the uptake of interventions of skilled birth attendants.

Goland et al (2012) similarly find a significant relationship between household wealth and education associated with antenatal care coverage and skilled birth attendants. They compared the influence of ethnicity and wealth. They also found an association between the use of health care independent of ethnicity. As women who belong to an ethnic minority and live in a poor household had an almost tenfold risk of not receiving antenatal care as compared to ethnic majority women living in a non-poor household. Multi-variate analysis of determinants shows that education wealth and ethnicity were all significantly associated with skilled birth attendance

Say and Raine (2007) demonstrate variation due to socioeconomic factors in the use of maternal health care across population within and between 23 developing countries. Similarly, Jat et al (2011) analyse factors affecting the use of maternal health care services in Madhya Pradesh state of India. Results show a considerable amount of variation in the use of maternal health services at community and district level. About 40% and 14% of total variation in use of antenatal care and 29% and 8% of total variation in use of skilled attendance at delivery was observed. The results show that socioeconomic status and mother's education were the most important factors associated with the use of antenatal care and skilled birth attendants at delivering.

Babalola and Fatusi (2007) find that education, ethnicity, residence, age at birth of last child, and attitude towards family planning are significant in the use of antenatal care in Nigeria. The Igbo ethnic group are likely to utilise skilled delivery care than the Hausa ethnic groups. This was anchored by Adamu (2011) and Zere et al (2011). Goland *et al* (2012) used the logit regression to establish a significant relationship between household wealth, education and ethnicity associated with antenatal care and skilled delivery utilisation,

Nwosu *et al* (2012) used count data models to investigate the determinant of antenatal care service utilisation in Nigeria. The results show that wealth, region and women education beyond primary educational level increases antenatal care utilisation. Arthur (2012) used the 2008 Ghana Demographic and Health survey data to investigate the effect of wealth on antenatal care utilisation in Ghana. Results show that wealth has a significant influence on antenatal care use in Ghana. Education, age, number of living children, transportation, regions and health insurance are other

factors that were found to influence the use of antenatal care in Ghana. Say and Raine (2007) demonstrate variation due to socioeconomic factors in the use of maternal health care across population within and between 23 developing countries. Other studies reviewed are Jat *et al* (2011), Owoo and Lambon-Quayefio (2013) as well as Nketiah-Amponsah et al (2012). Oresanya *et al* (2008) found that wealth index and education are significant in determining the possession of ITNs for children in Nigeria.

Nwosu *et al* (2012) used count data models to investigate the determinant of antenatal care service utilisation in Nigeria. The results show that women education beyond primary educational level increases significantly the likelihood that a pregnant woman would complete at least four antenatal visits before delivery. Results also show that household wealth status has significant positive effect on the number of visits before delivery.

Demographic factors

Babalola and fatusi (2007) find age at birth of last child and attitude towards family planning as the most significant individual level predictor for the use of antenatal care in Nigeria. Health service is also a function of ethnicity. Compared to the Hausa ethnic group, the Igbo's are more likely to report use of skilled delivery. And use is higher for urban than the rural residents.

Zere *et al* (2010) in his study of inequity in the utilisation of maternal interventions in Namibia find no significant difference in the regional distinction of the provision of antenatal care by skilled providers, they observe a remarkable difference in the delivery by skilled health workers, caesarean sections and postnatal checkups, as women in urban areas are delivered by skilled providers 30% more than their rural counterparts. Similarly,

Goland *et al* (2012) find a significant relationship in ethnicity associated with antenatal care coverage and skilled birth attendants. They found greatest discrepancy between ethnic groups where the ethnic minority women had more than tenfold risk of not receiving antenatal care. They observe that the greatest disparity was accounted for by ethnic groups among all other variables. Stratified logit regression reveals an increased risk for minority women of not utilising antenatal care independent of their economic status

Nwosu *et al* (2012) also find significant differences in Nigeria in the number of antenatal visits determined by geo-political zones and the place of receiving antenatal

care. Pregnant women in the North West and North East would have 18% and 10.7% lower antenatal visits relative to the North central. They find a higher percentage increase in use of antenatal care in the South East, South West and South-South relative to North Central and this corresponds to 29.8, 43.2 and 96.4 percent respectively.

Dairo and Owoyokun (2010) conducted a cross sectional study using questionnaire in two local government areas in Ibadan to examine the factors that determine the utilisation of antenatal care service in Ibadan. Results show that majority of the respondents attended antenatal clinic. However, women in urban areas were more than two times likely to attend antenatal clinic than women in urban areas. Women who were muslims or other religions were more than two times likely to attend ANC clinic than women who were christians. Also, women who were 25 years and older were more than two times more likely to utilise antenatal care.

Arthur (2012) used the 2008 Ghana Demographic and Health survey data to investigate the effect of wealth on maternal health care utilisation in Ghana via its effect on antenatal care use. Results show that wealth has a significant influence on adequate use of antenatal care in Ghana. Education, age, number of living children, transportation, regions and health insurance are other factors that were found to influence the use of antenatal care in Ghana

Ortiz (2007) used the two part model to estimate the determinants of demand for antenatal care utilisation in Columbia. His findings shows that region and age of mothers influence antenatal care utilisation as mothers from pacific regions as well as young mothers have lower probability of attending the first visits but these factors are not related to the number of absences to antenatal consultation once the first visits has been established.

Role of insurance

A number of studies have found that access to health insurance plays a critical role in women's decision to utilise maternal and child health care services. Owoo and Lambon-Quayefio (2013), explores the importance of social influence and the availability of health insurance on maternal care utilisation in Ghana through the use of antenatal care services. Using the DHS data and controlling for a host of socioeconomic and geographical factors, results show that women who have health insurance appear to use more antenatal services than women who do not.

Nketiah-Amponsah *et al* (2012), examined the key factors influencing the utilisation of antenatal care services using the most recent Ghana Demographic and Health Survey data, they found ownership of health insurance is a significant predictor of the utilisation of antenatal care services.

Other factors

Houweling *et al* (2007) Indentify demand factors which are influence of cultural beliefs and practices, disparity in care by professionals and involvement in decision making by women as contributing to the larger inequalities in the use of skilled delivery and antenatal care in the 45 developing countries examined. Supply factors were also observed as determining inequality in the use of care. Supply factors identified has to do with accessibility, availability and nature of services needed and provided

Titaley *et al* (2010) used primary data to analyse why some women do not attend antenatal and postnatal care visits in six villages in three districts of Indonesia. Results showed that financial constrain, cost of health services, transport cost in remote areas, limited availability of health services, distance from facilities and lack of community awareness of the importance of the services were major factors that deter most women from attending antenatal and postnatal care.

This study however attempts to fills the gap by including access variable in the utilisation model which is not done on studies related to Nigeria. Also, a separate regional analysis is carried out to find out the regional differences in results. Also, variables are interacted to find out which one variables has the greatest impact, these include, the influence of education and religion, the influence of region and wealth, the influence of religion and education, the influence of religion and region the influence of wealth and religion as well as wealth and residence.

Inequity in general health care use

Gerdtherm (1996) tests the null hypothesis of no horizontal inequity in delivery of health care by the use of count data hurdle models and Swedish micro data. He found out that need proxy by morbidity has a significant positive effect on health care utilisation. He rejects the null hypothesis of no inequity because socioeconomic factors have significant effects on utilisation. Income and place of residence has a significant positive effect on the probability of visiting a physician.

Cisse *et al* (2007) used dominance relation as a criterion for making inequality comparisons. The result confirms that inequality is present in health care financing and delivery system in favour of the better-off and these inequities vary between countries.

Asada and Kephart (2007) find that low income is associated with less contact with general practitioners. But among those who had contact, low income and education are associated with greater intensity of use of general practitioners as such, socioeconomic inequity in the use of health care exists in Canada.

Curtis and Macminn (2008) observe a positive relationship between socioeconomic status and health care utilisation over time. They note that inequities are increasing over time and positively related to the probability of any visit to a doctor. But hospital admissions and length of stay are inversely related to socioeconomic status.

Bonfruer *et al* (2012) used the concentration indices for any care and inpatient care to illustrate that considerable socio economic inequality in favor of the rich exist in 18 countries in Sub-Saharan Africa. Results suggest that socioeconomic inequities in outpatient care are mostly related to wealth, which implies that the use of care is mostly determined by people's ability to pay for care and not so much by their ill health – status. The only exception to these findings is Mauritius where inequities in both types of care are virtually absent, that is health care use in Mauritius is pro-poor because of their higher per capital income. In Burkina Faso, Chad, Ethiopia and Mauritania, people living in urban locations are more likely to use in patient care than people in rural areas. There is a strong correlation between health care use and secondary as well as post secondary education.

Layte and Nolan (2004) analysed the extent of equity in health service delivery across the income distribution in Ireland, they find that almost all services apart from dental and optician services are used more by those at the lower end of the income distribution but that this group also has the greatest need for health care. This shows that utilisation of basic health services is pro-poor in terms of inequity.

One important thing to note about the studies on equity in health care utilisation is that, inequity in health care use is either pro-rich or pro-poor. Studies in developed countries shows pro-poor inequity in general and essential health care use. Pro-rich inequity is only observed in specialised care (Layte and Nolan, 2004; Curtis and Macminn, 2008). In high income countries poorer individuals consume more health care resources as a result of their lower health status and so, great need for care.

This suggests that, developed countries display a better need responsiveness. By implication, countries with higher income and level of education with better governance and more effective institutions as well as less urbanisation display better need responsiveness, (Bonfruer *et al,* 2012). Studies in developing countries show pro-rich inequity in utilisation of all the health care services. The reason is, socioeconomic inequities in health care use exist due to the fact that health care use is mostly related to wealth and ability to pay. In low income countries, the lack of health insurance and low purchasing power among the poor mean that utilisation of heath care is less than that of the rich. (O'Donnel *et al*; 2008, Bonfruer *et al*; 2012)

In all these literatures, none used the standardisation method for the analysis of equity in maternal and child health care. Also, the determinants of maternal health care utilisation such as distance to health facility and transport to health facilities, "no provider" and "no female provider" are not found in the literature. This study however intends to fill this gap.

3.4 Methodological literature

This section provides a review of literature on the methodology used to measure inequity in health care utilisation as well as the determinants of maternal and child health care utilisation.

3.4.1 Measurement of inequity in health care utilisation

Most of the empirical work on equity in health care delivery and utilisation are based on the concept of horizontal equity. Wagstaff et al (1991) gave an account of different methods used over time on the measurement of horizontal inequity in the delivery of health care. Among them are the Le Grand (1978) approach and others like the concentration curve approach, the Collins-Klein approach, the regression approach, and the discrimination literature. Other methods which he used in the literature are the direct and the indirect standardisation.

Le Grand (1978), analysed equity in health care delivery in the British National Health Service (NHS). He computed the cost to the NHS per person reporting illness in each socioeconomic group (SEG). This is obtained by dividing each group's total imputed expenditure by the number of persons reporting either chronic or acute illness in the group. Le Grand (1978) was criticised by Wagstaff et al (1991) on the ground that he relied on comparisons between the bottom and top SEGs. And his approach

focuses exclusively on the extreme classes and fails to take into account their relative sizes. Le Grand also fails to recognise that the sick and those receiving health care may not be identical populations.

3.4.1.1 The concentration curve approach

Wagstaff et al (1991) suggested the use of the concentration curve approach as a way of extending Le Grand's approach to allow the extent of inequity to be quantified in a way that overcomes the limitations of Le Grand's range measures, they suggest ranking the individuals not according to their SEG but according to their income, beginning with the poorest. And then construct an illness concentration curve which plots the cumulative proportions of the population ranked by income against the proportions of persons reporting illness.

Collins and Klein (1980) suggest an alternative to Le Grand's approach. They divide their sample into several need categories, such as the non-sick, the acutely sick and the chronically sick. They then compare the resources received by each of the SEGs within each need category. This approach is rather more reliable than Le Grand's approach. The problem with the Collins-Klein approach is that mean expenditures could be the same for both income groups within the chronic and acute categories even if there is inequity in the provision of health care.

To solve the problem associated with Collins and Klein (1980) approach. Puffer (1986) suggests that the assumptions of proportionality and similar treatment of the acutely and chronically sick might be relaxed by using regression analysis. He estimates an equation relating medical care consumption to measures of health status, income, age, sex and interaction terms between income and the other variables. The parameters are estimated with the use of structural model by a single equation model and then the existence of income-related inequity is tested for.

3.4.1.2 Direct and indirect standardisation

Wagstaff et al (1991), Wagstaff and Van Doorslare (2000), O'Donnel et al (2008) and Ourti et al (2012), advocate steps for the use of the standardisation method for measuring horizontal inequity. According to O'Donnel et al (2008), to measure inequity or inequality in health care use, utilisation of health care must be standardised for differences in need. After standardisation, any residual inequity in utilisation either by income or other factors is interpreted as inequity which is either pro-poor or pro-

rich. Standardisation implies identifying other factors apart from income that can account for inequity and differences in utilisation. For instance, poor health status, lack of insurance coverage, age, and place of residence may account for inequity. Therefore, a researcher must standardise for differences in the need variable. In the literature, Wagstaff and Van Doorslare (2000) as well as O'Donnel et al (2008) identify two major methods of standardisation; the direct and indirect. Van Ourti et al (2012) identify two methods of measuring horizontal equity in health care use; the method by Wagstaff and Van Doorslare (2000) and the method by Fleurbaey and Schokkaert (2009). The method by Wagstaff and Van Doorslare (2000) is the direct and the indirect standardisation, while the method by Fleurbaey and Schokkaert (2009) is the structural model which has its origin from the social choice theory. These methods will be discussed one after the other.

3.4.1.3 Direct Standardisation

This approach divide one's sample into income groups and then compute need–standardised medical care figures for each income group. The figures indicate how much medical care people in each income group would have received if they had been in the same degree of need, (Wagstaff and Doorslare, 2000).

3.4.1.4 Indirect Standardisation

The direct standardisation approach has a disadvantage; it requires the use of grouped data and its usefulness is limited by the fact that the index will depend on the number of groups. The indirect standardisation employs individual and grouped data. The indirect standardisation generates a figure for each individual indicating the amount of medical care he/she would receive if he/she had been treated like others with the same need characteristics. The indirect method gives the difference between the actual distribution of use and the distribution that would be expected given the distribution of need, (Wagstaff and Van Doorslare, 2000) and O'Donnel et al, 2008). The direct and indirect standardization can be estimated by a regression model that is either linear or non linear. The models are estimated as probit model, logit model, Poisson and negative binomial model.

The direct and indirect standardisation provides a partial picture of health care across the full distribution of population by income. The use of direct and indirect standardisation is limited to two income groups namely the rich and poor. However,

when income groups are represented in terms of income quintiles with about four or five income groups, we use the **concentration curve** and the **concentration index** to measure inequity in health care use. Therefore, a complete picture is provided by using a concentration curve to measure inequity in health care utilisation.

3.4.1.5 The concentration Curve

The concentration curve is a major tool used by most health economists to measure inequity in the use of health care services. According to Fleurbaey and Schokkaert (2009), the concentration curve has become widely accepted and used in health economics because, a number of health economic studies have proposed and established a welfare economic foundation for its use. Fleurbaey (2006) demonstrated by saying that in determining the dominance theorem, a higher generalised concentration curve is equivalent to a greater welfare for all social welfare function of the kind.

The medical care or illness concentration curve shows the distribution of medical care by income. It graphs the cumulative proportion of medical care against the cumulative proportion of the sample, ranked by income. The concentration curve displays the share of health care accounted for by cumulative proportion of individuals in the population ranked from poorest to richest by income quintiles It shows inequity when need for medical care does not vary with income. If illness or medical care use is concentrated among the lower income groups, the illness or medical care concentration curve will lie above the diagonal, if illness or medical care use is concentrated among the rich, the concentration curve will lie below the diagonal. The concentration curve shows a line of equality which indicates the 45^0 line running from bottom left-hand corner to the top right hand corner. The illness concentration curve is then compared to an expenditure concentration curve which plots the cumulative proportion of the population against the proportions of total expenditure received, (Wagstaff and Van Doorslare, (2000) and O'Donnel *et al*, (2008), Wagstaff *et al* 1991).

3.4.1.6 The concentration Index

The concentration curve does not give a measure of the magnitude of inequity or inequality that can be compared conveniently across many time periods, between countries and socioeconomic groups. The concentration index which is directly related to concentration curve does quantify the degree of socioeconomic related inequity in

health care. The concentration index is defined with reference to the concentration curve. It is defined as twice the area between the concentration curve and the line of equality. When there is no socioeconomic related inequity, the concentration index is zero. The index takes a negative value when the curve lies above the line of equality indicating unequal concentration of health care among the poor. It takes a positive value when it lies below the line of equality. Wagstaff et al (2003) demonstrated that the concentration index of a health care variable is additively decomposable to the concentration indices of the determinants of that health care variable. It is expressed as the sum of the contributions of the various determinants of that variable with the unexplained residual component.

3.4.1.7 The structural model

Fleurbaey and Schokkaert (2009) developed a structural model to introduce the role of lifestyle and responsibility in determining fair and unfair inequalities in health and health care utilisation and access. Unfair and fair inequality in this sense means inequity or equity either in health and health care utilisation. they emphasise the role of social choice on equity, responsibility and compensation in determining legitimate and illegitimate inequality in health and health care delivery. The legitimate inequality is termed fair, while the illegitimate inequality is termed unfair. Inequity accounted for due to individual responsibility and lifestyle is referred to as fair or legitimate inequity. Unfair or illegitimate inequality is that accounted for due to differences in income and other socioeconomic factors. An equitable situation is a situation where unfair inequality does not exist.

The model is constructed by assuming that an individual health level is produced by a health technology which is a function of medical care consumed, consumption of other goods accounted for by lifestyle. The health level is also a function of individual social background characteristics as well as health endowments and biological consideration. The structural model is analysed for inequity in health care use by estimating a reduced form equation using appropriate econometric techniques. One important thing about this model is that, it specifies the role of individual responsibility in form of preferences and the choice of other consumption goods in determining fair and unfair inequality. The supply factor which affects accessibility of medical care is stated in the structural model as a function of medical care utilisation.

3.4.1.8 Empirical studies that apply the various methods of measuring inequity in health care utilisation.

Wagstaff and Van Doorslaer (2000) used the direct and indirect standardized technique to analyse inequity in the Netherland. They analysed the primary care, specialist and in-patient care using a two-part model to obtain standardised values. The first model they used is the probit model while the second is the truncated negative binomial model. Both indices suggested mild pro-poor inequity degree and pro-rich inequity in the delivery of specialist care.

Hotchkiss et al, (2010) estimated the concentration indices to assess the degree of inequity and inequality in contraceptive use by wealth groups over time in Nigeria, Uganda, Bangladesh and Indonesia using the DHS Data for actual, need predicted and need standardised contraceptive use. The study results suggest that in Nigeria and Uganda, actual modern contraceptive use was concentrated among the rich during the study period. In the two Asian countries; Bangladesh and Indonesia, actual modern contraceptive use was slightly pro-rich with the concentration declining from 0.04 in 1994 to 0.01 in 2007. Allin (2006) measured equity in use of health services using the indirect standardisation approach by Wagstaff and Van Doorslare (2000) at the country and provincial level. Results show a significant relationship between income, health and dental care use in most countries.

Zere et al (2011) analysed the causes of inequity in skilled birth attendance using a decomposable health concentration index. The concentration curve and concentration index show statistically significant wealth related inequities in delivering by skilled providers that are to the advantage of women from economically better off households.

Bonfruer et al (2012) measured socioeconomic inequalities in health care use by means of a concentration index. They used the corrected version of the concentration index suggested by Erreygens (2009) to measure inequity for maternal care and general health care use in Africa. Cisse et al (2007) used the concentration curve and indices to analyse progressivity and horizontal equity in health care finance and delivery in general, then, they examine its relevance for Francophone African capitals.

It is important to note that the available literature on equity in maternal and child health care do not standardise for differences in need and the non-need variables.

Therefore, the need and non-need variables are not defined in the maternal and child health care related literatures. This necessitates the review of other related literatures on how need and non-need variables are defined in the literature.

3.4.1.9 How is 'need' and health care utilisation measured in the empirical literature?

In the theoretical literature, the concept of need was discussed given the various definitions of needs by Culyer and Wagstaff (1993). Many empirical studies define need in different ways depending on the type of health care that is examined, either curative or preventive health care.

Most empirical studies use morbidity to measure need in health care utilisation, others used self assessed health status, others used number of visits as a measure of health care utilisation while others used age, sex, marital status and socioeconomic status as a measure of need and non need determinants of utilisation.

Grytten et al (1995) in their study of equity in Norwegian health care system used health status to reflect need for primary health care services by using health status measured by self reported data obtained on health status and whether the individual has reduced activities due to illness. Health status was also measured by background characteristics of the individual that is associated with illness like the age, unemployment. They measured health status behaviour like alcoholism and smoking.

Gerdtham (1996) used morbidity as a measure of needs. Layte and Nolan (2004) identify morbidities measures as falling between three main types depending on the underlying conceptual model; The medical, the functional, and the subjective measures. The medical need reflects a deviation from psychological norm. The functional measure reflects ill health and lack of ability to function, while the subjective measure reflects the individuals perception of his/her state of health. Cisse et al (2007) used self –reported morbidity to measure need. Respondents reported at least one episode of acute illness in the month prior to the interview.

Asada and Kephart (2007) measured health care utilisation by self reported number of visits or stays in the year prior to the survey. They measured needs by factors that predispose individuals to health care use, health behaviour and the health system factors. They measured utilisation of general practitioner, specialist care and hospital care by number of visits to the various specialist as well as overnight stay for the hospital care.

Allin (2006) measured health care utilisation by number of outpatient visits to the physician, general practitioner (GP), specialist and dental visits. Questions that capture visits were asked, for instance, "in the past 12 months, have you been a patient over night in a hospital and nursing home?"(Allin, 2006). Indicators of health care need include age, sex, self-assessed health in five categories (excellent, very good, good, fair and poor) and the presence of chronic condition and activity limitations.

Hotckkiss et al (2010) controlled for need of family planning services by generating questions on the desire for children at the time of the survey. A woman was said to have need for family planning if she wanted a child not sooner than two years following the survey, "wanted a child but was unsure of the timing", "did not want more children and currently pregnant". Women that are barren and those that want a child within the next two years were seen as not to have need of contraceptives.

Van de poel et al (2011) proxy need through rich array of self reported health problems and symptoms of chronic illness for medical condition. The medical conditions include; arthritis, angina asthma, depression, psychosis and tuberculosis. Non-need determinants of utilisation include marital status, education and employment. Socioeconomic status is measured by principal component score from analysis of asset ownership and household dwelling characteristics including sanitation facilities.

Bonfruer et al (2012) proxy medical care need by a set of self-reported health problems. Self assed health is measured on a point scale running from good to very bad for six chronic diseases such as arthritis, angina, asthma, depression, psychosis, and diabetes. The non-need related determinants of health care utilisation consist of marital status and occupational status. Bonfruer et al (2012) modeled maternal and child health care utilisation by constructing an indicator of whether the child's mother has received sufficient antenatal care defined as at least four antenatal visits to a medically trained skilled health worker and whether there are skilled birth attendants like doctors, nurses, or midwife.

3.4.2 Methodology on the determinants of maternal and child health care utilisation

In this section, literature on the various econometrics techniques other studies have used on the estimation of determinants of maternal and child health care services

utilisation will be reviewed. The technique ranges from the logit model, descriptive statistics, the poison model, the negative binomial model and the two-part model.

3.4.2.1 The logit, poison, negative binomial, and two-part model.

The logit model has been widely used in estimating the determinants of maternal and child health care utilisation. Some studies used the logit model to estimate the determinants of antenatal care and skilled delivery (Babalola and Fatusi; 2007, Goland et al ; 2012, Nketiah-Amponsah et al; 2012, Arthur; 2012), some studies used the poison or negative binomial model to estimate the determinant of antenatal care (Nwosu et al, 2012) while others used the two- part model (Ortiz, 2007) to estimate the determinants of antenatal care utilisation.

3.4.2.2 The Two-part model

The two part model is an econometrics model for estimating health care demand. The utilisation of health care services in general has two important characteristics that are vital in selecting the appropriate estimation method. Health care demand depends on two decision processes; in the first stage, the individual decides to either utilise the health care services or not. In the second stage, the individual and the health care provider decide on the intensity of use of the health care. For health care service utilisation like the antenatal care which is usually measured by number of visits, the use of negative binomial or poison regressions provides the appropriate method of estimations since the number of antenatal visits are counted.

However, in terms of estimation of antenatal visits using the negative binomial or poison regressions, the distribution of antenatal visits takes only non negative integer values and ignores all the zeros. This implies that, the decision of individuals with no antenatal visits are not taken into consideration in the analysis, while others with single or multiple visits are overrepresented in the model during the survey. Conceptually, the two part model can solve the problem of excess zeros and is a more appropriate model than using negative binomial or poison model. Comparing the poison model and the negative binomial model, the poison model assumes that the mean is equal to the variance and every count is independent of each other. The variance of health care utilisation often exceeds the mean, as one visit to a physician or one stay at a hospital may relate to the subsequent visits. The zero negative binomial

model relax the independence assumption and allows for over-dispersion (Asada and Kephart, 2007). The negative binomial regression model provides a better fit to health care utilisation than the binomial or poison models. Given the peculiar nature of antenatal visits in Nigeria where over 40 percent of respondents do not go for antenatal care, there exists the problem of excess zeros as such, the use of only logit model or negative binomial only in the analysis of antenatal care utilisation may lead to inconsistent parameter estimates and hence misinterpretation. This is the weakness found in Nwosu et al (2012) and other past studies on the determinants of antenatal care utilisation in Nigeria.

Secondly, according to Ortiz (2007), health care utilization partly involves agency problem in terms of demand inducement. In this case, the patient takes decision of attending the first medical visit but further decisions are decided by patient and medical doctors where each one maximises her utility function and takes advantage of some information asymmetry problems. To overcome this problem, the two part model on health care demand has been widely used to separate the two decisions of first deciding to seek medical care, and then to determine the frequency of visits. In this study, the individual in this case; the pregnant woman decides whether or not to seek antenatal care. In the second stage, the health professional determines the frequency of visits which is usually at least four antenatal visits according to the WHO standard.

The two-part model entails that, the first stage of the decision process is empirically measured by the logit model that predicts use of antenatal care. Then in the second stage, the negative binomial model is used to estimate the intensity or frequency of antenatal visit. Based on Gerdtham's (1996) two stage hurdle model, Deb et al (1999) as well as Nunez and chi (2013), two equations are estimated the first is specified as a binary logit model for the probability that a woman attends antenatal care or not. This is written as;

$$\text{Prob(antenatal visits} > 0) = 1/(1 + \exp(-X_i * a) \quad \text{.. (1)}$$

Where X_i is a row vector of k given individual characteristics (e.g gender, age) and a is a set of parameters to be estimated.

In the second equation, a negative binomial model is specified to model the frequency of antenatal visits by a woman. This is specified as;

$$(\lambda_i \mid \lambda_i > 0) = \exp(\textstyle\sum b_j X_{ji})\exp(e_i), \quad \text{.. (2)}$$

Where Xi is a row vector of K given individual characteristics, b is a set of parameter to be estimated and ei is the error term.

3.5 lessons learned from literature review and value additions of reviewed literature

The theoretical, empirical and methodological literature gives the following lessons.

1. Inequity occurs in health care utilisation when non-need variables affect health care utilisation. This was demonstrated in the welfare model by Gravelle *et al* (2006).

2. Social-economic factors are the major non-need variables that affects inequity in health care utilisation

3. In defining inequity in utilisation, the role of responsibility is important in determining what is fair and unfair. This is the true definition of inequity. This idea was demonstrated by Fleubaey and Schokkaet (2009)

4. Need variables may not necessarily be ill health, any factor that predispose an individual to utilise health care is a need variable.

5. concentration curves and standardized concentration index for need and non-need variables have welfare foundation for the measurement of horizontal inequity in health care utilisation.

6. In analysing determinants of maternal and child health care in Nigeria, income, education region, ethnicity and residence are important factors to consider.

    Given the above lessons, in the literature, the value additions are;

➢ The use of concentration curves and standardised concentration index for need and non-need variables to provide a true picture of the profile horizontal inequity in both maternal and child health care utilisation is a value addition not found in other studies in Nigeria.

➢ The use of the two-part model in the analysis of antenatal care to show the impact and role of the independent variable at each stage of decision in Nigeria is a value addition.

➢ Also, the inclusion of access variables in the model for maternal and child health care utilisation which are; "distance" and "transport" to health facility, "no provider" and "no female provider" as well as "no immunisation drugs" are value additions

- Introduction of religion in the theoretical framework to represents the role of responsibility are value additions in this study.

- Others are regional analysis, variable interactions to track the variable that have impact in the utilisation model. The use of the five sets of NDHS data. These are value additions not found in other studies for Nigeria .

Summary of empirical literature

The summary of the empirical literature is presented in table 3.1

Table 3.1 Summary of Empirical Literature Review

study	Maternal and child health care	Methodology	Main findings
Babalola and Fatusi (2009)	Antenatal care	Logit regression	Regional and socioeconomic disparity
Oresanya *et al* (2008)	ITN use by under-five.		Pro-rich use of INT
Houweling *et al* (2007)	Skilled delivery and antenatal care, immunisation	Concentration index	Pro-rich inequity
Nwosu *et al* (2010	Antenatal care	Poison model	Observed differences in utilization
Hotchkiss *et al* (2010)	Contraceptive use	Concentration indices.	Found pro-rich inequity
Bonfruer *et al* (2012)	General health care, and maternal health care	Concentration index	Socioeconomic inequity are related to wealth
Zere *et al* (2010)	Skilled delivery, antenatal care and postnatal care.		Found regional disparity.
Zere *et al* (2011)	Skilled delivery	concentration index	Pro-rich inequity in skilled birth attendants. Education is also significant.
Goland *et al* (2012)	Antenatal care coverage and skilled delivery	Logit regression	Found regional and socioeconomic disparity
Antai (2011)	Immunisation		Pro-rich inequity.
Nketiah-Amponsah *et al* (2012)	Antenatal care	Logit regression	Insurance is a major determinant of antenatal health care utilisation.
Schellenberg et al (2003)	General child health care	Descriptive statistics	Pro-rich inequity
Raine (2007)	General maternal health care		Socioeconomics variation in utilisation
Jat *et al* (2011)	Antenatal and skilled delivery care	Descriptive statistics	Socioeconomic variation in antenatal and skilled delivery utilisation.
Author (2012)	Antenatal care	Logit model	Wealth as significant determinant of antenatal care use
Dairo and Owoyokun (2010)	Antenatal care	Descriptive statistics	Socioeconomic, demographic and religious variation in utilisation.
Ortiz (2007)	Antenatal care	Two-part model	Regional and age variation in utilisation.

CHAPTER FOUR
METHODOLOGY

Introduction

This chapter contains the methodology of the study. The chapter is made up of the theoretical framework, the empirical model specification, the econometrics technique, data description and data sources.

4.1 Theoretical Framework

In this section, two theoretical frameworks are specified based on the two objectives. The first is the theoretical framework on horizontal inequity analysis of maternal and child health care utilisation, the second is on the estimation of the determinants of maternal and child health care utilisation. The theoretical framework for horizontal inequity analysis follows the social welfare model by Gravelle *et al* (2006) as well as Fleurbaey and Schokkaet (2009). The model by Gravelle *et al* (2006) is modified by adding a variable obtained from Fleurbaey and Schokkaet (2009). The variable captures the role of responsibility in determining if inequity is legitimate/fair, or illegitimate/unfair. In the theoretical framework for this study, the assumption of equal marginal level of utilisation is violated because of differences in preferences for maternal and child health care utilisation. Preferences in this respect accounts for the illegitimate difference in health care utilisation as pointed out by Fleurbaey and Schokkaet (2009). The Grossman (1972) model of demand for health care as well as Andersen and Newman (1995) model of health care utilization are used as theoretical frameworks for the determinants of maternal and child health care utilisation.

4.1.1 The social welfare maximisation framework for inequity analysis

The theoretical framework for inequity analysis depicts a scenario where social welfare maximisation yields horizontal and vertical equity as a necessary condition for an optimal allocation of maternal and child health care utilisation. Based on the model

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by Gravelle *et al* (2006), the policy makers assume a welfare function of a set of women and children in the Nigerian health care population which is given as;

$$V_i = V(y_i, x_i, c_i, p_i) = \left(\alpha_0^0 + \alpha_1^0 x_{1i} + \alpha_2^0 x_{2i} - \alpha_3^0 c_i + \alpha_4^0 p_i\right) y_i - \frac{1}{2}\theta y_i^2\right) \quad ....(1)$$

Where V_i is the welfare that accrues to each woman and child from their utilisation of the available maternal and child health care. Vi also represents the health state of each woman and child due to the consumption of the available maternal and child health care. y_i in the equation represents the utilisation of health care by each woman and child and xi variable shows the socioeconomic and demographic characteristics that each woman and child belongs to. The x_{1i} and x_{2i} on the right hand side represents the x_i's for each individual say individual 1 and 2. The xi is assumed to affect the social value and utilisation level of the maternal and child health care services of each woman and child. c_i is the cost of accessing the service which may also depend on the individual's characteristics and pattern of supply in the health sysytem. The access cost involves monetary and non-monetary.

Following Fleurbaey and Schokkaet (2009), the pi is the variables which accounts for differences in utilisation between each individual which are regarded as legitimate because they are due to individual responsibility. Pi represents variables like religion, individual preferences and culture that deter women from utilisation of health care which is basically within individual control. However this study assumes that these variables do not contribute to legitimate/fair or unjust differences in utilisation; differences in utilisation due to these factors are regarded as unfair and unjust because most women take such decisions outside their control through religious and cultural indoctrination and influence from their environment as well as influence from their partners.

To analyse the model, we also assume that the health policy problem is to choose levels of individual utilisation so as to maximise an aggregate welfare function for the women and children which is given as;

$$W = \sum V(y_i, x_i, c_i, p_i) \text{ Subject to } \sum yi \leq S ....(2)$$

Where yi is the total utilisation level and S represents total supply of health care resources in the health care system. The optimal utilisation of resources in the aggregate social welfare function is given by the equality of the society's marginal value of each utilization across all individuals in equation 3.

$$\frac{\partial W}{\partial y_i} = \frac{\partial V_i}{\partial y_i} = \lambda(S, x, c, p) = \alpha_o^{\,o} + \alpha_i^{\,o} x_{1i} + \alpha_2\, x_{2i} - \alpha_3\, c_i\, :) - \theta y_i \dots\dots(3)$$

The λ is the langrage multiplier of the welfare problem which shows the marginal value of utilisation of the welfare optimisation problem. The λ depends on total supply and on the distribution of individual characteristics x, access costs c, and the values of p. To know the utilisation level of each individual, we solve for optimal use of health care resources.

$$y_i^* = (\alpha_0 + \alpha_1 x_{1i} + \alpha_2 x_{2i} - \alpha_3\, c_i - \alpha_4 p_i\,) - \lambda(S, x, c, p) \dots\dots\dots\dots(4)$$

$$\alpha_j = \alpha_j^0 / \varphi, \lambda = \lambda^0 / \theta$$

x_{1i} represents the characteristics of each woman and child which affect the amount of health care they ought to have as need variables, the need variables are factors that predisposes the woman and child to utilise the health care, for instance the woman's pregnancy status and her age will necessitate the utilisation of contraceptive, antenatal and skilled delivery care. The child's age will also necessitate the utilisation of immunisation. Differences in utilisation due to x_{2i}, c and p are termed to be illegitimate/unfair or unjust source of differences in utilisation; they are the non-need variables that result to inequity in utilisation. If we assume that the coefficients of x_{2i}, c and p are non zero, it implies that c, x, and p affects the marginal welfare from utilisation. This means that individuals in the same need characteristics receive or utilise different amounts of health care due to unfair circumstances like income and other socioeconomic factors; this implies horizontal inequity. If individuals with different need characteristics receive different treatment also, it implies vertical inequity. Given this scenario, the difference in health care utilisation level between individuals i and j with the same levels of needs variables can be estimated as;

$$y_i^* - y_j^* = \alpha_1\left(x_{1i} - x_{1j}\right) + \alpha_2\left(x_{2i} - x_{2j}\right) - \alpha_3\left(c_i - c_j\right) \dots\dots\dots\dots\dots(5)$$

The scenario discussed in equations 1 to 5 depicts the optimal utilisation level of individuals, if we suppose that the true model of actual rather than optimal utilisation is given as;

$$y_i = \beta_o + \sum \beta_j Z_{ji} - \beta_3\, c_i + \sum_{j=1}^{2} \gamma_j X_{ji} + \sum k_j P_{ji} + e_i \dots\dots \dots\dots\dots\dots (6)$$

where Z_{ij} shows the difference in utilisation due to the need variables, the need variables in this context also shows the legitimate or justified source of differences in

utilisation explained in equation (4). The X_{ji}, P_{ij} and c_i, are the non–need variables which shows the illegitimate or unfair source of differences in utilisation, these are the sources of inequity in utilisation, they include income, education and other socioeconomic variables as also discussed in equation 4. e_i in the model represent the random error term obtained in the process of estimation. Given equation 6, actual utilisation will differ from optimal utilization indicated in equation (4) if $e_i \neq 0$. Also, if $\gamma_i \neq 0$, it means utilization of health care is affected by non-need variables and this implies horizontal inequity. If $k_i \neq 0$ it means that utilisation of health care is also affected by non-need variables which is due to individual responsibility. This is termed the legitimate source of difference in utilisation, although in the context of this study it is termed illegitimate due to the assumption that the condition of choices in most cases is affected. Lastly, if $\beta_j \neq \alpha_j$ it means that utilisation does not vary appropriately with need variables, and this implies vertical inequity. Note that the major cause of horizontal inequity is differences in utilisation that is due to non-need variable, this entails estimating equation 6 for need and non-need variables. The differences in utilisation after the need variable is removed give the horizontal inequity in utilisation.

4.1.2 Theoretical framework for the determinants of health care utilisation

In this section, two theoretical frameworks that form the basis in achieving the second objective of this study are given. The first is the modified model of health care demand/utilization by Grossman (1972) and its extension while the second is the health care utilization model by Andersen (1968) as well as Andersen and Newman (1995). The first framework is outlined to show that health care utilization improves health and provides utility; utility maximisation yields a demand/utilisation function which is estimated as the maternal and child health care utilisation model, the second is outlined for the purpose of emphasis on important variables in the maternal and child health care utilisation model derived in the first theoretical framework which is also meant to support and provide more theoretical backing on the model of estimation. The two theoretical frameworks are discussed within the context of maternal and child health care utilisation

4.1.2.1 The modified Grossman (1972) Demand for health care

Following Grossman (1972) and its extensions, the demand for maternal and child health care is a derived demand to enhance the stock of good health of women and children. The quantity of health care demanded is related to its own shadow price and the price of other goods as well as other maternal characteristics. Maternal characteristics affect taste and health productive efficiency of the woman and child. These characteristics include; wealth status, education, marital status, health insurance status, area of residence, age, religion, employment status and region. For instance, the more wealthy and educated a woman is, the more she is able to afford the health care needed to improve the efficiency of her health and that of her child. Also, the utilization of maternal and child health care by women and children promotes good health which in turn improves utility.

Assume that the *ith* woman and her child's have a utility function *U* where

$$U_i = U(H_i, Z_i, X_i) \text{...} (7)$$

Hi is the stock of health for the mother and child at age t, Z is a vector of all other goods consumed, and *Xi* is a vector of characteristics of the ith woman and child that influence preferences for maternal and child health care.

$$\frac{\delta U}{\delta H} \geq 0 \,\&\, \frac{\delta U}{\delta Z} \geq 0.$$

The health of the *ith* woman and child is produced via a health production technology (*T*) such that

$$H_i = T(C_i, M_i, Y_i) \text{...} (8)$$

$$\frac{\delta T}{\delta C_i} \geq 0, \frac{\delta T}{\delta M_i} \geq 0.$$

Ci stands for maternal and child health care while *Mi* is a vector of other complementary health inputs, *Yi* is a vector of characteristics of the *ith* woman and child that determine the efficiency of their own health production.

Equations 7 and 8 form a composite utility function which is stated as;

$$U_{yi} = U[T(C_i, M_i, Y_i), Z_i; X_i] \text{...} (9)$$

Equation 9 is differentiated with respect to *Y* to obtain equation 10

$$\delta U / \delta Y_i = U^{\cdot}(C_i, M_i, Z_i, X_i Y_i) \text{...} (10)$$

If *Zi** is define as a vector consisting of *Zi and Mi,* equation 10 is reduced to

$$U_i = U^{\cdot}\left(C_i, Z^*{}_i, X_i, Y_i\right) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(11)$$

Equation 11 is maximised subject to the budget constraint in equation 12.

$$I_i = P_c C_i + P_z . Z_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(12)$$

Where I_i is income of the ith woman, P_c is the price of health care, while P_z is the vector of prices of other goods. The optimisation process yields a demand or utilisation function specified in equation 13

$$D_i = D_C^{\cdot}\left(P_C, P_Z, I_i X_i, Y_i\right) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots,,,(13)$$

Equation 13 is estimated as the maternal and child health care utilisation model. The D_I is the demand/utilisation of maternal and child health care services, P_c is the price of health care, P_z is the price of other goods, I is the wealth/income of the ith woman, X is the vector of characteristics of ith woman which influences her health care consumption, Y is a vector of characteristics that determine the efficiency of health production such as education.

4.1.2.2 Andersen (1968) and Andersen and Newman (1995) health care utilisation model

Following Andersen (1968) as well as Andersen and Newman (1995) the determinants of health care utilszation are categorized into three; the predisposing factors, the enabling factors and the need based factors. The predisposing factors consists of sociocultural and demographic characteristics of the individual; these include, education, occupation/employment status, ethnicity, age, gender social networks and interaction such as religion, beliefs of health care benefits and knowledge that people have concerning the health care system.

The second determinant of health care utilisation is the enabling factor; which consists of determinants such as individual/family resources and community resources. Family resources are made up of economic status and location of residence; these include income, health insurance cover, travel capacity and quality of relationships. The community resources incorporate access to health facilities and availability of persons for assistance such as health personnel. The third is the need factor. Health care is demanded because of societal or clinically evaluated need for health care; such needs comes about due to functional or health problems that necessitates health care

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utilisation. Andersen (1995) incorporated health care system into the model as another determinant of health care utilisation; health system includes health policy, health resources and organization as well as their changes over time. Health resources includes; health care providers and their level of education while the health system organisation reflects how the health system manages it resources and this affects access and structure of health care. The volume of health personnel and their quality as well as how health care resources are distributed affects health care utilisation. The 1995 model also included the issue of consumer satisfaction which has to do with convenience, quality financing and provider characteristics.
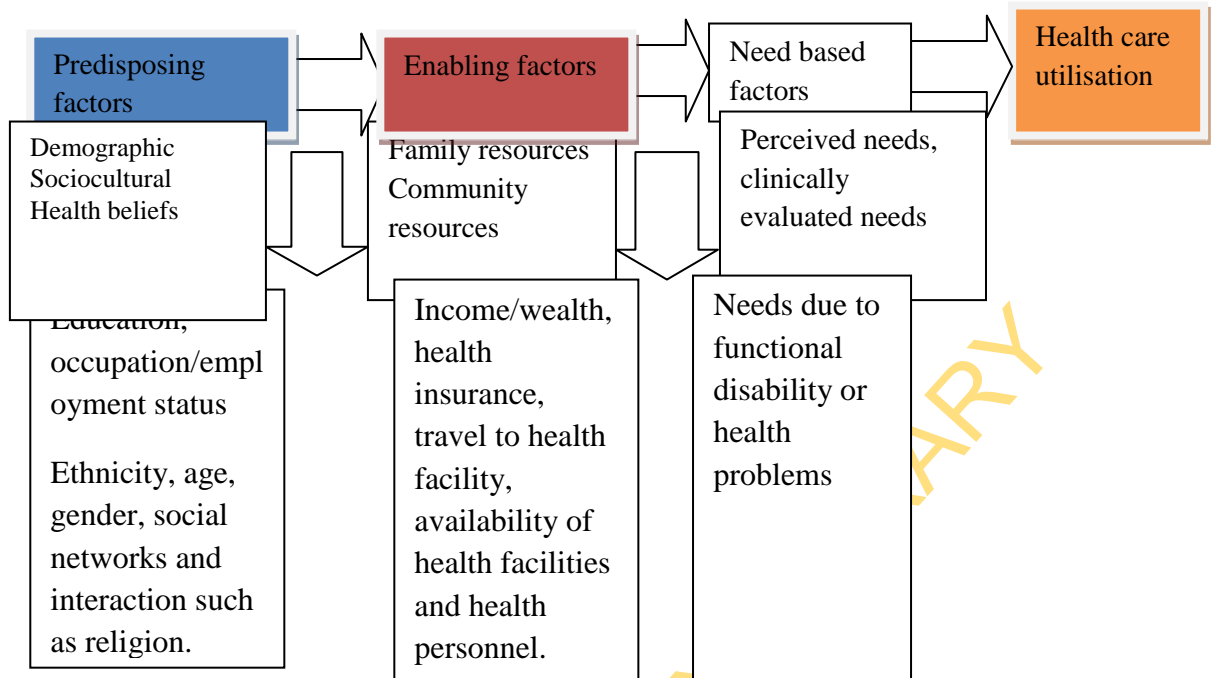
Figure 4.1 modified Andersen (1968) model of determinants of health care utilisation

Applying this model to maternal and child health care utilisation, we can say that the determinants of maternal and child health care utilisation are education, employment status, ethnicity, age, religion, wealth/income, insurance, distance to health facility and availability of health care providers. The need factors are based on the fact that every pregnant woman is perceived to be in need of antenatal care and skilled delivery care; while every under-five child is also said to be in need of immunisation and bed nets.

The theoretical model by Andersen (1968) as well as Andersen and Newman (1995) have similar features with the modified Grossman (1972) health care demand model. The similarity lies in the derived demand model in equation 13. Some of the determinants of health care demand in equation 13 are similar to the determinants of health care utilisation in Andersen's model of health care utilisation. Table 4.1 presents information on the description of variables for each of the theoretical models for objectives one and two in equations 6 and 13.

Table 4.1: Description of Variables for the Theoretical Models for Objectives One and Two

Variable	Description
Objective 1: the welfare model for inequity analysis: equation 6 is estimated	
y_i	Dependent variable which stands for maternal and child health care utilisation
Z	Health care utilisation due to need variable
C	Access cost
X	Health care utilisation due to non-need variables such as socioeconomic and demographic factors
P	Variables representing the role of responsibility in determining inequity in health care utilisation such as religion, culture, preferences.
Objective 2 : the model of demand for health care utilisation: equation 13 is estimated	
D	Demand/utilisation of maternal and child health care
p_c	Price of health care
p_z	Price of other goods
I	Income/wealth of individual
X	A vector of characteristics of the *ith* woman and child that influence preferences for health care..
Y	A vector of characteristics of the *ith* woman and child that determined the efficiency of the health production.

4.2 Conceptual framework

The conceptual framework describes the concepts of the first and second objective and how the variables are interacted. Figure 4.2 shows the conceptual framework for the study

| Inequality in maternal and child health care utilisation |
| (Measures absolute differnces in health care utilisation between individuals and populations) |

Inequity in maternal and child health care utilisation
(Measures differnces in utilisation due to need for health care) (Need and non-need variables)

Horizontal inequity
(Persons with similar health care needs recieve unequal treatment) or (utilisation of health care is affected by non-need variables so that individuals with the same level of needs consume differnt amounts of care)
(Relevant in health care utilisation)

Vertical inequity
(Greater treatment of health care need is not provided to persons with more health care need
(Relevant in health care finance)

Role of responsibility
(Religion, culture, and preferences)

Need variables
(Pregnancy status, age of respondent, child age, under-five)

Non-need variables
Wealth, women's education/education of mother, partner/father;s education, region/region of mother, resisdence/residence of mother, ethnicity/ethnicity of mother, insurance staus, marital status employment status and child sex

Price variables

Wealth/income variables

Access and supply variables

Determinants of maternal and child health care utilisation
(Objective 2)

Other socioeconomic and demograhic variables

Efficiency of health producion (education)

Figure 4.2 ConceptualFframework for the Study

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4.2 Empirical model of estimation

In this section, the estimable empirical model is specified for each objective. Each section is presented according to the objective of the study. The econometrics method as well as the apriori expectation is also specified.

4.2.1 Profile of inequity in maternal and child health care utilisation

In order to measure horizontal inequity in this study, equation 6 is estimated using the standardised concentration or horizontal inequity index for differences in need and non need variables as well as the concentration curve. The equation for measuring the concentration index is presented in equation 14 while equation 15 presents the equation for measuring the horizontal inequity index. Equations 14 and 15 are derived from Wagstaff and Van Doorslaer (2000).

$$C_N = 1 - 2\int_0^1 [LN(R)]dp \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{(14)}$$

$$HI_{WV} = 2\int_0^I [LN(R) - LM(R)]dp = CM - CN \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{(15)}$$

(C_N) is the concentration index for maternal and child health care services utilization, C_M is the concentration curve for maternal and child health care utilisation and HI_{WV} is the horizontal inequity index which shows the sum of the standardised values of the concentration index for the need and the non-need variables. When the concentration curve lies above or below the diagonal /line of equality, inequity is pro-poor or pro-rich, respectively. The $LN(R)$ or CM is the concentration curve of utilisation for maternal and child health care which plots the cumulative proportion of population of women ranked by wealth status beginning from the poorest to the richest against the cumulative proportion of population utilising maternal and child health care services. When there is no inequity, the concentration index is zero, when it is positive it represents pro-rich inequity and when it is negative it represents pro-poor inequity. HI_{WV} shows the horizontal inequity index measured using the indirect standardisation. A positive or negative HI_{WV} indicates horizontal inequity favouring the rich or the poor. Equations 14 and 15 are estimated using ADEPT soft ware to construct the concentration curves and the concentration index as well as the standardised concentration index which is the horizontal inequity index for two maternal and two child health care services.

4.2.2 Determinants of maternal and child health care utilisation.

In this section, demand equation for health care services utilisation derived from the theoretical framework in section 4.1.2 in equation 13 is used. The equation is recalled in this section.

$$D_i = D_C^{\cdot}(P_C, P_Z, I_i X_i, Y_i) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(13)$$

Some variables that are important as determinants of maternal and child health care utilization derived from the Andersen(1968) are also included in the empirical model along with equation 13 to form the empirical model that is estimated in chapter five. In addition, interactive terms are also included in the model, the inclusion of the interactive terms in equations 16 and 17 is an addition to the original model. The variables in equation 13 are operationalised as given in equations 16 and 17 as well as Table 4.2. The model is estimated for four health care services in this thesis. These comprise two maternal health care represented as Y_{Mi} in equation 16 and two child health care services represented as Y_{Ci} in equation 17. The health care services are; antenatal care and skilled delivery while the two child health care are; immunisation and bed nets use. For each health care, a specific econometrics tool is used, this is because the nature of the dependent variable for each health appears differently. The nature of the dependent variable therefore defines which of the econometrics technique that is appropriate. The estimation of the empirical model for each of the health care is discussed one after the other.

$Y_{Mi} = f(\beta_0 + \beta_1$wealth $+ \beta_2$education $+ \beta_3$religion $+ \beta_4$age $+ \beta_5$residence $+ \beta_6$region $+ \beta_7$partners education $+ \beta_8$birth order $+ \beta_9$marital status $+\beta_{10}$ethnicity $+ \beta_{11}$employment $+ \beta_{12}$health insurance $- \beta_{13}$distance $- \beta_{14}$transport $- \beta_{15}$no provider $- \beta_{16}$no female provider $+ (\beta_2$education x $\beta_3$religion$) + (\beta_3$religion x $\beta_2$education$) + (\beta_2$education x $\beta_6$region$) + (\beta_3$religion x $\beta_6$region$) + (\beta_1$wealth x $\beta_3$religion$) + (\beta_1$wealth x $\beta_5$residence$)) + u$ .... (16)

$Y_{Ci} = f(\beta_0 + \beta_1$wealth of mother $+ \beta_2$education of mother $+ \beta_3$region of mother $+ \beta_4$religion of mother $+ \beta_5$age of mother $+ \beta_6$residence of mother $+ \beta_7$birth order $- \beta_8$distance $+ \beta_9$ethnicity of mother $+ \beta_{10}$employment status of mother $+ \beta_{11}$health insurance $- \beta_{12}$transport $+ \beta_{13}$father's education $+ \beta_{14}$marital status $- \beta_{15}$no provider $+ (\beta_2$education x $\beta_4$religion$) + (\beta_4$religion x $\beta_2$education$) + (\beta_2$education x $\beta_3$region$) + (4_3$religion x $\beta_2$region$) + (\beta_1$wealth x $\beta_4$religion$) + (\beta_1$wealth x $\beta_6$residence$)) + u$ ....(17)

4.2.2.1 Determinants of maternal health care utilisation.

In this section, the two maternal health care; skilled delivery and antenatal care will be discussed one after the other.

(1) Determinants of antenatal care utilisation.

In estimating the demand for antenatal care, the study used the two-part model approach. This involves first identifying women who have attended at least one antenatal visit against those who never did. This is the first part and it is estimated using logit model. After this, the study also attempted to investigate the effect of having attended antenatal care more than once and this is estimated using the Negative Binomial model. The essence of this is to examine the importance of attending antenatal care many times. The two-part model also shows the impact of the explanatory variable at each stage of decision in utilisation of antenatal care; this involves the decision to go for antenatal care and the decision to have the recommended number of antenatal visits. The two-part model is outlined below according to the parts;

First part

In the first part, we run the logit model which is stated as;

$$\log it(P_i) = \ln\left(\frac{P_i}{1-P_i}\right) = \alpha_0 + \alpha_1.X_1 + ...\alpha_k.X_{ki} ....,..(18)$$

P represents the probability that a woman attends antenatal care. The responses are coded as 1 if a woman goes for antenatal care and 0 if not.

The second part

In part 2, the negative binomial model is estimated which is presented as;

$$\Pr(antenatal\,visits > 0) = \exp\left(\sum b_j X_{ji}\right)\exp(e_i)...(19)$$

Where X_{ij} is a row vector of K of i individual characteristics, b is a set of parameter to be estimated and e_i is the error term. The negative binomial measures frequency of visits of antenatal care. The model is estimated for 1990, 1999, 2003, 2008 and 2013 NDHS data.

(2) Determinants of skilled delivery utilisation

Skilled delivery is estimated using logit model. The logit model as specified in equation 18 is recalled below;

$$\log it(P_i) = \ln\left(\frac{P_i}{1 - P_i}\right) = \alpha_0 + \alpha_1.X_1 + \ldots\ldots\alpha_k.X_{ki}\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(18)$$

Here the dependent variable P is the probability that a pregnant woman is assisted by skilled birth attendants. The responses are coded as 1 if the pregnant woman is assisted by a doctor/or trained nurse/midwife/or auxiliary midwife during delivery and 0 if she is assisted by traditional birth attendant, relatives and friends. The justification for using the logit method follows the fact that the dependent variable of the model for skilled delivery utilisation specified in equation 16 empirical model of utilisation has binary outcome of 0 and 1. The model for skilled delivery is also estimated for 1990, 1999, 2003, 2008 and 2013 NDHS data.

4.2.2.2 Determinant of child health care utilization
(1) Determinant of immunisation utilisation

In estimating the immunization utilization model in equation 13 which is operationalised in equation 17, the study use the logit model to investigate whether a child has ever been immunised or not. The logit model is also recalled in this section;

$$\log it(P_i) = \ln\left(\frac{P_i}{1 - P_i}\right) = \alpha_0 + \alpha_1.X_1 + \ldots\ldots\alpha_k.X_{ki}\ldots\ldots\ldots\ldots\ldots\ldots\ldots(18)$$

In the logit model, P_i gives a 0, 1 response for which it is the appropriate model because it gives the odds ratio of the probability of a child being immunised. The utilisation model for immunisation is also estimated for 1990, 1999, 2003, 2008 and 2013 NDHS data.

(2) Determinants of bed nets utilisation

In estimating the demand/utilisation model for bed nets, we use the multinomial logit model in estimating equations 13/17. The dependent variable measures the probability that a child uses bed nets. The dependent variable has three options which are; no bed nets, untreated bed nets, and treated bed nets. Given these options, the multinomial logit gives robust estimate than either logit or probit or OLS model. These estimations are done for three periods which are 2003, 2008 and 2013. The multinomial logit model is specified in equation 20 where y is the outcome category of bed nets utilisation.

$$\Pr(y=3) = \frac{\exp^{X\beta^{(1)}}}{\exp^{X\beta^{(1)}} + \exp^{X\beta^{(2)}} + \exp^{X\beta^{(3)}}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(20)$$

Note that the variables "distance", "transport" and "no provider" are not included in the utilisation model for bed nets because they are not applicable to bed nets utilisation. Also, variable interaction for the bed nets regression model is not achieved due to some deficiency such as missing observations and inconsistency on the data on bed net utilisation.

4.3 Description of theoretical model, its empirical application and apriori expectation

Table 4.2 gives the summary of theoretical model description and how it is applied empirically in the study. The theoretical models are presented based on the objectives. The theoretical model for objective two is also operationalised in equations 16 and 17. The first theoretical model is meant to construct the profile of inequity; Yi in the model represents the utilization variable. Empirically, *Yi* stands for antenatal care, skilled delivery, immunisation and bed nets utilisation. *Z* is the need variable in the health care utilisation model. *Z* empirically is represented as age of the respondent and pregnancy status of the woman for maternal health care; while child age as well and being in the category of under-five children are the need variables for child health care. Respondents age and pregnancy status are need variables for maternal health care because a woman within the age of 15 and 49 is under the reproductive age and she is likely to be in need of antenatal and skilled delivery care. Also, the moment a woman is pregnant, she immediately fall within the category of women who need to utilise antenatal care and subsequently skilled delivery. Child's age is a need factor because it predisposes the child to be in need of immunisation, most children are immunised within the age of 0 and 5 years. Age in the data is measured in months, the study includes "under-five" as a need variable. At age 0 to 4 immunisation and the use of bed nets are very important because infants are very delicate and fragile, exposure to infections and malaria increases the chances of mortality. The *c* in the model represents access cost, *c* is not relevant to the empirical model because the variable centres on access issues in the estimation of inequity. This study is focused on horizontal inequity in utilisation. The variable *X* stands for the non-need variables in the theoretical model which influences health care utilisation. This involves all the

variables apart from the need variable that influences health care utilisation which are basically socioeconomic and demographic factors. The non-need variable in the empirical model include wealth of the respondent, respondent's education, partner's education, respondent's region, respondent's ethnicity, insurance status, marital status and employment status.

In child health care the non-need variable are basically related to the socioeconomic and demographic characteristics of mother apart from child sex; these include education of mother, father's education, mother's region, residence, ethnicity, insurance, marital and employment status. The P in the model represents the variable added to the model, which is obtained from Fleurbaey and Schokkaet (2009), it represents the role of responsibility in determining inequity in health care utilisation. In the model all the non-need variables are socioeconomic and demographic factors which show the respondent's identity and status in the society that affects utilisation of health care beyond the person's control. Religion falls within this category because it has to do with belief the respondent has about health care as a result of the religion the person belongs to, this falls within the sphere of the individual responsibility. However unlike the study by Fleurbaey and Schokkaet (2009), religion in the context of maternal and child health care utilisation in Nigeria may raise issues of soundness in women's decision making about the health care and therefore differences in utilisation due to religion may not be regarded as unfair.

The appriori expectation for the first theoretical and empirical model is that; if the standardized concentration index is estimated, negative concentration index for the need and the non-need variables show that inequity is pro-poor and if it is positive, it means inequity is pro-rich. Horizontal inequity in utilisation of maternal and child health care exists and is pro-rich if the horizontal inequity index is positive and pro-poor if the horizontal inequity index is negative. The concentration curve is used to back up the results obtained from the horizontal inequity index. When the concentration curve lies below the diagonal it shows that there is pro-rich inequity, but if the concentration curve lies above the diagonal, it shows that there is pro-poor inequity in maternal and child health care utilisation.

The second theoretical model estimates the determinants of maternal and child health care utilisation. The dependent variable $"D"$ stands for health care demand/utilisation. Empirically, the utilisation variables are antenatal care, skilled

delivery, immunisation and bed nets utilisation. The P_c stands for the price of health care, empirically; there is no data on how much is paid for the health care. The price of health care is therefore measured by access cost. Access cost in the data is represented by proxies such as "distance to health facility" and "transport to health facility". These variables are also represented by proxies in the data because the numerical values of distance and transport cost is not in the data, therefore, proxies like "distance to health facility" being a big problem and not being a big problem is used. Respondents who have transport to health facilities as big problem are affected negatively by the access cost of health care. This variable is a good proxy for the price of health care because, for a respondent to access health care, she has to transport herself to the nearest health care centre. Also, distance and transport to health facility also determine the ease of financial and physical access to health care. However, distance to health facility is available for the period 2003, 2008 and 2013, while transport to health to health facility is available for the period, 2003 and 2008.

The I in the model stands for the income of the respondent, empirically, income in terms of numerical value is not captured in the DHS data. However, two proxies for long run income of the household is captured using asset/wealth index. In the first proxy the values of the index are used in terms of wealth index values or scores. The wealth scores are generated through the principal component analysis (PCA). In the second case, the index is categorised into quintiles/index and included in the regression model differently at each instance. In terms of apriori expectation in the case were the quintiles/index is used, wealth is expected to be positively related to the utilisation model; in the second case, wealth index is transformed to dummies and the richest wealth index is used as the reference category. It is expected that the richest wealth quintile will have higher level of utilisation than other category of wealth index. The wealth index for 1990 and 1999 DHS surveys are generated through the principal component analysis (PCA) to derive the wealth quintile category for each group. The P_x in the theoretical model represents the price of other goods but is not used in the empirical model because data that will capture the price of other goods is not found in the data. The X in the theoretical model represents the characteristics of the respondents which influences her health care utilisation. These variables are represented in the empirical model as region of respondent, residence of respondent, ethnicity of respondent, her insurance status, marital status, employment status,

religion as well as age. For child health care, all the characteristics of the mother mentioned above and child's age and sex constitute the *X* in the empirical model.

The a priori expectation of region and ethnicity is not categorically indicated in the theoretical model, region and ethnicity are subjective and depends on country, however for this study, given the empirical literature of studies in Nigeria and the background on the pattern of utilisation in chapter two, it is expected that respondents from the southern part of the country and the Yoruba ethnic groups are more likely to utilise any of the health care than respondents from the northern part of the country and other ethnic groups. Region and ethnicity in the regression are represented by dummies with the South West and Hausa ethnic group as the reference category. Residence in the empirical model is an indicator variable for current residence in the rural-urban context with "rural" as the reference category. The apriori expectation for residence based on the empirical literature and the background in chapter 2 is that respondents from the rural areas are less likely to utilise any of the health care compared to respondents from the urban areas. Also it is expected that respondents who are insured and employed are more likely to utilise health care compared to those who are not employed. Also, it is expected that respondent's age influences utilisation positively based on the empirical literature. The appriori expectation for sex of child as determinant of health care utilisation is ambiguous. Religion is also among the variables in *X*, in the theoretical model, the apriori expectation based on the empirical literature shows that christians are less likely to utilise the maternal and child health care compared to other religions. Lastly, partner's education and education of father is also included among the variables in the *X; it* is expected that women whose husband's have higher education are more likely to utilise health care than women whose husbands are not educated. Also children whose fathers are educated are more likely to utilise any health care than children whose fathers are not educated. Birth order as part of variable *X* is applied empirically by considering the number of births, or the order of birth of a child as affecting maternal and child health care utilisation. The *Y* in the theoretical model is the characteristics of the respondent that determine the efficiency of the health production. In this respect, Grossman(1972) asserts that the demand for health care which provides utility to an individual improves health.; therefore the characteristics of individual that improves the efficiency of health production is education which is represented in the empirical model as education of respondent and mother for child health care. Education in the regression model is included in form of

dummies as "no education" for those who do not have formal education, then primary education, secondary education, and higher education. The priori expectation based on theoretical, empirically and background information is that education is positively related to health care utilisation, women with higher education are expected to have a higher probability of utilising health care than respondents without education.

To back up the model in objective 2, Andersen's (1968) model of health utilisation is also presented. In this respect, all factors under predisposing factors are already represented in the second model. Also some of the variables represented as the enabling factors are already considered in the second model with the exception of "no provider, "no female provider" and "no immunisation drugs". The "no provider, "no female provider" are used as proxy to represent availability of health personnel in providing the health care services. These variables are important because antenatal and skilled delivery care utilisation as well as immunisation is dependent on available health personnel and their quality. The available information in the data on these variables represents availability of health personnel as affecting health care utilisation by asking if it is a big problem or not. The "no female provider" as a variable is very important in maternal health care utilisation because it has to do with reproductive health. Many women will like to attend antenatal care if the health personnel are female compared to when they are males during antenatal care visits and delivery. Women who are less likely to utilise antenatal and skilled delivery because "no provider" and "no female provider" is a big problem are said to be influenced by availability of health care personnel. The last variable of "no drugs" is only applicable to immunisation. This is also represented by a proxy by asking if "no immunisation drug" is a big problem or not. It is also said that mothers who see "no immunisation drug" as a big problem are said to be influenced by the availability of drugs which is a proxy for health facility.

The Andersen model considers social interaction and network as a determinant of health care utilisation, in the empirical model, it is represented as religion which is also indicated in the second model discussed above. The need factor in Andersen model is however not included in the empirical model because the health care under consideration are utilised not because the respondent is sick, the health care are majorly preventive and not curative. Details on the theoretical and empirical model are presented in Table 4.2.

Table 4.2: Variable description of the theoretical model and its empirical application

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Objective 1: the welfare model for inequity analysis

$$y_i = \beta_o + \sum \beta_j Z_{ji} - \beta_3 \, c_i + \sum_{j=1}^{2} \gamma_j X_{ji} + \sum k_j P_{ji} + e_i \quad \ldots\ldots\ldots\ldots .. (6)$$

S/N	Variable	Theoretical model	The empirical application
1	yi	Dependent variable which stands for the health care utilisation	Antenatal care, skilled delivery care, immunisation and bed net utilisation
2	Z	Health care utilisation due to need variable	Maternal health care(Age of respondent and pregnancy status), child health care(child age and under-five)
3	C	Stands for access cost	Not part of the empirical model because it deals with equity in access.
4	X	Health care utilization due to non-need variables such as socioeconomic and demographic factors	Wealth, woman's education/education of mother, partners/father's education, region/region of mother, and residence/residence of mother, ethnicity/ethnicity of mother, insurance status, marital status, and employment status, child sex.
5	P	Variables representing the role of responsibility in determining inequity in health care utilisation such as culture, preferences and religion	Religion is represented but, culture and preferences not in the data.

Objective 2 : health care utilisation model

$$D_i = D_C^{\cdot}\left(P_C, P_Z, I_i X_i, Y_i\right)\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots,,..(13)$$

S/N	Variable	Theoretical model	The empirical application
1	D	Demand/utilisation of health care	Antenatal care, skilled delivery care, immunization and bed nets
2	P_c	Price of health care	Distance to health facilities, transport to health facility (cost of accessing maternal

			and child health care services).
3	P_z	Price of other goods	Data not available
4	I	Income of the *ith* woman	Wealth, and wealth index
5	X	A vector of characteristics of the *ith* woman and child that influence preferences/taste for health care.	partners/father's education, region of respondent /region of mother, and residence of respondent/residence of mother, ethnicity of respondent/ethnicity of mother, insurance status, marital status, and employment status, religion, age of respondent, child age, child sex and birth order
6	Y	A vector of characteristics of the *ith* respondent that determined the efficiency of the health production.	Respondent's education and education of mother.

Interactive terms which is an addition to the original model |

Objective 2 : modified Andersen 1968 model (determinants of health care utilisation)

1	**Predisposing factors** (Education, occupation, ethnicity, age, gender, social networks and interaction.	Education, employment status, ethnicity, respondents and child age, age, religion.
2	**Predisposing factors** (Education, occupation, ethnicity, age, gender, social networks and interaction).	Education, employment status, ethnicity, respondents and child age, age, religion.
3	**Enabling factors** (Income, health insurance, travel to health facility, availability of health facilities and health personnel)	Wealth/wealth index, health insurance, distance and transport to health facility, "no provider", "no female provider", "no immunisation drugs".

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Need factors	This variable is not represented in the empirical model because it is not found in the data and the health care under consideration is utilised not because an individual is sick.
(Needs due to functional disability or health problems)	

4.4 Variable description and measurement

Table 4.3 shows the dependent and the independent variable and how they are measured in the data. Most of the variables are measured in nominal or discrete terms and demand qualitative modeling approach for the regression. Antenatal care utilisation which is the dependent variable is measured in two forms to capture the two part model. The first is the frequency of antenatal care visits which is measured in continuous terms; the negative binomial model is used in this respect. The antenatal care is measured in nominal scale to model use and non use of antenatal care through the logit model. Details on how other dependent and independent variables are measured are specified in table 4.3. Also note that wealth index for the 1990 and 1999 NDHS data is not given. The wealth index for these years is generated through the principal component analysis (PCA) to derive the wealth quintile category for each

group. All the nominal and discrete variables are estimated using dummies with one of the dummies used as a reference category as specified in table 4.3.

The standard errors in the empirical model of all the dependent variables are estimated with robust methods to account for unequal variance. Statistical significance level is considered at 1%, and 5%. The probability value provides the statistical significance of each variable. To find out which variable has the greatest influence, the study tested for interaction terms that are identified to be most significant and most influential. Such variables include; education, region, wealth and religion. The over dispersion parameter $\beta 0$ in the empirical model is estimated as a constant. The study made use of Stata 12 for all the analysis on the second objective.

Table 4.3 Variables description for objective 2 empirical model

	Variable	Measurement scale	Definition
	Dependent variables		
	(a) Antenatal care use(logit model)	nominal	Antenatal care visits for pregnancy: women with no ANC visits take the value 0 while women with 1 or more ANC visits takes the value 1.
1	(b) Frequency of antenatal visits (negative binomial model	Continues	Antenatal visit for pregnancy: this is measured by number of antenatal visits during pregnancy from 1 to more than one visits

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2	Skilled delivery	Discrete/nominal	Women who gave birth with the assistance of Doctor, nurse/midwife and auxiliary midwife takes the value 1, while women that were assisted by TB attendants, relative and friends takes the value 0.
3	immunization	Discrete	Children who ever had vaccination take the value "1" while those with no vaccination take the value "0".
4	Use of bed nets	categorical	This is described by "type of bed net child slept under last night". The categories include; "no bed net", "only treated", "only untreated" .

Independent Variables

1	Age	Continuous	Current age of respondents. This is measured in years from 15 to 49 in continuous term
3	Region	Discrete	This is measured in dummies based on the six geopolitical zones in Nigeria. North central, North east, North West, South East, South South, South West (South West is the reference category)
4	Residence	Discrete	Measured in dummies as "Urban" and "rural" with rural as a reference category
5	Education/mother's education	Ordinal/discrete	measured in dummies as "No education", "Primary", "Secondary", " higher" (higher education is the reference category)
6	Partners education/father's education		No education, primary, secondary, higher (higher is the reference category)
6	Religion	Discrete	Measured in dummies as "Christianity", "Islam", "Traditional" (Christianity is the reference category)
7	Ethnicity	Discrete	Measured in dummies as "Hausa/Fulani", "Igbo", "Yoruba", "Tiv", "Ijaw/Izon", "others" (Hausa is the reference category)

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8	Wealth index	Ordinal/discrete	Measured in dummies as "Poorest", "poorer", "middle", "richer", "richest" (richest is the reference)
9	Wealth	Continues	Measured by the values of index as "wealth index factor score".
10	Marital status	Discrete	Current marital status: Married, single, (married is the reference)
11	Birth order	continues	Measured by number of children that a woman gave birth to and the order in which they were given birth to. "Birth order number"
12	Distance To health facility		Getting medical help for self: having to take transport: (a) big problem (b) not a big problem. This is also measured in dummies with "not a big problem" as the reference category.
13	Employment/mothers employment status	Discrete	Respondents currently employed : employed, not employed (employed is the reference)
14	insurance	Discrete	Respondent insured: "insured", "not insured". This is also measured in dummies with "not a big problem" as the reference category.
15	No female provider	Discrete	Getting medical help for self: concern no female provider: (a) big problem (b) not a big problem. This is also measured in dummies with "not a big problem" as the reference category.
16	No provider	Discrete	Getting medical help for self: concern no provider: (a) big problem (b) not a big problem. This is also measured in dummies with "not a big problem" as the reference category.
17	No immunisation drugs	Discrete	Getting medical help for self: concern no drugs: (a) big problem (b) not a big problem (not a big problem is the reference). This is also measured in dummies with "not a big problem" as the

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reference category.

4.5 Data requirement and sources

The study utilises data from the available NDHS. There are five sets of NDHS data these include; 1990, 1999, 2003, 2008 and 2013. Analysis in this study is done using all the sets of data. NDHS provides information on the reproductive health of women aged between 15 and 49 as well as children under the age of five. Table 4.3 provides information on the sample for each of the surveys.

Table 4.4 data information

S/N	Year	Total household sampled	Number of women
1	NDHS 1990	8,999	8,781
2	NDHS 1999	7,647	8,918
3	NDHS 2003	7,864	2,572
4	NDHS 2008	34,070	34,596
5	NDHS 2013	38,522	39,902

CHAPTER FIVE

PRESENTATION OF RESULTS, INTERPRETATION AND DISCUSSION

Introduction

This chapter focused on the application of the methodology discussed in chapter four. The chapter contains the results for the analysis of the two stated objectives presented in three sub-sections. The first dwells on the descriptive statistics of all the variables used in the regression model. The second presents the results on the analysis of the first objective, while the third is on the second objective. The result on the analysis for the first objective are presented using the concentration curves and the standardised concentration index. The second objective are presented in two parts; the bivariate and multivariate analysis of the determinants of maternal and child health care utilisation.

5.1 Summary and descriptive statistics

Tables 5.1a to 5.1e presents the descriptive statistics for all the variables used in the regressions in this study for each of the maternal and child health care by NDHS periods.

Table 5.1a: Summary Statistics for NDHS 2013

Variable	Definition	mean	SD
DEPENDENT VARIABLES			
MATERNAL HEALTH CARE			
(a) Antenatal care use (logit model)	0 if no visit, 1 if respondent had 1 or more visits.	0.663	0.473
(b) Frequency of antenatal visits (negative binomial model	Antenatal visits from 1 to 30	5.322	6.145
SKILLED DELIVERY CARE	1 if assisted by doctor, nurse/midwife and auxiliary midwife, 0 is if assisted by TB attendants, relative and friends	0.098	0.297
CHILD HEALTH CARE			
IMMUNISATION	1 if ever partake in vaccination 0 if never partake vaccination	0.712	0.453
BED NET USE	No nets, only treated nets, only untreated nets	0.233	0.541
INDEPENDENT VARIABLES			
INCOME VARIABLES			
Wealth	Scores with negative and positive values	-7.82	2.129
WEALTH INDEX/WEALTH INDEX OF MOTHER (REF. RICHEST)			
Poorest	1 if respondent belong to poorest 20% of respondent; 0 if otherwise	0.240	0.427
Poorer	1 if respondent belong to poorer 20% of respondent; 0	0.229	0.420

	if otherwise		
Middle	1 if respondent belong to middle 20% of respondent; 0 if otherwise	0.205	0.404
Richer	1 if respondent belong to richer 20% of respondent; 0 if otherwise	0.186	0.389
EMPLOYMENT STATUS/ EMPLOYMENT STATUS OF MOTHER			
not employed	1 if not employed; 0 if employed	0.235	0.424
PRICE VARIABLES			
DISTANCE TO HEALTH FACILITY/MOTHER'S DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	1 if distance is a big problem; 0 if otherwise	0.329	0.470
INSURANCE STATUS/INSURANCE STATUS OF MOTHER			
No insurance	1 if not insured, 0 if insured	0.984	0.127
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION/MOTHER'S EDUCATION (REF: HIGHIER)			
No education	1 if no education; 0 otherwise	0.510	0.500
Primary	1 if has primary education; 0 otherwise	0.234	0.424
Secondary	1 if has secondary education; 0 if otherwise	0.203	0.403
PARTNER'S EDUCATION/FATHER'S EDUCATION (REF: HIGHIER)			
No education	1 if no education; 0 if otherwise	0.429	0.495
Primary	1 if has primary education; 0	0.211	0.408

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	if otherwise		
Secondary	1 if has secondary education ; 0 if otherwise	0.239	0.426

AGE OF THE RESPONDENT/MOTHER'S AGE IN YEARS

Age	Age of respondent 15 to 49	35.986	8.073

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

Birth order	Birth order 1 to 18	3.526	2.379

MARITAL STATUS/MOTHER'S MARITAL STATUS (REF: MARIED)

Single	1 if single, 0 if married	0.071	0.256

ETHNICITY/MOTHERS ETHNICITY (REF. HAUSA)

Igbo	1 if Igbo; 0 if otherwise	0.111	0.314
Ijaw/izon	1 if Ijaw/izon; 0 if otherwise	0.038	0.190
Kanuri/beriberi	1 if Kanuri/beriberi; 0 if otherwise	0.015	0.122
Tiv	1 if Tiv; 0 if otherwise	0.016	0.126
Yoruba	1 if Yoruba; 0 if otherwise	0.113	0.316
Others	1 if Others; 0 if otherwise	0.292	0.455

REGION/REGION OF MOTHER (REF SOUTH WEST)

North Central	1 if from North Central; 0 if otherwise	0.135	0.341
North East	1 if from North East; 0 if otherwise	0.202	0.402
North West	1 if from North West; 0 if otherwise	0.325	0.468
South East	1 if from South East; 0 if otherwise	0.095	0.293

South South	1 if from South South; 0 if otherwise	0.122	0.327
RESIDENCE/MOTHER'S RESIDENCE			
Urban	1 if from urban; 0 if otherwise	0.326	0.469
RELIGION/MOTHER'S RELIGION (REF. CHRISTIANITY)			
Islam	1 if respondent practice Islam; 0 if otherwise	0.578	0.494
Traditionalist	1 if respondent practice Traditional religion; 0 if otherwise	0.013	0.115
CHILD AGE IN MONTHS			
Child age	From 0 to 37 months	10.174	7.647
CHILD SEX			
Child sex	1 if female; 0 if otherwise	0.487	0.500
INTERACTION VARIABLES			
RELIGION AND EDUCATION			
Christian no education	1 if Christian with no education; 0 if otherwise	0.062	0.242
Christian higher education	1 if Christian with higher education; 0 if otherwise	0.041	0.198
Muslim no education	1 if Muslim no education; 0 if otherwise	0.438	0.496
Muslim higher education	1 if Muslim with higher education, 0 if not	0.012	0.107
RELIGION AND REGION			
Muslim North West	1 if a Muslim from North West, ; 0 if otherwise	0.309	0.462
Christian North West	1 if a Christian from North West ; 0 if otherwise	0.013	0.115
Muslim North East	1 if a Muslim from North East; 0 if otherwise	0.163	0.369

Christian North East	1 if a Christian from North East, 0 if not	0.037	0.189
Muslim South West	1 if a Muslim from South West; 0 if otherwise	0.040	0.196
Christian South West	1 if a Christian from South West; 0 if otherwise	0.080	0.272
Muslim North Central	1 if a Muslim from North central; 0 if otherwise	0.063	0.242
Christian North Central	1 if a Christian from North Central, 0 if not	0.069	0.254
EDUCATION AND REGION			
No education Northeast	1 if from North East with no education; 0 if otherwise	0.145	0.352
Higher education Northeast	1 if from North East with higher education; 0 if otherwise	0.006	0.077
No education Northwest	1 if from North West with no education; 0 if otherwise	0.269	0.443
Higher education Northwest	1 if from North West with higher education; 0 if otherwise	0.004	0.062
No education North Central	1 if from North central with no education; 0 if otherwise	0.052	0.221
Higher education North Central	1 if from North Central with higher education; 0 if otherwise	0.011	0.106
No education South West	1 if from South West with no education; 0 if otherwise	0.017	0.130
Higher South West	1 if from South West with higher education; 0 if otherwise	0.014	0.118
WEALTH AND REGION			
Poorest Northeast	1 if poorest from North East;	0.082	0.275

	0 if otherwise		
Richest North East	1 if richest from North East; 0 if otherwise	0.010	0.102
Poorest North West	1 if poorest from North West; 0 if otherwise	0.136	0.343
Richest North West	1 if poorest from North East; 0 if otherwise	0.015	0.120
Poorest South West	1 if poorest from South West; 0 if otherwise	0.003	0.055
Richest South West	1 if richest from South West; 0 if otherwise	0.049	0.215
Poorest North Central	1 if poorest from North Central; 0 if otherwise	0.012	0.107
Richest North Central	1 if richest from North Central; 0 if otherwise	0.022	0.146
WEALTH AND RELIGION			
Poorest Christian	1 if in the poorest category of Christians; 0 if otherwise	0.024	0.153
Richest Christian	1 if in the richest category of Christians; 0 if otherwise	0.094	0.292
Poorest Muslim	1 if in the poorest category of Muslims; 0 if otherwise	0.212	0.409
Richest Muslim	1 if in the richest category of Muslims; 0 if otherwise	0.045	0.208
WEALTH AND RESIDENCE			
Poorest rural	1 if among the poorest from rural; 0 if otherwise	0.225	0.418
Richest rural	1 if among the richest from rural; 0 if otherwise	0.024	0.153

Table 5.1b Summary Statistics for NDHS 2008

Variable	Definition	mean	SD
DEPENDENT VARIABLES			
MATERNAL HEALTH CARE			
(a) Antenatal care use (logit model)	0 if no visit, 1 if respondent had 1 or more visits.	0.583	0.493
(b) Frequency of antenatal visits (negative binomial model	Antenatal visits from 1 to 50	4.405	5.643
SKILLED DELIVERY CARE	1 if assisted by Doctor, nurse/midwife and auxiliary midwife, 0 is if assisted by TB attendants, relative and friends	0.088	0.284
CHILD HEALTH CARE			
IMMUNISATION	1 if ever partake in vaccination 0 if never partake vaccination	0.626	0.484
BED NET USE	No nets, only treated nets, only untreated nets	0.276	0.800
INDEPENDENT VARIABLES			
INCOME VARIABLES			
Wealth	Scores with negative and positive values	4.41	2.090
WEALTH INDEX/WEALTH INDEX OF MOTHER (REF. RICHEST)			
Poorest	1 if respondent belong to poorest 20% of respondent; 0 if otherwise	0.274	0.446
Poorer	1 if respondent belong to poorer 20% of respondent; 0 if otherwise	0.246	0.431
Middle	1 if respondent belong to	0.202	0.402

	middle 20% of respondent; 0 if otherwise		
Richer	1 if respondent belong to richer 20% of respondent; 0 if otherwise	0.160	0.367
EMPLOYMENT STATUS/ EMPLOYMENT STATUS OF MOTHER			
not employed	1 if not employed; 0 if employed	0.293	0.455
PRICE VARIABLES			
DISTANCE TO HEALTH FACILITY/MOTHER'S DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	1 if distance is a big problem; 0 if otherwise	0.412	0.492
TRANSPORT TO HEALTH FACILITY/MOTHER'S TRANSPORT TO			
HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
Big problem	1 if transport is a big problem; 0 if otherwise	0.395	0.489
NO PROVIDER (REF: NOT A BIG PROBLEM)			
Big problem	1 if no provider is a big problem; 0 if otherwise	0.372	0.483
NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)			
Big problem	1 if no female provider is a big problem; 0 if otherwise	0.227	0.419
INSURANCE STATUS/INSURANCE STATUS OF MOTHER			
No insurance	1 if not insured, 0 if insured	0.987	0.114
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION/MOTHER'S EDUCATION (REF: HIGHIER)			
No education	1 if no education; 0 otherwise	0.559	0.497
Primary	1 if has primary education; 0 otherwise	0.238	0.426
Secondary	1 if has secondary education; 0 if otherwise	0.161	0.368
PARTNER'S EDUCATION/FATHER'S EDUCATION (REF: HIGHIER)			
No education	1 if no education; 0 if otherwise	0.475	0.499
Primary	1 if has primary education; 0 if otherwise	0.222	0.415

Variable	Description	Mean	SD
Secondary	1 if has secondary education ; 0 if otherwise	0.205	0.404
AGE OF THE RESPONDENT/MOTHER'S AGE IN YEARS			
Age	Age of respondent 15 to 49	35.692	8.110
OTHER VARIABLES			
NUMBER OF CHILDREN OR BIRTH ORDER			
Birth order	Birth order 1 to ---18	3.565	2.418
MARITAL STATUS/MOTHER'S MARITAL STATUS (REF: MARIED)			
Single	1 if single, 0 if married	0.067	0.249
ETHNICITY/MOTHERS ETHNICITY (REF. HAUSA)			
Igbo	1 if Igbo; 0 if otherwise	0.106	0.308
Ijaw/izon	1 if Ijaw/izon; 0 if otherwise	0.031	0.175
Kanuri/beriberi	1 if Kanuri/beriberi; 0 if otherwise	0.033	0.178
Tiv	1 if Tiv; 0 if otherwise	0.028	0.166
Yoruba	1 if Yoruba; 0 if otherwise	0.106	0.308
Others	1 if Others; 0 if otherwise	0.326	0.469
REGION/REGION OF MOTHER (REF SOUTH WEST)			
North Central	1 if from North central; 0 if otherwise	0.178	0.383
North East	1 if from North East; 0 if otherwise	0.231	0.422
North West	1 if from North West; 0 if otherwise	0.276	0.447
South East	1 if from South East; 0 if otherwise	0.088	0.284
South South	1 if from South South; 0 if otherwise	0.114	0.318
RESIDENCE/MOTHER'S RESIDENCE			
Urban	1 if from urban; 0 if otherwise	0.251	0.434
RELIGION/MOTHER'S RELIGION (REF. CHRISTIANITY)			
Islam	1 if respondent practice Islam; 0 if otherwise	0.560	0.496
Traditionalist	1 if respondent practice Traditional religion; 0 if otherwise	0.022	0.148
CHILD AGE IN MONTHS			
Child age	From 0 to 37 months	10.07	7.58
CHILD SEX			
Child sex	1 if female; 0 if otherwise	0.467	0.499
NO IMMUNIZATION DRUGS (REF: NOT			

BIG PROBLEM)

Big problem	1 if no immunization drugs is a big problem; 0 if otherwise	0.458	0.498

INTERACTION VARIABLES
RELIGION AND EDUCATION

Christian no education	1 if Christian with no education; 0 if otherwise	0.098	0.298
Christian higher education	1 if Christian with higher education; 0 if otherwise	0.034	0.182
Muslim no education	1 if Muslim no education; 0 if otherwise	0.444	0.497
Muslim higher education	1 if Muslim with higher education, 0 if not	0.008	0.086

RELIGION AND REGION

Muslim Northwest	1 if a Muslim from North West, ; 0 if otherwise	0.257	0.437
Christian Northwest	1 if a Christian from North West ; 0 if otherwise	0.014	0.119
Muslim Northeast	1 if a Muslim from North East; 0 if otherwise	0.184	0.387
Christian Northeast	1 if a Christian from North East, 0 if not	0.044	0.205
Muslim Southwest	1 if a Muslim from South West; 0 if otherwise	0.040	0.196
Christian Southwest	1 if a Christian from South West; 0 if otherwise	0.070	0.255
Muslim North Central	1 if a Muslim from North Central; 0 if otherwise	0.074	0.262
Christian North Central	1 if a Christian from North Central, 0 if not	0.101	0.301

EDUCATION AND REGION

No education Northeast	1 if from North East with no education; 0 if otherwise	0.178	0.382
Higher education Northeast	1 if from North East with higher education; 0 if otherwise	0.003	0.052
No education Northwest	1 if from North West with no education; 0 if otherwise	0.231	0.421
Higher education Northwest	1 if from North West with higher education; 0 if otherwise	0.004	0.063
No education North central	1 if from North Central with no education; 0 if otherwise	0.091	0.287
Higher education North central	1 if from North Central with higher education; 0 if otherwise	0.009	0.095
No education Southwest	1 if from South West with no education; 0 if otherwise	0.024	0.153

		mean	SD
Higher Southwest	1 if from South West with higher education; 0 if otherwise	0.011	0.106
WEALTH AND REGION			
Poorest North East	1 if poorest from North East; 0 if otherwise	0.113	0.316
Richest North East	1 if richest from North East; 0 if otherwise	0.005	0.070
Poorest North West	1 if poorest from North West; 0 if otherwise	0.100	0.301
Richest North West	1 if poorest from North East; 0 if otherwise	0.014	0.118
Poorest South West	1 if poorest from South West; 0 if otherwise	0.006	0.078
Richest South West	1 if richest from South West; 0 if otherwise	0.040	0.196
Poorest North Central	1 if poorest from North Central; 0 if otherwise	0.036	0.187
Richest North Central	1 if richest from North Central; 0 if otherwise	0.021	0.144
WEALTH AND RELIGION			
Poorest Christian	1 if in the poorest category of Christians; 0 if otherwise	0.065	0.247
Richest Christian	1 if in the richest category of Christians; 0 if otherwise	0.078	0.269
Poorest Muslim	1 if in the poorest category of Muslims; 0 if otherwise	0.199	0.399
Richest Muslim	1 if in the richest category of Muslims; 0 if otherwise	0.039	0.195
WEALTH AND RESIDENCE			
Poorest rural	1 if among the poorest from rural; 0 if otherwise	0.262	0.440
Richest rural	1 if among the richest from rural; 0 if otherwise	0.028	0.166

Table 5.1c Summary Statistics for NDHS 2003

Variable	Definition	mean	SD

DEPENDENT VARIABLES

MATERNAL HEALTH CARE

(a) Antenatal care use (logit model)	0 if no visit, 1 if respondent had 1 or more visits.	0.656	0.475
(b) Frequency of antenatal visits (negative binomial model	Antenatal visits from 1 to 36	5.169	6.129
SKILLED DELIVERY CARE	1 if assisted by Doctor, nurse/midwife and auxiliary midwife, 0 is if assisted by TB attendants, relative and friends	0.095	0.293

CHILD HEALTH CARE

IMMUNIZATION	1 if ever partake in vaccination 0 if never partake vaccination	0.692	0.462
BED NET USE	No nets, only treated nets, only untreated nets	0.150	0.637

INDEPENDENT VARIABLES

INCOME VARIABLES

Wealth	Scores with negative and positive values	9.49	2.352

WEALTH INDEX/WEALTH INDEX OF MOTHER (REF. RICHEST)

Poorest	1 if respondent belong to poorest 20% of respondent; 0 if otherwise	0.248	0.432
Poorer	1 if respondent belong to poorer 20% of respondent; 0 if otherwise	0.219	0.413
Middle	1 if respondent belong to middle 20% of respondent; 0 if otherwise	0.202	0.402
Richer	1 if respondent belong to richer 20% of respondent; 0 if otherwise	0.186	0.389

EMPLOYMENT STATUS/ EMPLOYMENT STATUS OF MOTHER

not employed	1 if not employed; 0 if employed	0.292	0.455

PRICE VARIABLES

DISTANCE TO HEALTH FACILITY/MOTHER'S DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)

big problem	1 if distance is a big problem; 0 if otherwise	0.529	0.499
Small problem	1 if distance is a small problem; 0 if otherwise	0.198	0.399

TRANSPORT TO HEALTH FACILITY/MOTHER'S TRANSPORT TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)

Big problem	1 if transport is a big problem; 0 if otherwise	0.542	0.498
Small problem	1 if transport is a small problem; 0 if otherwise	0.193	0.395

NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)

Big problem	1 if no female provider is a big problem; 0 if otherwise	0.718	0.450

EDUCATION VARIABLES

RESPONDENT'S EDUCATION/MOTHER'S EDUCATION (REF: HIGHIER)

No education	1 if no education; 0 otherwise	0.582	0.493
Primary	1 if has primary education; 0 otherwise	0.237	0.425
Secondary	1 if has secondary education; 0 if otherwise	0.143	0.350

PARTNER'S EDUCATION/FATHER'S

EDUCATION (REF: HIGHIER)

No education	1 if no education; 0 if otherwise	0.476	0.499
Primary	1 if has primary education; 0 if otherwise	0.247	0.431
Secondary	1 if has secondary education ; 0 if otherwise	0.177	0.382

AGE OF THE RESPONDENT/MOTHER'S AGE IN YEARS

Age	Age of respondent 15 to 49	35.68	8.114

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

Birth order	Birth order 1 to 18	3.686	2.481

MARITAL STATUS/MOTHER'S MARITAL STATUS (REF: MARIED)

Single	1 if single, 0 if married	0.070	0.255

REGION/REGION OF MOTHER (REF SOUTH WEST)

North Central	1 if from North Central; 0 if otherwise	0.163	0.370
North East	1 if from North East; 0 if otherwise	0.238	0.426
North West	1 if from North West; 0 if otherwise	0.288	0.453
South East	1 if from South East; 0 if otherwise	0.109	0.312
South South	1 if from South South; 0 if otherwise	0.101	0.301

RESIDENCE/MOTHER'S RESIDENCE

Urban	1 if from urban; 0 if otherwise	0.361	0.480

RELIGION/MOTHER'S RELIGION (REF. CHRISTIANITY)

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Islam	1 if respondent practice Islam; 0 if otherwise	0.566	0.496
Traditionalist	1 if respondent practice Traditional religion; 0 if otherwise	0.025	0.157
CHILD AGE IN MONTHS			
Child age	From 0 to 36 months	10.41	7.829
CHILD SEX			
Child sex	1 if female; 0 if otherwise	0.484	0.500

INTERACTION VARIABLES

RELIGION AND EDUCATION

Christian no education	1 if Christian with no education; 0 if otherwise	0.120	0.325
Christian higher education	1 if Christian with higher education; 0 if otherwise	0.030	0.172
Muslim no education	1 if Muslim no education; 0 if otherwise	0.443	0.497
Muslim higher education	1 if Muslim with higher education, 0 if not	0.007	0.084
RELIGION AND REGION			
Muslim North West	1 if a Muslim from North West, ; 0 if otherwise	0.269	0.444
Christian North West	1 if a Christian from North West ; 0 if otherwise	0.018	0.132
Muslim North East	1 if a Muslim from North East; 0 if otherwise	0.200	0.400
Christian North East	1 if a Christian from North East, 0 if not	0.033	0.179
Muslim South West	1 if a Muslim from South West; 0 if otherwise	0.035	0.185
Christian South West	1 if a Christian from South West; 0 if otherwise	0.062	0.240

Muslim North Central	1 if a Muslim from North Central; 0 if otherwise	0.059	0.236
Christian North Central	1 if a Christian from North Central, 0 if not	0.101	0.301

EDUCATION AND REGION

No education Northeast	1 if from North East with no education; 0 if otherwise	0.177	0.382
Higher education Northeast	1 if from North East with higher education; 0 if otherwise	0.006	0.074
No education Northwest	1 if from North West with no education; 0 if otherwise	0.235	0.424
Higher education Northwest	1 if from North West with higher education; 0 if otherwise	0.004	0.065
No education North central	1 if from North central with no education; 0 if otherwise	0.085	0.278
Higher education North central	1 if from North Central with higher education; 0 if otherwise	0.005	0.073
No education Southwest	1 if from South West with no education; 0 if otherwise	0.033	0.178
Higher Southwest	1 if from South West with higher education; 0 if otherwise	0.006	0.079

WEALTH AND REGION

Poorest North East	1 if poorest from North East; 0 if otherwise	0.085	0.280
Richest North East	1 if richest from North East; 0 if otherwise	0.011	0.106
Poorest North West	1 if poorest from North West; 0 if otherwise	0.063	0.242
Richest North West	1 if poorest from North East; 0 if otherwise	0.022	0.146
Poorest South West	1 if poorest from South West; 0 if otherwise	0.019	0.138
Richest South West	1 if richest from South West; 0 if otherwise	0.045	0.207
Poorest North Central	1 if poorest from North Central;	0.042	0.200

	0 if otherwise		
Richest North Central	1 if richest from North Central; 0 if otherwise	0.022	0.148
WEALTH AND RELIGION			
Poorest Christian	1 if in the poorest category of Christians; 0 if otherwise	0.094	0.292
Richest Christian	1 if in the richest category of Christians; 0 if otherwise	0.096	0.295
Poorest Muslim	1 if in the poorest category of Muslims; 0 if otherwise	0.141	0.348
Richest Muslim	1 if in the richest category of Muslims; 0 if otherwise	0.050	0.217
WEALTH AND RESIDENCE			
Poorest rural	1 if among the poorest from rural; 0 if otherwise	0.225	0.417
Richest rural	1 if among the richest from rural; 0 if otherwise	0.031	0.173

Table 5.1d Summary Statistics for NDHS 1999

Variable	Definition	mean	SD
DEPENDENT VARIABLES			
MATERNAL HEALTH CARE			
(a) Antenatal care use (logit model)	0 if no visit, 1 if respondent had 1 or more visits.	0.660	0.474
(b) Frequency of antenatal visits (negative binomial model	Antenatal visits from 1 to 20	4.746	4.889
SKILLED DELIVERY CARE	1 if assisted by Doctor, nurse/midwife and auxiliary midwife, 0 is if assisted by TB attendants, relative and friends	0.056	0.229
CHILD HEALTH CARE			
IMMUNISATION	1 if ever partake in vaccination 0 if never partake vaccination	0.526	0.499
INDEPENDENT VARIABLES			
INCOME VARIABLES			
Wealth	Scores with negative and positive values	-0.01	1.967
WEALTH INDEX/WEALTH INDEX OF MOTHER (REF. RICHEST)			
Poorest	1 if respondent belong to poorest 20% of respondent; 0 if otherwise	0.202	0.401
Poorer	1 if respondent belong to poorer 20% of respondent; 0 if otherwise	0.203	0.402
Middle	1 if respondent belong to middle 20% of respondent; 0 if otherwise	0.202	0.401
Richer	1 if respondent belong to richer 20% of respondent; 0 if	0.196	0.397

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otherwise

EMPLOYMENT STATUS/ EMPLOYMENT STATUS OF MOTHER			
not employed	1 if not employed; 0 if employed	0.392	0.488
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION/MOTHER'S EDUCATION (REF: HIGHIER)			
No education	1 if no education; 0 otherwise	0.562	0.496
Primary	1 if has primary education; 0 otherwise	0.253	0.435
Secondary	1 if has secondary education; 0 if otherwise	0.145	0.352
PARTNER'S EDUCATION/FATHER'S EDUCATION (REF: HIGHIER)			
No education	1 if no education; 0 if otherwise	0.456	0.498
Primary	1 if has primary education; 0 if otherwise	0.263	0.440
Secondary	1 if has secondary education ; 0 if otherwise	0.175	0.380
AGE OF THE RESPONDENT/MOTHER'S AGE IN YEARS			
Age	Age of respondent 15 to 49	34.89	7.876
OTHER VARIABLES			
NUMBER OF CHILDREN OR BIRTH ORDER			
Birth order	Birth order 1 to 15	3.385	2.280
MARITAL STATUS/MOTHER'S MARITAL STATUS (REF: MARIED)		0.061	0.240
Single	1 if single, 0 if married		
REGION/REGION OF MOTHER (REF SOUTH WEST)			

North Central	1 if from North Central; 0 if otherwise	0.214	0.410
North East	1 if from North East; 0 if otherwise	0.190	0.393
North West	1 if from North West; 0 if otherwise	0.160	0.367
South East	1 if from South East; 0 if otherwise	0.216	0.411
RESIDENCE/MOTHER'S RESIDENCE			
Urban	1 if from urban; 0 if otherwise	0.291	0.454
RELIGION/MOTHER'S RELIGION (REF. CHRISTIANITY)			
Islam	1 if respondent practice Islam; 0 if otherwise	0.176	0.381
Traditionalist	1 if respondent practice Traditional religion; 0 if otherwise	0.496	0.500
CHILD AGE IN MONTHS			
Child age	From 0 to 37 months	10.09	7.323
CHILD SEX			
Child sex	1 if female; 0 if otherwise	0.475	0.499
INTERACTION VARIABLES			
RELIGION AND EDUCATION			
Christian no education	1 if Christian with no education; 0 if otherwise	0.099	0.299
Christian higher education	1 if Christian with higher education; 0 if otherwise	0.022	0.146
Muslim no education	1 if Muslim no education; 0 if otherwise	0.040	0.197
Muslim higher education	1 if Muslim with higher education, 0 if not	0.013	0.111
RELIGION AND REGION			
Muslim North West	1 if a Muslim from North West, ;	0.004	0.062

	0 if otherwise		
Christian North West	1 if a Christian from North West ; 0 if otherwise	0.010	0.102
Muslim North East	1 if a Muslim from North East; 0 if otherwise	0.003	0.051
Christian North East	1 if a Christian from North East, 0 if not	0.016	0.125
Muslim South West	1 if a Muslim from South West; 0 if otherwise	0.066	0.249
Christian South West	1 if a Christian from South West; 0 if otherwise	0.070	0.255
EDUCATION AND REGION			
No education North East	1 if from North East with no education; 0 if otherwise	0.162	0.368
Higher education North East	1 if from North East with higher education; 0 if otherwise	0.003	0.052
No education North West	1 if from North West with no education; 0 if otherwise	0.139	0.346
Higher education North West	1 if from North West with higher education; 0 if otherwise	0.001	0.037
No education South West	1 if from South West with no education; 0 if otherwise	0.082	0.274
Higher South West	1 if from South West with higher education; 0 if otherwise	0.017	0.130
WEALTH AND REGION			
Poorest North East	1 if poorest from North East; 0 if otherwise	0.064	0.244
Richest North East	1 if richest from North East; 0 if otherwise	0.020	0.139
Poorest North West	1 if poorest from North West; 0 if otherwise	0.046	0.209
Richest North West	1 if poorest from North East; 0 if otherwise	0.014	0.117
Poorest South West	1 if poorest from South West; 0 if otherwise	0.030	0.170

Variable	Definition	mean	SD
Richest South West	1 if richest from South West; 0 if otherwise	0.073	0.261
WEALTH AND RELIGION			
Poorest Christian	1 if in the poorest category of Christians; 0 if otherwise	0.047	0.212
Richest Christian	1 if in the richest category of Christians; 0 if otherwise	0.077	0.267
Poorest Muslim	1 if in the poorest category of Muslims; 0 if otherwise	0.019	0.135
Richest Muslim	1 if in the richest category of Muslims; 0 if otherwise	0.051	0.220
WEALTH AND RESIDENCE			
Poorest rural	1 if among the poorest from rural; 0 if otherwise	0.192	0.394
Richest rural	1 if among the richest from rural; 0 if otherwise	0.066	0.249

Table 5.1e Summary Statistics for NDHS 1990

Variable	Definition	mean	SD
DEPENDENT VARIABLES			
MATERNAL HEALTH CARE			
(a) Antenatal care use (logit model)	0 if no visit, 1 if respondent had 1 or more visits.	0.662	0.473
(b) Frequency of antenatal visits (negative binomial model	Antenatal visits from 1 to 30	5.042	5.164

SKILLED DELIVERY CARE	1 if assisted by Doctor, nurse/midwife and auxiliary midwife, 0 is if assisted by TB attendants, relative and friends	0.107	0.309
CHILD HEALTH CARE			
IMMUNISATION	1 if ever partake in vaccination 0 if never partake vaccination	0.452	0.498

INDEPENDENT VARIABLES

INCOME VARIABLES

Wealth	Scores with negative and positive values	0.001	2.145
WEALTH INDEX/WEALTH INDEX OF MOTHER (REF. RICHEST)			
Poorest	1 if respondent belong to poorest 20% of respondent; 0 if otherwise	0.212	0.409
Poorer	1 if respondent belong to poorer 20% of respondent; 0 if otherwise	0.190	0.392
Middle	1 if respondent belong to middle 20% of respondent; 0 if otherwise	0.201	0.401
Richer	1 if respondent belong to richer 20% of respondent; 0 if otherwise	0.197	0.398
EMPLOYMENT STATUS/ EMPLOYMENT STATUS OF MOTHER			
not employed	1 if not employed; 0 if employed	0.268	0.443

EDUCATION VARIABLES

RESPONDENT'S
EDUCATION/MOTHER'S EDUCATION
(REF: HIGHIER)

No education	1 if no education; 0 otherwise	0.669	0.471
Primary	1 if has primary education; 0 otherwise	0.234	0.424
Secondary	1 if has secondary education; 0 if otherwise	0.084	0.277
PARTNER'S EDUCATION/FATHER'S EDUCATION (REF: HIGHIER)			
No education	1 if no education; 0 if otherwise	0.555	0.497
Primary	1 if has primary education; 0 if otherwise	0.269	0.443
Secondary	1 if has secondary education ; 0 if otherwise	0.131	0.338
AGE OF THE RESPONDENT/MOTHER'S AGE IN YEARS			
Age	Age of respondent 15 to 49	34.30	7.774
OTHER VARIABLES			
NUMBER OF CHILDREN OR BIRTH ORDER			
Birth order	Birth order 1 to 15	3.506	2.338
MARITAL STATUS/MOTHER'S MARITAL STATUS (REF: MARIED)			
Single	1 if single, 0 if married	0.065	0.247
REGION/REGION OF MOTHER (REF SOUTH WEST)			
North East	1 if from North East; 0 if otherwise	0.243	0.429
North West	1 if from North West; 0 if otherwise	0.212	0.409
South East	1 if from South East; 0 if otherwise	0.279	0.448
RESIDENCE/MOTHER'S RESIDENCE			
Urban	1 if from urban; 0 if otherwise	0.337	0.473

RELIGION/MOTHER'S RELIGION (REF. CHRISTIANITY)			
Islam	1 if respondent practice Islam; 0 if otherwise	0.499	0.500
Traditionalist	1 if respondent practice Traditional religion; 0 if otherwise	0.028	0.165
CHILD AGE IN MONTHS			
Child age	From 0 to 37 months	9.075	6.888
CHILD SEX			
Child sex	1 if female; 0 if otherwise	0.483	0.499
INTERACTION VARIABLES			
RELIGION AND EDUCATION			
Christian no education	1 if Christian with no education; 0 if otherwise	0.195	0.396
Christian higher education	1 if Christian with higher education; 0 if otherwise	0.011	0.105
Muslim no education	1 if Muslim no education; 0 if otherwise	0.424	0.494
Muslim higher education	1 if Muslim with higher education, 0 if not	0.002	0.044
RELIGION AND REGION			
Muslim North West	1 if a Muslim from North West, ; 0 if otherwise	0.198	0.398
Christian North West	1 if a Christian from North West ; 0 if otherwise	0.013	0.112
Muslim North East	1 if a Muslim from North East; 0 if otherwise	0.197	0.398
Christian North East	1 if a Christian from North East, 0 if not	0.039	0.193
Muslim South West	1 if a Muslim from South West; 0 if otherwise	0.091	0.288

Christian South West	1 if a Christian from South West; 0 if otherwise	0.163	0.369

EDUCATION AND REGION

No education North East	1 if from North East with no education; 0 if otherwise	0.222	0.416
Higher education North East	1 if from North East with higher education; 0 if otherwise	0.000	0.000
No education North West	1 if from North West with no education; 0 if otherwise	0.191	0.393
Higher education North West	1 if from North West with higher education; 0 if otherwise	0.001	0.027
No education South West	1 if from South West with no education; 0 if otherwise	0.098	0.297
Higher South West	1 if from South West with higher education; 0 if otherwise	0.010	0.101

WEALTH AND REGION

Poorest North East	1 if poorest from North East; 0 if otherwise	0.063	0.243
Richest North East	1 if richest from North East; 0 if otherwise	0.021	0.142
Poorest North West	1 if poorest from North West; 0 if otherwise	0.049	0.216
Richest North West	1 if poorest from North East; 0 if otherwise	0.028	0.166
Poorest South West	1 if poorest from South West; 0 if otherwise	0.020	0.139
Richest South West	1 if richest from South West; 0 if otherwise	0.122	0.327

WEALTH AND RELIGION

Poorest Christian	1 if in the poorest category of Christians; 0 if otherwise	0.093	0.290
Richest Christian	1 if in the richest category of	0.112	0.315

	Christians; 0 if otherwise		
Poorest Muslim	1 if in the poorest category of Muslims; 0 if otherwise	0.093	0.291
Richest Muslim	1 if in the richest category of Muslims; 0 if otherwise		
WEALTH AND RESIDENCE			
Poorest rural	1 if among the poorest from rural; 0 if otherwise	0.203	0.402
Richest rural	1 if among the richest from rural; 0 if otherwise	0.023	0.148

The tables show all the variables used in the regression model and how they are used. It also shows the mean and the standard deviation (SD) of each of the variable. For simplicity and the purpose of clarity, the variables are presented in terms of the dependent and independent variables. Antenatal and skilled delivery care are the dependent variables for maternal health care while immunisation and bed nets use are the dependent variables for child health care. Most independent variables are common to all the health care. These include; wealth, wealth index, employment status of respondent, education, partner's education, age of respondents, insurance status, ethnicity, marital status, religion, birth order and region. These variables represent the common maternal characteristics that determine maternal and child health care utilisation. "Distance to health facility", "transport to health facility" and "no provider" are often use in all health care regression except bed nets regression model. Meanwhile, "no female provider" is only applicable in maternal health care regressions. Variable interactions are not included in the regressions for bed nets due to inadequacies in the data for bed nets. It is important to note that not all variables are available for all the NDHS, each table is designed to capture the variables available in particular year which NDHS data is used.

Table 5.1a shows the variables available in the NDHS for 2013, on which regressions are based on these variables. The mean and standard deviation of variables

with 0 and 1 responses are described in percentage, while the mean and standard deviation of continues variables are described in absolute terms. Table 5.1a shows that for antenatal care use, about 66% of women used antenatal care in 2013 with a standard deviation of 47%. This shows that more than half of the women sampled during this period attended antenatal care. In terms of frequency of visits, women who utilised antenatal care have an average of 5 visits with a standard deviation of 6 visits. This is so because the data shows that some women had up to 30 visits which appears to be beyond the normal. The standard WHO requirement is 4 visits. This means that in 2013, women met the requirements on the average. The data shows that about 10% of the respondents sampled had skilled delivery with a standard deviation of 30%. In terms of child health care, about 71% of mothers that were sampled immunised their children, while only 23% slept with bed nets with their children.

Wealth in the regression which has negative and positive magnitude in terms of scores shows an average of -7.8. The table also shows that over 20% of respondents belong to the poorest, poorer and middle class. Majority of the respondents are within the poorest 20% wealth quintiles while 18.7% belong to the richer wealth quintile. Also about 23% of respondents were not employed in 2013, 32.9% of indicated distance to health facility as a big problem. About 98% respondents sampled had no insurance. In terms of education 51% of respondents sampled had no formal education, 23.5% had primary education while 20% had secondary education. The respondents' partners' education information also shows that 42.9% had no formal education, 21% had primary education while 23% had secondary education. The mean age for the respondents sampled is about 35 years. The data also shows that majority of respondents are married with a mean value of 7% singles. The data for 2013 also shows that 13.5% of respondents were from the North Central, 20% were from the North East, 32.5% are from the North West, while 9.5% and 12% were from the South East and South West. The average age of the respondents' children sampled was about 10 months, with about 48% females. Other details on each of the variables were presented in Table 5.1a. Also, details on the variables for NDHS 2008, 2003, 1999, and 1990 in Tables 5.1b, 5.1c, 5.1d and 5.1e.

In comparing the tables, the percentage of women that attended antenatal care within these periods fluctuated from 66.2% in 1990 through 66.0% in 1999, 63.6% in 2003 and 58.3 in 2008 to 66.3 in 2013. 2013 survey recorded the highest percentage of women with antenatal care use and the highest mean visits. This shows an

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improvement in antenatal care utilisation. Skilled delivery as a dependent variable shows that for all the surveys, about 89% to 94% of women do not deliver their babies with the skilled delivery assistants. Skilled delivery is only about 5% to 9.8% for each of the survey. Skilled delivery is lowest in 1999 and more in 2013. For child health care, more than 50% of children received vaccination/immunisation as shown from 1999 to 2013 surveys. The 1990 survey recorded the lowest immunisation rate with less than 50% of children being immunised. The highest percentage of children immunisation was recorded in 2013 survey with about 71.2%, this shows an improvement in the number of children being immunised. In terms of bed nets use by children, the survey with bed net data for children include the 2003, 2008 and 2013. The use of bed nets is categorised into treated and untreated. Majority of the children in all the survey did not use bed nets; they accounted for about 80% to 94% of the total. The number of children that used treated bed nets improved from 15% to 23% in 2003 to 2013 survey. The descriptive statistics on respondents' ages for all the surveys show that the average age of the respondents ranged between 34 and 36 years, while the average age of the children ranged between 10 months and a maximum of 36 to 37 months (equivalent to 3 years) for all the surveys (please see details on independent variables data for all the years). Maternal and child health care utilisation improved from 1990 to 2013, based on information from the data. This is indicated by the percentages of antenatal care use and frequencies of visits, skilled delivery and bed nets utilisation as well as immunisation.

5.2 Profile of inequity in maternal and child health care utilisation

In this section, the analysis of inequity is carried out by the use of concentration curves and the horizontal inequity index or standardised concentration index. Measures of inequity as discussed in the literature and the methodology involves estimating the causes of inequity by standardising for differences in utilisation for the need and the non-need variable so that differences in utilisation of health care due to non- need variables are termed inequity or unjustified inequality. The results obtained in this section are discussed one after the other.

5.2.1. Profile of inequity in maternal health care utilisation

This section discusses results on antenatal and skilled delivery health care

5.2.1.1 Profile of inequity in antenatal care utilisation

This section presents the results on horizontal inequity for antenatal care utilisation for the 1999, 2003, 2008, and 2013. The results are presented using the concentration curve and the horizontal inequity index. The concentration curve that is farthest from the line of equality gives a higher horizontal inequity index and indicates higher level of inequity. Positive value indicates pro-rich inequity in antenatal care utilisation. Figure 5.1 presents the concentration curve and horizontal inequity index for the four periods considered in the analysis.
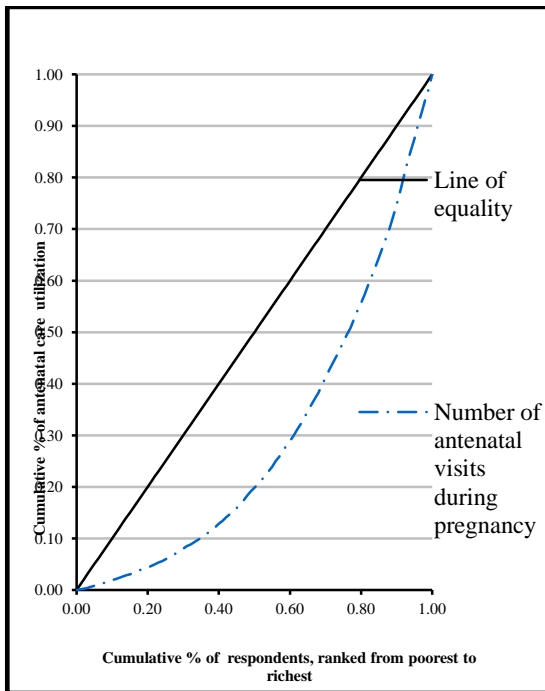
Horizontal inequity index = 0.373 for year 2013
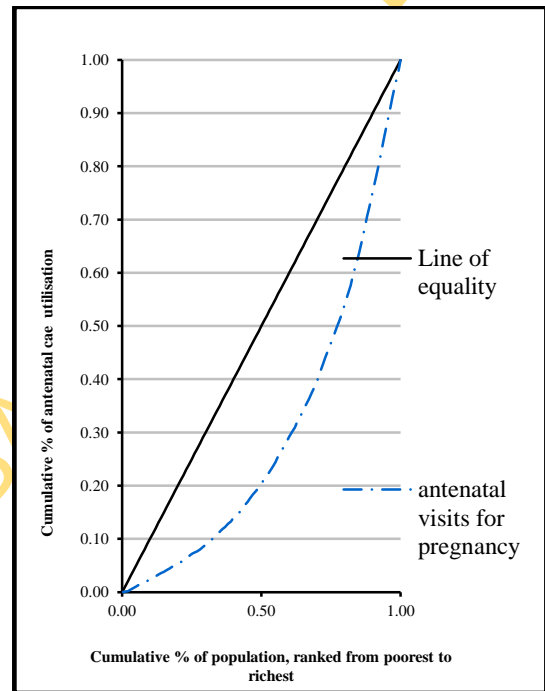
Horizontal inequity index = 0.386 for year 2008
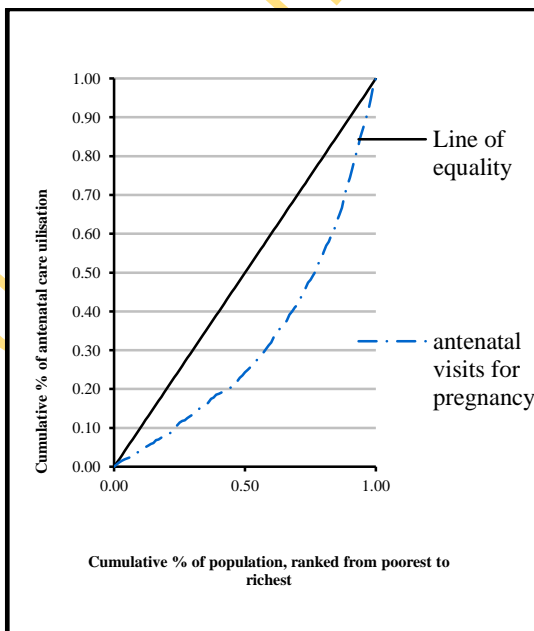
Horizontal inequity index = 0.327 for year 2003
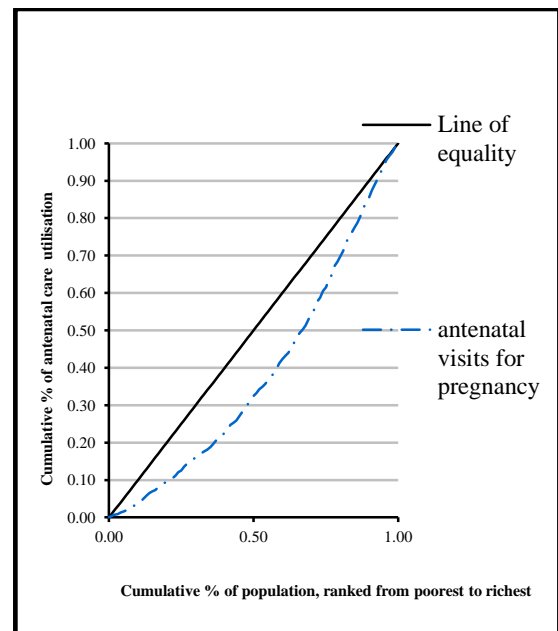
Horizontal inequity index = 0.264 for year 1999

Figure 5.1: Concentration curves and horizontal inequity index of antenatal care utilisation 1999-2013

As revealed by the values of the horizontal inequity index, the study found that inequity increased between 1999 and 2013 with an index of 0.264 in 1999 to 0.373 in 2013. There was a slight decrease in inequity from 0.386 to 0.373 from 2008 to 2013. The study also considered the components that drove inequity in antenatal care utilisation; this is shown in Figure 5.2. Figure 5.2, which shows the components of the horizontal inequity index represented as the concentration index of each of the factor that contributes to inequity in antenatal health care utilisation.
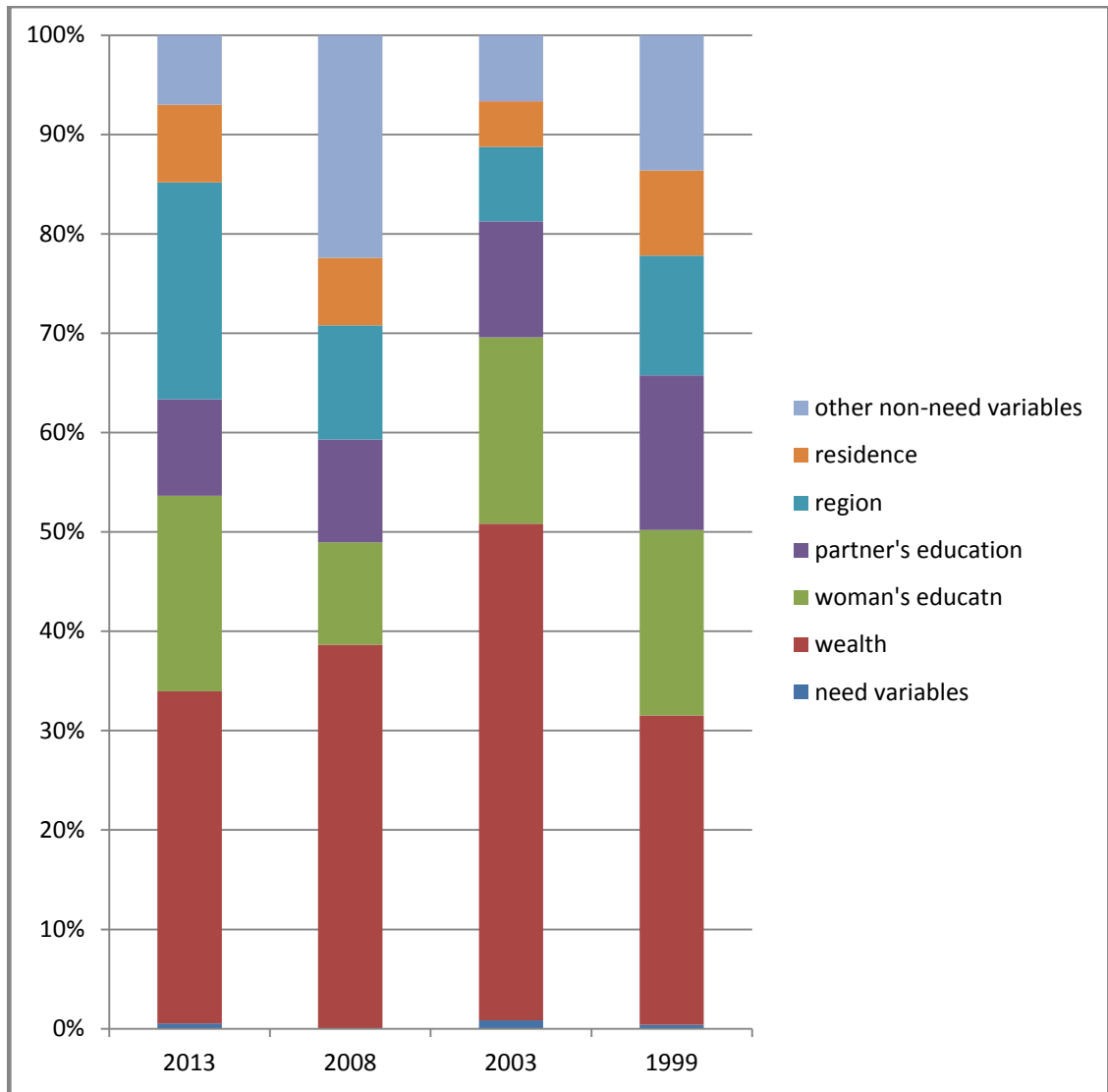
Figure 5. 2 Standardised concentration index of need and non-need variables for antenatal care utilisation

The results show that wealth status, education of a woman and her partner's education accounted for more than 60% of about 80% of the factors driving inequity in Nigeria. It is also important to note that need variables accounted for less than 2% of the factors driving inequity in antenatal care utilisation for the 4 periods under consideration. Table 5.2 presents detailed information on the concentration index in Figure 5.2 and how the horizontal inequity index was derived given the concentration index for the need and non-need. The table shows the concentration index as the components of the need and the non-need variables, the inequality total as well as the horizontal inequity index discussed in Figure 5.1.

Table 5.2: Standardised Concentration Index for Antenatal care Utilisation

	NDHS 2013	NDHS 2008	NDHS 2003	NDHS 1999
Variable	Index	Index	Index	Index
NEED VARIABLES				
currently pregnant	0.000<0.001	0.000<0.001	0.001	0.001
age of woman	0.002	0.000<0.001	0.000<0.001	0.000<0.001
Subtotal of need variables	**0.002**	**0.000**	**0.002**	**0.001**
NON-NEED /CONTROLLED VARIABLES				
wealth index	0.124	0.131	0.120	0.080
woman's educational	0.073	0.035	0.045	0.048
Religion	0.000	0.007	0.014	0.016
Ethnicity	0.023	0.033		
Insurance	-0.001	-0.003		
current marital status	0.000	0.000		-0.001
partner's education level	0.036	0.035	0.028	0.040
Employment status	0.004	0.039	0.002	0.020

Region	0.081	0.039	0.018	0.031
Residence	0.029	0.023	0.011	0.022
Subtotal of non-need variables	**0.369**	**0.305**	**0.251**	**0.256**
Residual error	0.004	0.081	0.077	0.256
Residual missing data	-0.003	-0.004	-0.007	-0.001
Inequality total	0.371	0.382	0.322	0.264
Horizontal inequity index	**0.373**	**0.386**	**0.327**	**0.264**

5.2.1.2 Profile of inequity in skilled delivery care utilization

In this section, the results on the concentration curve and the horizontal inequity index are presented for skilled delivery utilisation for 1999, 2003, 2008, and 2013 in Figure 5.3.
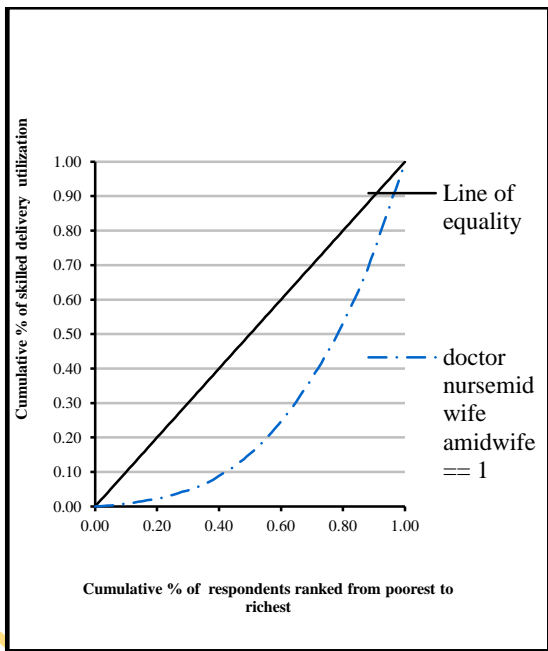
Horizontal inequity index =0.481 for year 2013
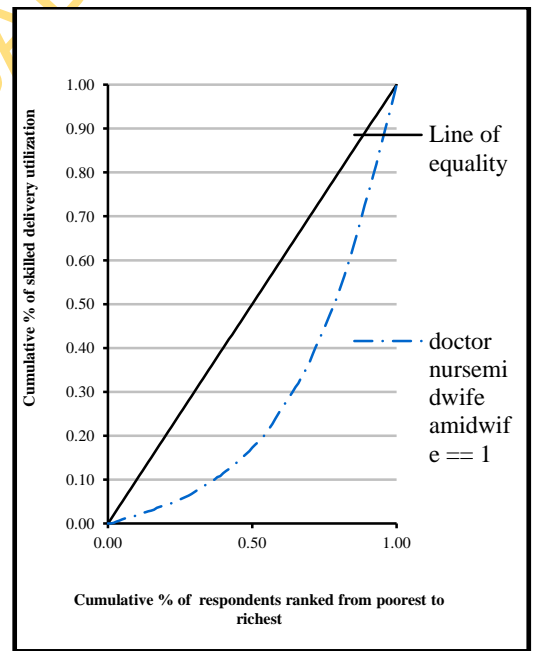
Horizontal inequity index = 0.457 for year 2008
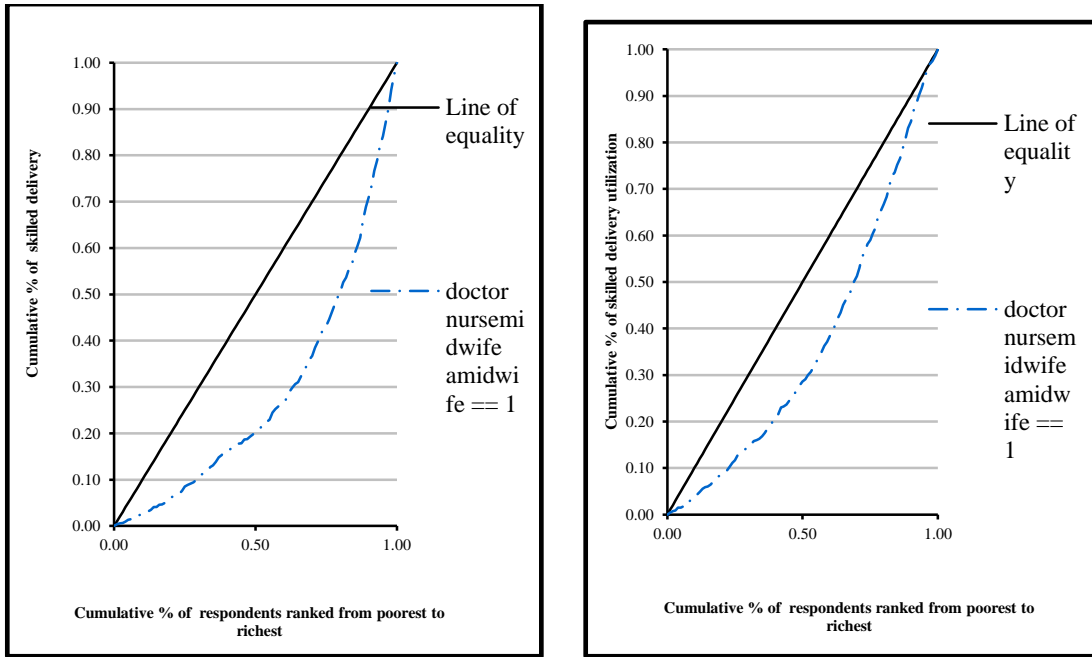
Horizontal inequity index = 0.457 for year 2003   Horizontal inequity index = 0.320 for year 1999

Figure 5.3: Concentration curves and horizontal inequity index for skilled delivery Utilization 1999 to 2013

The results show that the concentration curves for skilled delivery lie below the line of equality with positive horizontal inequity index. This implies that there is pro-rich inequity in skilled delivery utilisation for the 4 periods under consideration. As revealed by the values of the horizontal inequity index, the results show that inequity increased between 1999 and 2013 from an index of 0.320 in 1999 to 0.481 in 2013 without a decrease at any point in time. Figure 5.4 reveals the components of the horizontal inequity index, the drivers of inequity in skilled delivery utilisation for each factor represented by the concentration index.
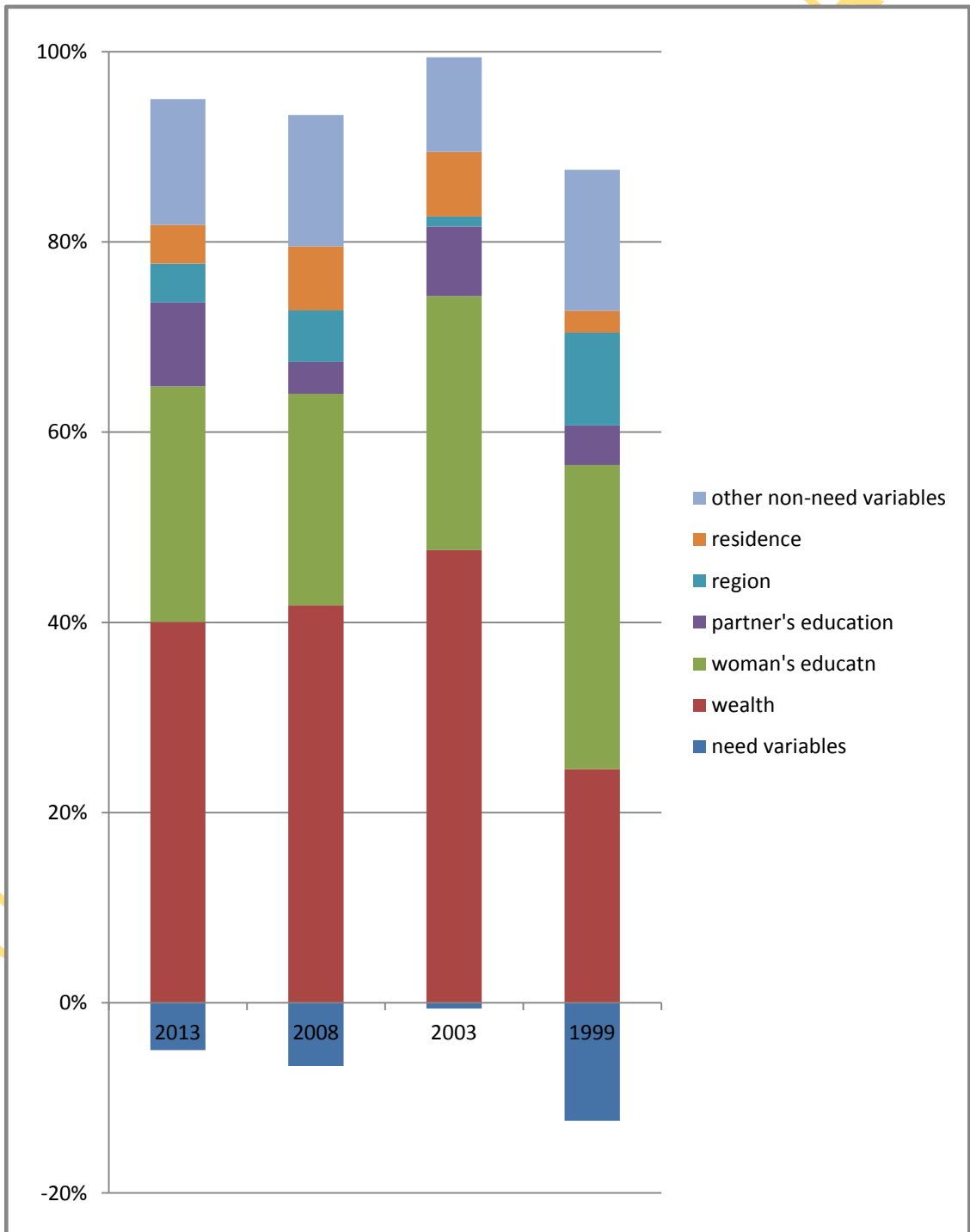
Figure 5. 4 Standardised concentration index of skilled delivery utilisation for need and non-need variables

Just like antenatal care, wealth status, the woman and her partner's education accounted for 70% of 85% factors driving inequity in skilled delivery utilisation in Nigeria. Similarly, need variables accounted for less than 1% of the factors driving skilled delivery utilisation for all the four periods. Table 5.3 also shows detailed information on the components of the horizontal inequity index as concentration index for need and non-need variables.

Table 5.3: Standardized Concentration Index for Skilled Delivery Utilization

Variable	NDHS 2013	NDHS 2008	NDHS 2003	NDHS 1999
	Index	Index	Index	Index
NEED VARIABLES				
currently pregnant	0.000<0.01	0.000<0.01	0.000<0.01	0.001
age of woman	-0.015	-0.014	-0.002	-0.028
Subtotal of need variables	**-0.015**	**-0.014**	**-0.001**	**-0.027**
NON-NEED VARIABLES				
wealth index	0.118	0.124	0.091	0.053
Woman's educational	0.073	0.066	0.051	0.069
Religion	0.031	0.021	0.018	0.017
Ethnicity	0.010	0.020		
Insurance	0.000	-0.001		
current marital status	-0.002	-0.001		0.001

partner's education level	0.026	0.010	0.014	0.009
Employment status	0.000	0.002	0.001	0.014
Region	0.012	0.016	0.002	0.021
Residence	0.012	0.020	0.013	0.005
Subtotal of non-need variables	**0.303**	**0.277**	**0.170**	**0.189**
Residual error	0178	0.180	0.268	0.131
Residual missing data	-0.003	-0.004	-0.014	-0.010
Inequality total	0.463	0.440	0.424	0.283
Horizontal inequity index	**0.481**	**0.457**	**0.438**	**0.320**

Further, results on inequity on antenatal and skilled delivery can be compared. Both health care are inequitably utilised in favour of the rich, however, inequity in skilled delivery is greater than inequity in antenatal care going by the results for the values of

the horizontal inequity index. Figure 5.5 shows the concentration curves that compares inequity between skilled delivery and antenatal care.
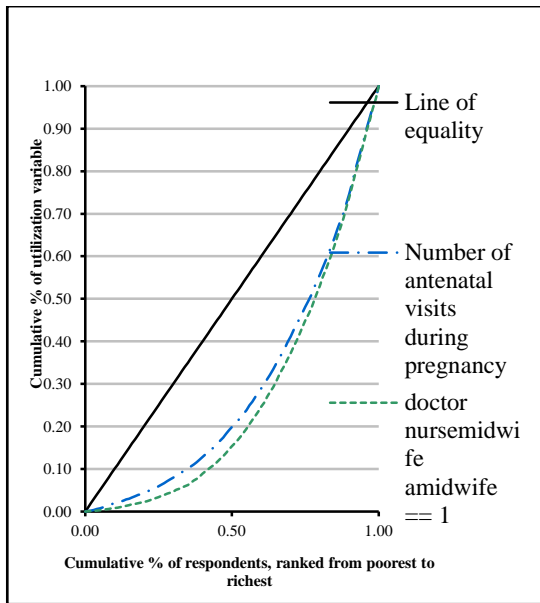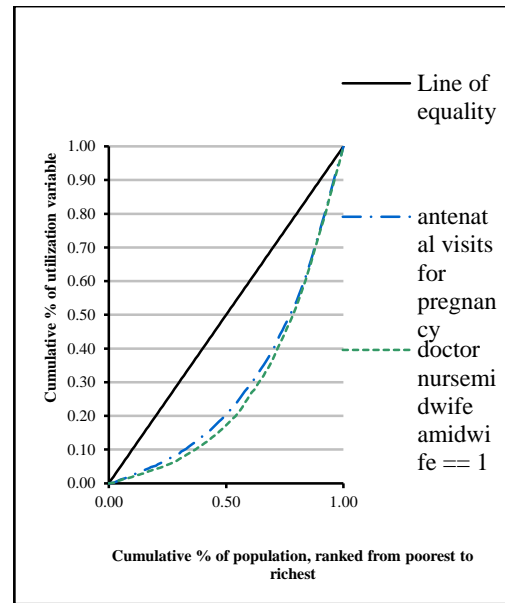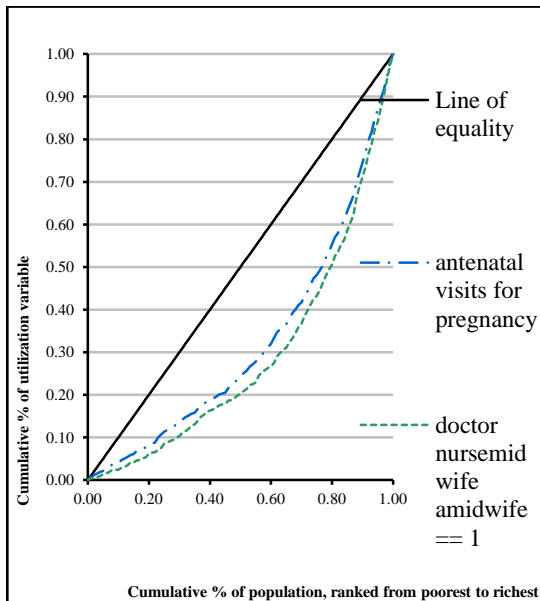
NDHS 2013

NDHS   2008

NDHS 2003
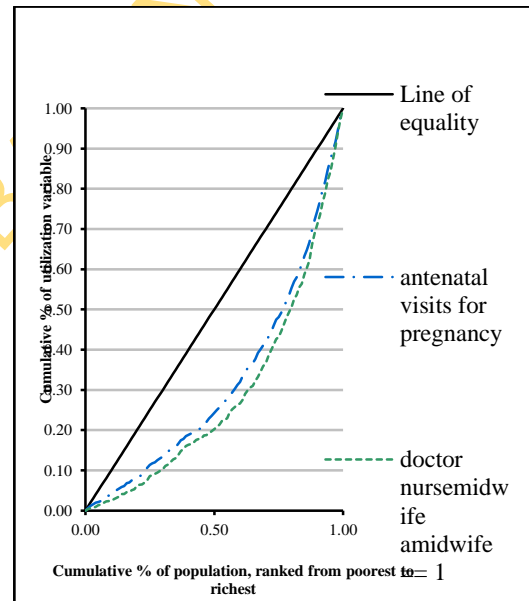
NDHS 1999

Figure 5.5: Inequity in antenatal and skilled delivery utilisation 1999 to 2013 survey

5.2.2 Profile of inequity in child health care utilisation

Inequity in this section is also measured by concentration curves and horizontal inequity index for immunisation and bed nets used during the four periods.

5.2.2.1 Profile of inequity in immunisation utilisation

The results on the concentration curve and the horizontal inequity index are presented for immunisation utilisation for periods 1999, 2003, 2008, and 2013 in Figure 5.6.
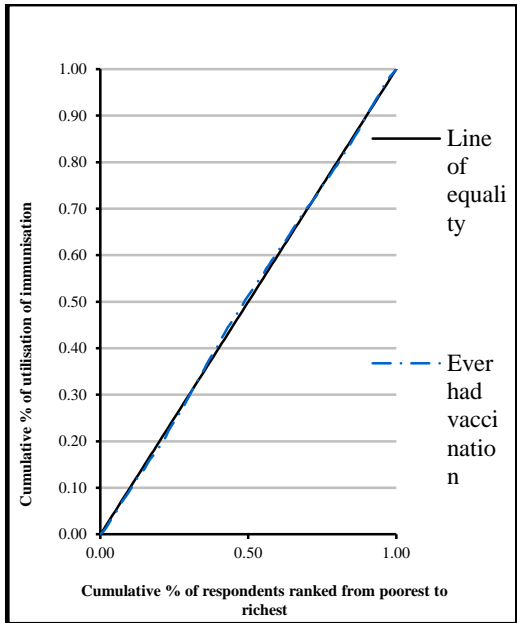
Horizontal inequity index = 0.068 for year 2013
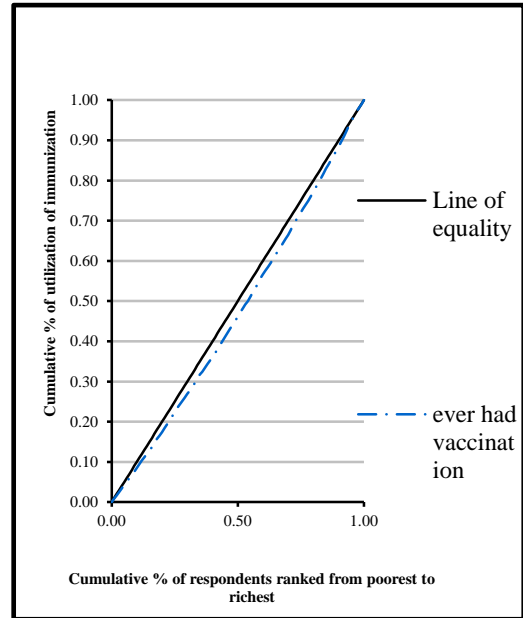
Horizontal inequity index = 0.114 for year 2008
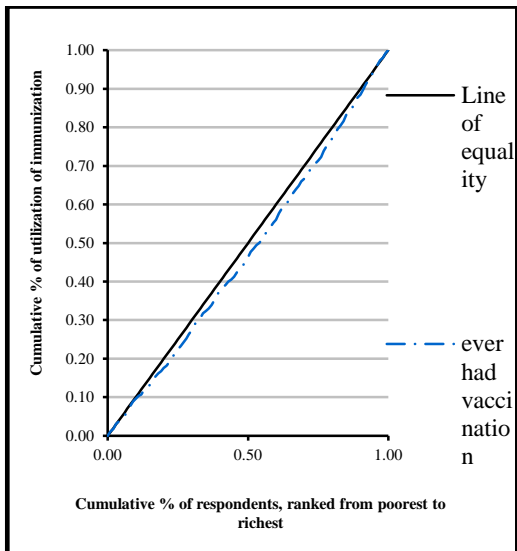
Horizontal inequity index = 0.069 for year 2003
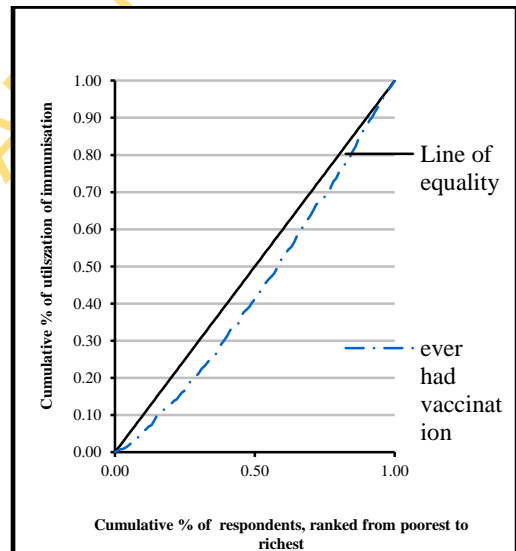
Horizontal inequity index = 0,216 for 1999

Figure 5.6: Concentration curves and horizontal inequity index for immunisation utilisation between 1999 and 2013

The results show that the concentration curves in 2013 for immunisation utilisation almost lie on the line of equality with positive horizontal inequity index that is close to 0 depicting near equity in immunisation during this period. The concentration curve for 1999 to 2008 is close to the line of equality with positive horizontal inequity index higher than that of 2013, which shows that there is slight pro-rich inequity in immunisation utilisation for 2003 and 2008. As revealed by the horizontal inequity index, inequity in immunisation declined over time from 0.216 between 0.068 and 1999 to 2013. There was a sharp decline in inequity from 0.216 to 0.069 from 1999 to 2003 after which inequity increased from 0.069 to 0.114 in 2008. A sharp decline in inequity in immunisation was also observed from 0.114 to 0.068 between 2008 and 2013. Figure 5.7 reveals the components that are the drivers of inequity in immunisation utilisation.
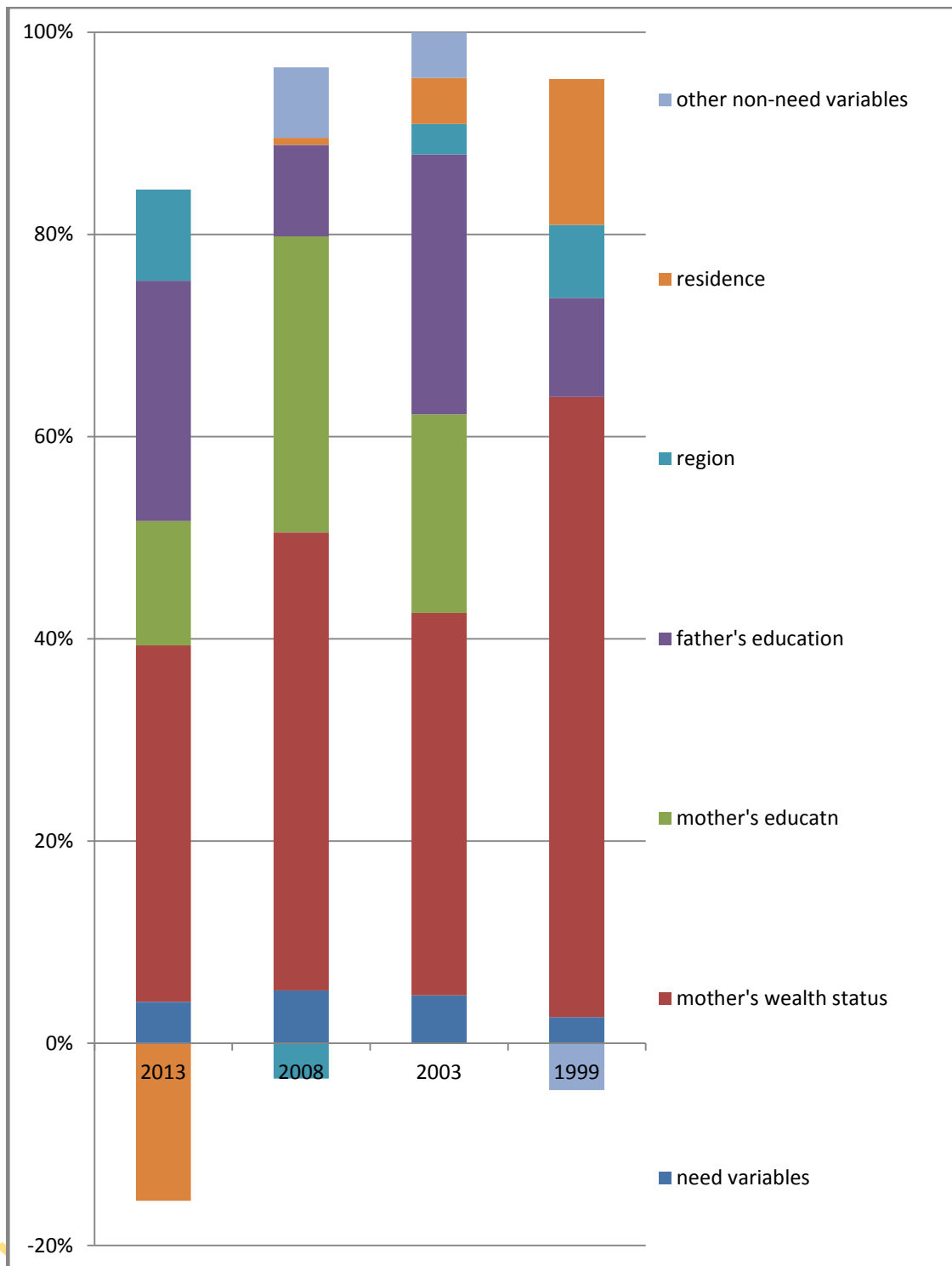
Figure 5.7: Standardised concentration index of need and non-need variables for immunisation utilisation

Wealth status of mother and education of mother and father accounts for 80% of 90% factors driving inequity in immunisation utilization in Nigeria. Need variables accounted for less than 0.5% of the factors driving inequity in immunisation utilisation for all the four periods. Table 5.4 also presents details on the components of horizontal inequity using the concentration index for both need and non-need variables as well as the inequality total.

Table 5.4 Standardised Concentration Index for Immunisation Utilisation

	NDHS 2013	NDHS 2008	NDHS 2003	NDHS 1999
Variable	Index	Index	Index	Index
NEED VARIABLES				
Current age of child	0.003	0.007	0.003	0.005
Number of under -five children	0.001	0.001	0.001	0.000
Subtotal	**0.004**	**0.008**	**0.004**	**0.005**
NON-NEED/CONTROLLED VARIABLES				
wealth index of mother	0.043	0.065	0.025	0.119
Educational status of mother	0.015	0.042	0.013	0.059
Religion of mother	0.000	0.008	0.004	0.010
Ethnicity of mother	-0.006	0.006		
Insurance status of mother	0.001	0.001		
current marital status of mother	0.000	0.000		0.000
father's education level	0.029	0.013	0.017	0.019
Employment status of mother	0.007	0.005	0.001	0.022
Region of mother	0.011	-0.005	0.002	0.014

Residence of mother	-0.019	0.001	0.003	0.028
Birth order of child	-0.002	-0.002	-0.002	
Sex of child6	0.000	0.000	0.000	0.000
Subtotal of non-need variable	**0.079**	**0.133**	**0.064**	**0.272**
Residual regression error	-0.011	-0.019	0.006	-0.056
Residual missing data	0.000	-0.001	0.001	-0.002
Inequality total	0.072	0.121	0.073	0.219
Horizontal inequity index	**0.068**	**0.114**	**0.069**	**0.216**

5.2.2.2 Profile of inequity in bed nets utilisation

In this section, the results on the concentration curve and the horizontal index are presented for bed nets utilisation for 2003, 2008 and 2013 in Figure 5.8.
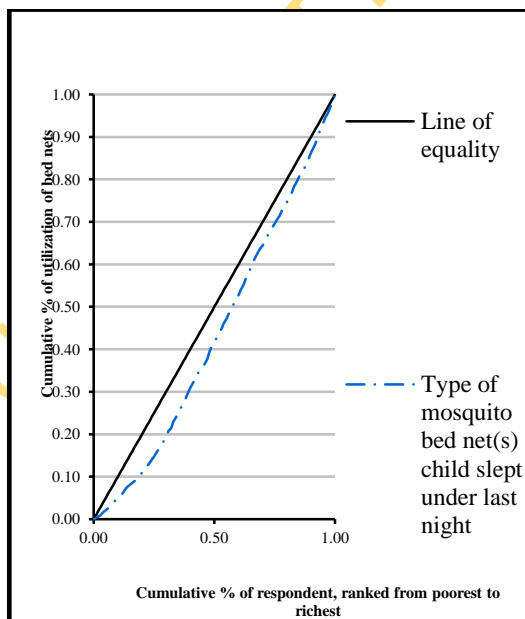
Horizontal inequity index = 0.128 for year 2013
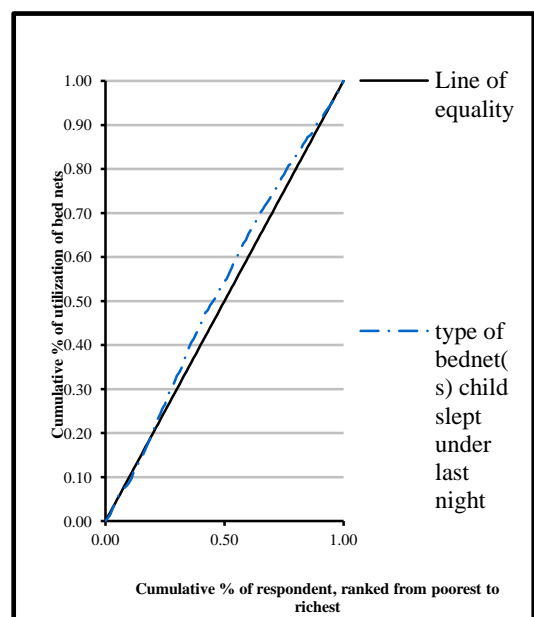
Horizontal inequity index = -0.080 for year 2008
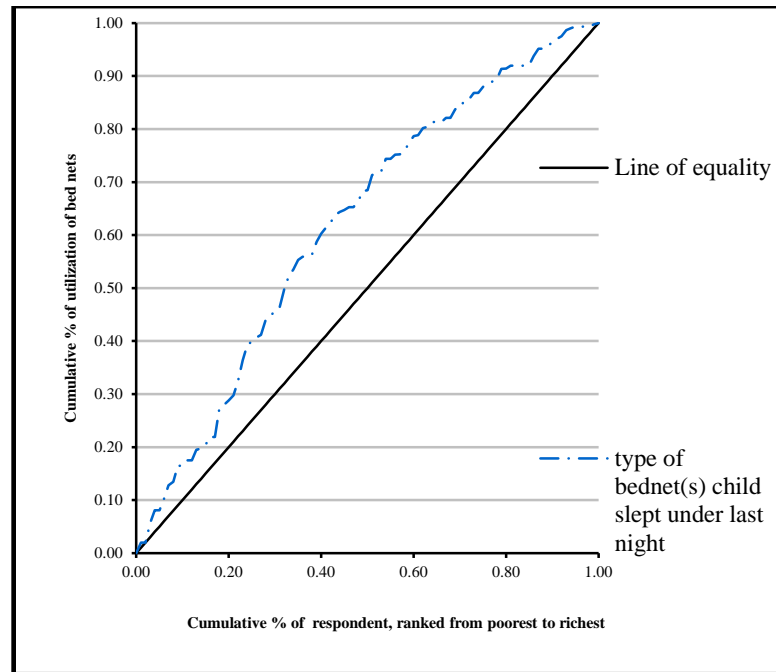
Horizontal inequity index = -0.301 for year 2003

Figure 5.8: Concentration curves and horizontal inequity index on the use of bed nets for the period 2003 to 2013.

The results show that the concentration curve lies above the line of equality in 2003 as indicated by the negative horizontal inequity index. Similarly, the concentration curve for 2008 slightly lies above the line of equality as indicated by the negative horizontal inequity index. The results reveals that there was pro-poor inequity in bed nets utilization in 2003 and 2008 but in 2013, bed nets utilization was slightly inequitable in favour of the rich. In absolute terms, inequity in bed nets utilisation is small between 2008 and 2013 but larger in 2003. This implies that inequity in bed nets utilisation in absolute terms declined in 2003 from -0.301 to 0.128 in 2013. Figure 5.9 reveal the components' drivers of inequity in bed nets utilisation in Nigeria.
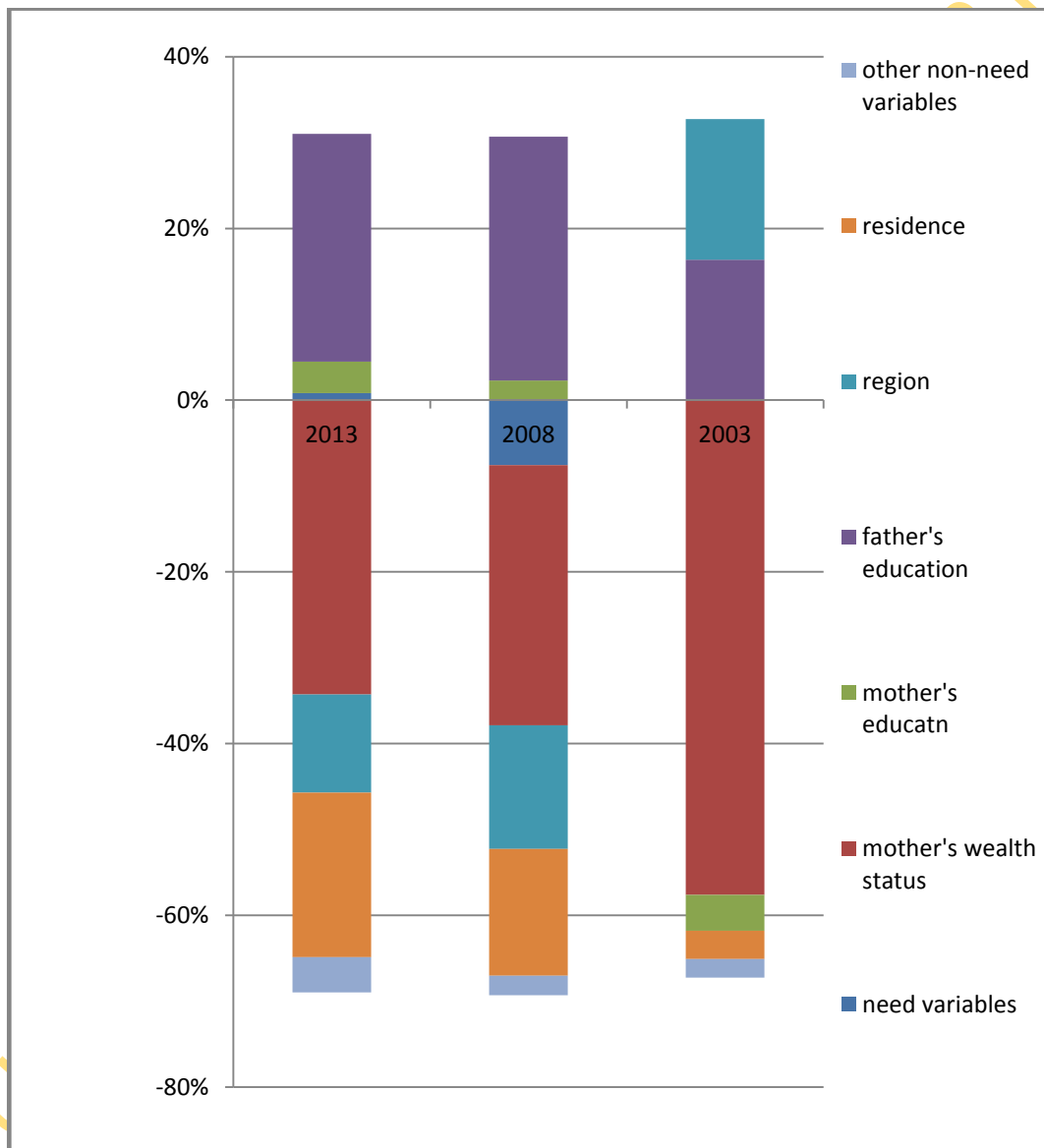
Figure 5.9 Standardised concentration index of need and non-need variables for bed nets utilisation for the period 2003 to 2013

The figure shows that the contribution of each variable to total inequity varies across periods. In 2003, wealth status of mother, father's education and region accounted for about 80% of inequity. In 2008, wealth status of mother, father's education, region and residence contributed more than 70% of the factors driving inequity in bed nets utilisation in Nigeria. Similarly, in 2013 wealth of mother, region, residence and father's education were the major drivers of inequity. Table 5.5 presents details on the results of the components of the horizontal inequity index. The values of the concentration index of each factor are presented for the need and non-need variables.

Table 5.5 Standardised concentration index for bed nets utilisation

	NDHS 2013	NDHS 2008	NDHS 2003
Variable	Index	Index	Index
NEED VARIABLES			
Current age of child	-0.003	-0.001	0.001
Number of under -five children	-0.016	0.004	-0.001
Subtotal of need variable	**-0.020**	**0.002**	**0.000**
NON-NEED/CONTROLLED VARIABLES			
wealth index of mother		-0.084	-0.286
Educational status of mother	0.006	0.009	-0.033
Religion of mother	0.002	-0.004	-0.008
Ethnicity of mother	-0.019	-0.012	
Insurance status of mother	0.000	0.000	
current marital status of mother	0.000	0.000	
father's education level	0.075	0.063	0.094

Employment status of mother	0.013	0.006	0.000
Region of mother	-0.038	-0.028	-0.003
Birth order	0.000	0.000	0.000
Residence of mother	-0.039	-0.047	-0.014
Sex of child	0.002	0.000	-0.001
Subtotal of non-need variable	**-0.083**	**-0.097**	**-0.249**
Residual regression error	0.210	0.018	-0.051
Residual missing data	0.000	0.000	0.006
inequality	0.108	-0.078	-2.95
Horizontal inequity index	**0.128**	**-0.080**	**-0.301**

The results of the analysis for child health care utilisation reveal that inequity is higher in bed nets utilisation in favour of the poor compared to immunization in favour of the rich. Figure 5.10 shows the comparison of the concentration curves for immunisation and bed nets.
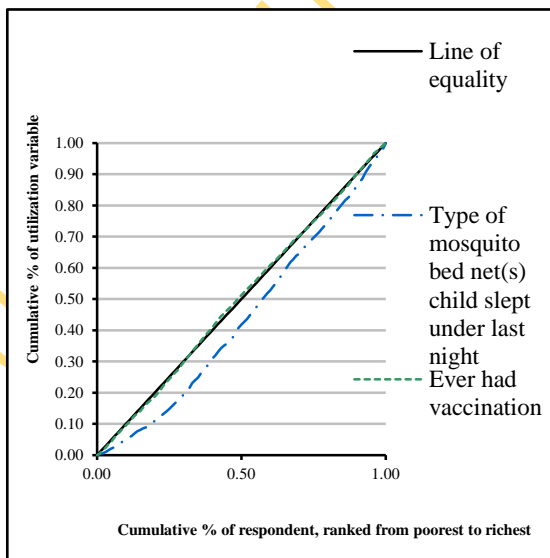
NDHS 2013
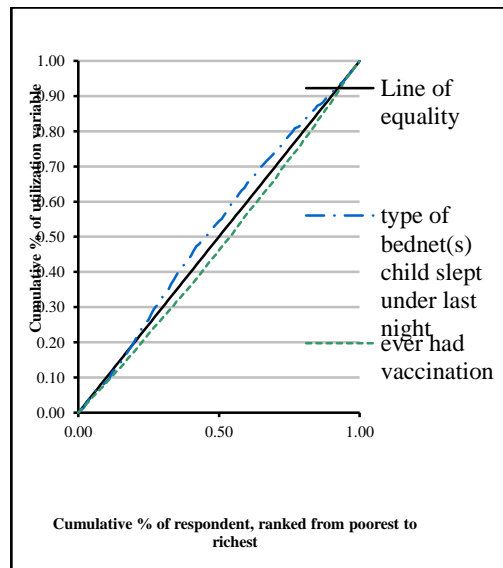
NDHS 2008
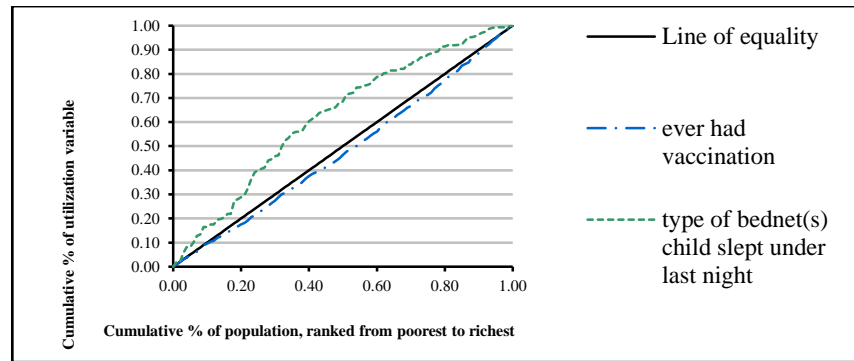
NDHS 2003

Figure 5.10: Bed nets and Immunization for 2003 to 2013

It is important to note that, the effect of wealth status and education on inequity in maternal and child health care utilisation supersede the effect of religion introduced in the theoretical model as shown by the results.

5.3 Determinants of maternal and child health care utilisation in Nigeria.

This section discusses the results obtained from the regression model on the determinants of maternal and child health care utilisation. The results are presented in two forms; the bivariate and multivariate analyses.

5.3.1 Bivariate analysis of determinants of maternal and child health care in Nigeria

In this section, each of the dependent variable is meant to establish a significant relationship between each of the independent variables in the model. The bivariate analysis is achieved through cross tabulation and chi -square test. The results from the

cross tabulation were presented by indicating the chi-square tests and their p-values. Tables 5.7 to 5.10 show the bivariate analysis for each of the dependent and the corresponding independent variables in each of the model.

5.3.1.1 Bivariate analysis of determinants of antenatal care utilisation

Table 5.6 shows the bivariate analysis of antenatal care and the dependent variables. The bivariate analysis was carried out for the five demographic and health survey data; 2013, 2008, 2003, 1999, and 1990. It established a relationship between antenatal care and other independent variables. The analysis shows that all the chi-square test performed for each of the variables for 2013 were significant given their p-values. The 2003 and 2008 data show that most variables were significant at $p<0.001$ or 1%. The 1990 and 1999 surveys analysis also shows that all variables were significant at 1% except birth order; significant at $p<0.05$ or 5%.

Table 5.6 Bivariate Analysis of Antenatal Care Utilisation in Nigeria

VARIABLE	NDHS 2013		NDHS 2008		NDHS 2003		NDHS 1999		NDHS 1990	
	P Value	Chi-square test	P Value	Chi-square test	P Value	Chi-square test	P Value	Chi-square test	P Value	Chi-square test
wealth index	0.000	chi2(12)= 5.4e+03	0.000	chi2(12)= 4.7e+03	0.000	chi2(12) = 867.3320	0.000	chi2(12) = 732.1660	0.000	chi2(12) =732.1660
Education	0.000	chi2(9) =4.9e+03	0.000	chi2(9)= 4.6e+03	0.000	chi2(9)= 985.1260	0.000	chi2(9) = 1.0e+03	0.000	chi2(9) = 1.0e+03
Partners education	0.000	chi2(9) 4.4e+03	0.000	chi2(9) =4.0e+03	0.000	chi2(9)= 775.7824	0.000	chi2(9) = 811.0264	0.000	chi2(9) =811.0264
Region	0.000	chi2(15)= 4.3e+03	0.000	chi2(15) =4.7e+03	0.000	chi2(15)= 878.0438	0.000	chi2(12) = 1.0e+03	0.000	chi2(12) = 1.0e+03
Residence	0.000	chi2(3)= 2.6e+03	0.000	chi2(3) =1.9e+03	0.000	chi2(3) =356.2032	0.000	chi2(3) = 303.7200	0.000	chi2(3)= 303.7200
Employment	0.000	chi2(3)= 408.5289	0.000	chi2(3) =443.6935	0.000	chi2(3) =100.7645	0.000	chi2(3) = 423.9655	0.000	chi2(3) =423.9655
Religion	0.000	chi2(6) =2.0e+03	0.000	chi2(6) =2.4e+03	0.000	chi2(6) = 517.4402	0.000	chi2(12) = 674.9757	0.000	chi2(12)= 674.9757
Marital status	0.000	chi2(3) 39.3295	0.000	chi2(3) =49.0694	0.002	chi2(3) = 14.4797	0.004	chi2(3) = 13.1479	0.004	chi2(3) = 13.1479
Age of respondent	0.000	chi2(18)= 253.2202	0.000	chi2(18) =257.25	0.000	chi2(18) = 57.9366	0.000	chi2(21) = 108.3264	0.000	chi2(21)= 108.3264
Birth oder	0.000	chi2(6) =300.3810	0.000	chi2(6) =225.8309	0.000	chi2(6) = 34.4426	0.014	chi2(6) = 16.0240	0.014	chi2(6) = 16.0240
Transport to health facility			0.000	chi2(3) = 734.9388	0.000	chi2(6) = 305.7194				
Distance to health facility	0.000	chi2(3) =1.6e+03	0.000	chi2(3)= 622.8583	0.000	chi2(6) = 309.0598				
No female provider			0.000	chi2(3) =788.6691	0.000	chi2(6) = 444.7066				
Ethnicity	0.000	chi2(18)=4.7e+03	0.000	chi2(18) = 4.8e+03						
Insurance	0.000	chi2(3)= 206.6855	0.000	chi2(3) =161.5739						
No provider			0.000	chi2(3) =381.7698						

201

5.3.1.2 Bivariate analysis of skilled delivery utilisation in Nigeria

The bivariate analysis for skilled delivery established relationship between skilled delivery utilisation and each of the independent variables. Table 5.7 shows that the 2013 and 2008 surveys' results for the chi-square test for all the variables were significant at 1% except employment and marital status. Employment and marital status for these years does not show any relationship for the bivariate analysis. The 1990 and 1999 results show that marital status was significant at 5% while birth order do not show any level of significance for that period.

Table 5.7 Bivariate Analysis of Skilled Delivery Utilisation in Nigeria

VARIABLE	NDHS 2013		NDHS 2008		NDHS 2003		NDHS 1999		NDHS 1990	
	P Value	Chi-square test	P Value	Chi-square test	P Value	Chi-square test	P Value	Chi-square test	P Value	Chi-square test
wealth index	0.000	chi2(4) = 7.7e+03	0.000	chi2(4) = 6.4e+03	0.000	chi2(4) = 1.2e+03	0.000	chi2(4) = 312.1274	0.000	chi2(4) = 312.1274
Education	0.000	chi2(3) = 1.0e+04	0.000	chi2(3) = 8.5e+03	0.000	chi2(3) = 2.1e+03	0.000	chi2(3) = 1.2e+03	0.000	chi2(3) = 1.2e+03
Partners education	0.000	chi2(3) = 6.6e+03	0.000	chi2(3) = 5.6e+03	0.000	chi2(3) = 1.3e+03	0.000	chi2(3) = 645.4890	0.000	chi2(3) = 645.4890
Region	0.000	chi2(5) = 6.5e+03	0.000	chi2(5) = 5.1e+03	0.000	chi2(5) = 824.0963	0.000	chi2(4) = 355.1532	0.000	chi2(4) = 355.1532
Residence	0.000	chi2(1) = 3.8e+03	0.000	chi2(1) = 2.4e+03	0.000	chi2(1) = 320.2590	0.000	chi2(1) = 92.4754	0.000	chi2(1) = 92.4754
Employment	0.000	chi2(1) = 0.0313	0.000	chi2(1) = 81.1788	0.739	chi2(1) = 0.1110	0.000	chi2(1) = 59.3850	0.000	chi2(1) = 59.3850
Religion	0.000	chi2(2) = 3.0e+03	0.000	chi2(2) = 2.4e+03	0.000	chi2(2) = 522.4603	0.000	chi2(4) = 275.7099	0.000	chi2(4) = 275.7099
Marital status	0.000	chi2(1) = 43.3201	0.000	chi2(1) = 28.0291	0.412	chi2(1) = 0.6718	0.022	chi2(1) = 5.2142	0.022	chi2(1) = 5.2142
Age of respondent	0.000	chi2(6) = 7.3e+03	0.000	chi2(6) = 5.6e+03	0.000	chi2(6) = 1.5e+03	0.000	chi2(7) = 916.0769	0.000	chi2(7) = 916.0769
Birth oder	0.000	chi2(2) = 85.3346	0.000	chi2(2) = 62.0838	0.000	chi2(2) = 21.1247	0.222	chi2(2) = 3.0133	0.222	chi2(2) = 3.0133
Transport to health facility			0.000	chi2(1) = 765.8615	0.000	chi2(2) = 307.4019				
Distance to health facility	0.000	chi2(1) = 1.2e+03	0.000	chi2(1) = 649.9500	0.000	chi2(2) = 305.4421				
No female provider			0.000	chi2(1) = 594.0848	0.000	chi2(2) = 311.4076				
Ethnicity	0.000	chi2(6) = 6.5e+03	0.000	chi2(6) = 4.9e+03						
Insurance	0.000	chi2(1) = 331.9308	0.000	chi2(1) = 217.4729						
No provider			0.000	chi2(1) = 531.8555						

5.3.1.3 Bivariate analysis of immunisation

The bivariate analysis for immunisation establishes relationship between immunisation and all the independent variables. Table 5.8 shows that all the chi-square tests undertaken for all the variables in 2013 were significant at 1% except child sex. Also the chi-square tests for the 2008 were also significant at 1%. In 2003, all chi-square tests are significant at 1% except marital status of mother, child sex, and birth order which were not significant at all. The 1999 results shows that the chi-square test was significant at 1% for all variables except marital status which was significant at 5% while birth order was not significant at all. This was also the same for 1990 although child sex was not significant in 1990.

Table 5.8 Bivariate Analysis of Immunization Utilization in Nigeria

	NDHS 2013		NDHS 2008		NDHS 2003		NDHS 1999		NDHS 1990	
VARIABLE	P Value	Chi-square test	P Value	Chi-square test	P Value	Chi-square test	P Value	Chi-square test	P Value	Chi-square test
wealth index of mother	0.000	chi2(4) = 657.3179	0.000	chi2(4) = 1.0e+03	0.000	chi2(4) = 151.2945	0.000	chi2(4) = 327.6319	0.000	chi2(4) = 327.6319
Education of mother	0.000	chi2(3) = 763.6092	0.000	chi2(3) = 1.4e+03	0.000	chi2(3) = 234.8811	0.000	chi2(3) = 411.6322	0.000	chi2(3) = 411.6322
Partners education of mother	0.000	chi2(3) = 737.9279	0.000	chi2(3) = 1.2e+03	0.000	chi2(3) = 181.2234	0.000	chi2(3) = 310.1876	0.000	chi2(3) = 310.1876
Region of mother	0.000	chi2(5) = 1.5e+03	0.000	chi2(5) = 874.3253	0.000	chi2(5) = 216.3520	0.000	chi2(4) = 308.5070	0.000	chi2(4) = 308.5070
Residence of mother	0.000	chi2(1) = 129.1771	0.000	chi2(1) = 265.2868	0.000	chi2(1) = 47.5183	0.000	chi2(1) = 144.3968	0.000	chi2(1) = 144.3968
Employment status of mother	0.000	chi2(1) = 495.4407	0.000	chi2(1) = 443.4666	0.000	chi2(1) = 123.1326	0.000	chi2(1) = 213.0627	0.000	chi2(1) = 213.0627
Religion of mother	0.000	chi2(2) = 363.9068	0.000	chi2(2) = 857.0392	0.000	chi2(2) = 182.1741	0.000	chi2(4) = 263.2722	0.000	chi2(4) = 263.2722
Marital status of mother	0.000	chi2(1) = 26.2233	0.000	chi2(1) = 36.0994	0.136	chi2(1) = 2.2270	0.053	chi2(1) = 3.7577	0.053	chi2(1) = 3.7577
mothers Age	0.000	chi2(6) = 94.8414	0.000	chi2(6) = 237.6670	0.000	chi2(6) = 67.8210	0.000	chi2(7) = 69.4186	0.000	chi2(7) = 69.4186
Child sex	0.981	chi2(1) = 0.0006	0.000	chi2(1) = 0.7025	0.955	chi2(1) = 0.0031	0.000	chi2(1) = 2.9180	0.088	chi2(1) = 2.9180
Birth oder	0.005	chi2(2) = 10.6545	0.001	chi2(2) = 13.1858	0.963	chi2(2) = 0.0763	0.116	chi2(2) = 4.3162	0.116	chi2(2) = 4.3162
Transport to health facility			0.000	chi2(1) = 118.3168	0.000	chi2(2) = 78.4318				
Distance to health facility	0.000	chi2(1) = 125.4852	0.000	chi2(1) = 109.5225	0.000	chi2(2) = 83.3124				
Ethnicity of mother	0.000	chi2(6) = 659.4734	0.000	chi2(6) = 1.1e+03						
Insurance status of mother	0.000	chi2(1) = 36.0679	0.000	chi2(1) = 52.6221						
No immunisation drugs			0.000	chi2(1) = 22.0171						

5.3.1.4 Bivariate analysis of bed nets utilisation.

This establishes relationship between bed nets use and each of the independent variables through the use of chi-square test. Table 5.9 presents the bivariate analysis of each of the year. 2013 survey shows that marital status of mother and child sex was not significant. Most variable were significant at 1% while age of mother, was significant at 5%. For 2008, child sex and birth order were significant. Marital status was significant at 5% and all other variables were significant at 1%. The 2003 survey shows that father's education, employment status of mother, mother's religion, mother's marital status, child sex, and birth order were not significant for the bivariate analysis.

Table 5.9 Bivariate Analysis of Bed net Use in Nigeria

	NDHS 2013		NDHS 2008		NDHS 2003	
variable	P Value	Chi-square test	P Value	Chi-square test	P Value	Chi-square test
wealth index	0.000	chi2(8) = 219.9894	0.000	chi2(8) = 307.9974	0.000	chi2(8) = 59.1340
Education	0.000	hi2(6) = 236.0600	0.000	chi2(6) = 368.3130	0.001	chi2(6) = 22.1215
Partners education	0.000	chi2(6) = 233.6222	0.000	chi2(6) = 354.7509	0.238	chi2(6) = 7.9949
Region	0.000	chi2(10) = 379.8892	0.000	chi2(10) = 361.8130	0.000	chi2(10) = 83.736
Residence	0.000	chi2(2) = 38.4222	0.000	chi2(2) = 99.2838	0.000	chi2(2) = 18.5025
Employment	0.000	chi2(2) = 18.2819	0.002	chi2(2) = 12.6375	0.489	chi2(2) = 1.4294
Religion	0.000	chi2(4) = 267.1080	0.000	chi2(4) = 166.5601	0.120	chi2(4) = 7.3175
Marital status	0.120	chi2(2) = 4.2362	0.021	chi2(2) = 7.7515	0.640	chi2(2) = 0.8932
Age of respondent	0.015	chi2(12) = 24.8690	0.000	chi2(12) = 54.6216	0.057	chi2(12) = 20.5614
Child sex	0.306	chi2(2) = 2.3665	0.275	chi2(2) = 2.5816	0.110	chi2(2) = 4.4068
Birth oder	0.004	chi2(4) = 15.1422	0.114	chi2(4) = 7.4531	0.823	chi2(4) = 1.5226
Ethnicity	0.000	chi2(12) = 282.6913	0.000	chi2(12) = 417.6241		
Insurance	0.008	chi2(2) = 9.5829	0.000	chi2(2) = 44.4982		

3.2 Multivariate analysis of the determinants of maternal and child health care utilisation in Nigeria

In order to further understand the main determinants of maternal and child health care utilization, the study presents the results on the regressions for each of the maternal and child health care. In this section, the results obtained from the regression model for the determinants of maternal and child health care utilisation are discussed for 1990, 1999, 2003, 2008 and 2013. The results for each of the health care consist of the national and regional regression, the regional regressions; is meant to investigate regional differences in the utilisation model across the six geopolitical zones. The regional regression model for each of the regions excludes the variable on "ethnicity" because of multi-collinearity problem as each of the ethnic groups is associated with each of the regions. In all cases as discussed in the methodology, two proxies for long run income of the house hold using asset index in form of wealth and wealth index is regressed for each of the health care in the national regression. This section is divided into two; the first interprets the result on the determinants of maternal health care utilisation while the second interprets the results on child health care utilisation.

5.3.2.1 Determinants of maternal health care utilisation in Nigeria.

In this section, the results on the national and regional regressions for antenatal care and skilled delivery care are discussed in details.

(A) Determinants of antenatal care utilisation in Nigeria

As explained in the methodology in chapter 4, the study estimated the two-part model for antenatal care which consists of the logit and the negative binomial model. The results for all the NDHS periods are presented in Tables 5.10a to 5.10e.

Table 5.10a: Two-part Regression Model for Antenatal Care Utilisation for NDHS 2013

	NDHS 2013					
	Wealth in quintiles/index			**Wealth index values/scores**		
	First		Second	First		Second
	Logit model		NB model	Logit model		NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.	Coef./Std Err	Mar. Effect	Coef./Std Err.
WEALTH VARIABLES						
Wealth				0.053***	.009***	0.016***
				(0.014)	(0.002)	(0.00)
Poorest	-1.859***	-.383***	-0.689***			
	(0.138)	(0.029)	(0.039)			
Poorer	-1.33***	-.264***	-0.328***			
	(0.134)	(0.029)	(0.030)			
Middle	-0.871***	-.167***	-0.096***			
	(0.127)	(0.0265)	(0.024)			
Richer	-0.459***	-.083***	-0.018			
	(0.126)	(0.024)	(0.017)			
EMPLOYMENT						
not employed	-0.347***	-.061***	-0.107***	-0.344***	-.060***	-0.100**
	(0.044)	(0.008)	(0.019)	(0.044)	(0.008)	(0.049)
PRICE VARIABLES						
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)						
big problem	-0.547***	-.097***	-0.325***	-0.754***	-.137***	-0.353***
	(0.046)	(0.009)	(0.022)	(0.041)	(0.008)	(0.053)
INSURANCE STATUS						
No insurance	-1.055***	-.129***	-0.039	-1.285***	-.148***	0.101
	(0.353)	(0.029)	(0.033)	(0.344)	(0.024)	(0.088)

EDUCATION VARIABLES

RESPONDENT'S EDUCATION (REF: HIGHIER)

	(1)	(2)	(3)	(4)	(5)	(6)
No education	-1.783***	-.307***	-0.271***	-2.169	-.376***	-0.042
	(0.278)	(0.046)	(0.033)	(0.271)	(0.044)	(0.090)
Primary	-1.126***	-.222***	-0.029	-1.414***	-.288***	0.205**
	(0.275)	(0.0594)	(0.029)	(0.269)	(0.060)	(0.087)
Secondary	-0.802***	-.149**	-0.022	-0.941***	-.178	0.230***
	(0.272)	(0.054)	(0.022)	(0.268)	(0.055)	(0.063)

PARTNER'S EDUCATION (REF: HIGHIER)

No education	-0.953***	-.170***	-0.376***	-1.357***	-.249***	-0.483***
	(0.097)	(0.0184)	(0.029)	(0.094)	(0.018)	(0.079)
Primary	-0.304***	-.054***	-0.053**	-0.621***	-.116	-0.167**
	(0.101)	(0.0188)	(0.0251)	(0.099)	(0.020)	(0.073)
Secondary	-0.301***	-.052***	-0.044**	-0.483***	0-.086***	-0.088**
	(0.096)	(0.017)	(0.019)	(0.095)	(0.018)	(0.057)

AGE OF THE RESPONDENTS

Age	0.015***	.002***	0.009***	0.019***	.003***	0.008
	(0.005)	(0.001)	(0.002)	(0.004)	(0.001)	(0.005)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

Birth order	-0.050***	-.008***	-0.021***	-0.063***	-.010***	-0.019
	(0.012)	(0.0021)	(0.005)	(0.012)	(0.002)	(0.014)

MARITAL STATUS (REF: MARIED)

Single	-0.091	-.016	0.037	-0.120	-.021	-0.08
	(0.1182)	(0.021)	(0.039)	(0.120)	(0.022)	1(0.278)

ETHNICITY (REF. HAUSA)

Igbo	1.027***	.134***	0.263***	1.123***	.145***	0.306***
	(0.297)	(0.022)	(0.041)	(0.214)	(0.020)	(0.106)
Ijaw/izon	-1.248***	-.269***	-0.451***	-1.057***	-.224**	-0.67***
	(0.135)	(0.033)	(0.071)	(0.135)	(0.033)	(0.203)

Kanuri/beriberi	-0.348**	-.063**	-0.093	-0.239	-.043**	0.084
	(0.160)	(0.032)	(0.077)	(0.151)	(0.029)	(0.171)
Tiv	-1.100***	-.234***	-0.423***	-1.178***	-.254***	-0.395**
	(0.169)	(0.041)	(0.078)	(0.172)	(0.042)	(0.194)
Yoruba	1.010***	.134***	0.295***	1.204***	.155***	0.308***
	(0.182)	(0.0179)	(0.038)	(0.181)	(0.016)	(0.103)
Others	0.224***	.037***	0.145***	0.308***	.050***	0.212***
	(0.073)	(0.011)	(0.030)	(0.071)	(0.011)	(0.070)
REGION (REF SOUTH WEST)						
North central	-0.115	-.019	-0.479***	-0.154	-.026	-0.44***
	(0.138)	(0.024)	(0.029)	(0.136)	(0.025)	(0.086)
Northeast	0.181	.0294	-0.562***	-0.112	-.019**	-0.47***
	(0.136)	(0.0215)	(0.035)	(0.133)	(0.023)	(0.102)
Northwest	-0.736***	-.133***	-0.909***	-0.925***	-.171***	-0.86***
	(0.137)	(0.026)	(0.041)	(0.134)	(0.027)	(0.107)
Southeast	0.079	.0131	-0.207***	-0.104	-.018	-0.139
	(0.265)	(0.043)	(0.038)	(0.248)	(0.044)	(0.101)
South south	-1.159***	-.239***	-0.458***	-1.006***	-.205***	-0.51***
	(0.141)	(0.033)	(0.036)	(0.139)	(0.032)	(0.110)
RESIDENCE						
Urban	0.364***	.05***	0.082***	0.810***	1 .127***	0.029
	(0.062)	(0.009)	(0.018)	(0.055)	(0.008)	(0.050)
RELIGION (REF. CHRISTIANITY)						
Islam	-0.041	-.007	0.043**	0.091	0.015	0.074
	(0.0850)	(0.014)	(0.0205)	(0.085)	(0.015)	(0.060)
Traditionalist	-0.752***	-.151***	-0.257**	-0.806***	-.165***	-0.297
	(0.199)	(0.046)	(0.096)	(0.209)	(0.049)	(0.227)
_cons	5.031***		2.206***	4.763***		1.740***
	(0.472)		(0.073)	(0.452)		(0.192)

INTERRACTION VARIABLES

RELIGION AND EDUCATION

Christian no education	-0.279	-.050	0.472**	-0.342	-.063	0.557***

	(0.386)	(0.074)	(0.2054)	(0.397)	(0.077)	(0.216)
Christian higher education	-10.601	-.863	-0.132	-10.54***	-.860	-0.061
	(#)	(0.011)	(0.314)	(2.378)	(#)	(0.321)
Muslim no education	-0.654*	-.113*	0.3554*	-0.841***	-.148**	0.372*
	(0.379)	(0.0677)	(0.203)	(0.391)	(0.052)	(0.212)
Muslim higher education	-11.396	-.814	-0.172	-11.33***		-0.138
	(#)	(0.014)	(0.315)	(2.389)	#	(0.322)

EDUCATION AND REGION

Muslim Northwest	-0.179	-.0313	-0.068	-0.116	-0.020*	0.042
	(0.208)	(0.038)	(0.094)	(0.212)	(0.038)	(0.095)
Christian northwest	-1.609**	-.362**	-0.239***	-1.492***	-.335*	-0.188***
	(0.764)	(0.186)	(0.0589)	(0.756)	(0.186)	(0.060)
Muslim northeast	-0.191	-.0332	-0.174*	-0.215	-.037	-0.238**
	(0.199)	(0.036)	(0.095)	(0.204)	(0.037)	(0.096)
Christian Northeast	-0.354	-.0659	-0.138**	-0.225	-.041	-0.123
	(1.122)	(0.229)	(0.073)	(1.113)	(0.214)	(0.075)
Muslim southwest	0.524**	.077***	0.195**	0.650***	.093***	0.249
	(0.210)	(0.026)	(0.095)	(0.215)	(0.025)	(0.097)
Christian southwest	-0.888	-.1839	0.0426	-0.869	-.180*	0.011
	(0.6578)	(0.1567)	(0.0507)	(0.654)	(0.156)	(0.051)
Muslim north central	0.181	.029	0.273**	0.137	.022	0.320***
	(0.277)	(0.0423)	(0.1118)	(0.277)	(0.044)	(0.114)
Christian north central	-1.1389	-.2445	-0.171***	-1.201	-.261	-0.215***
	(0.7690)	(0.1896)	(0.047)	(0.759)	(0.188)	(0.047)

WEALTH AND REGION

Poorest northeast	-0.0038	-.0006	-0.132	-0.555***	-.106***	-0.311***
	(0.3049)	(0.0516)	(0.100)	(0.080)	(0.017)	(0.045)
Richest northeast	-0.374	-.0696	-0.156***	0.423	.063	0.019
	(0.3945)	(0.080)	(0.053)	(0.366)	(0.048)	(0.046)
Poorest north west	-0.1041	-.0179	-0.323***	-0.695***	-.135***	-0.512***
	(0.3012)	(0.053)	(0.103)	(0.066)	(0.015)	(0.052)
Richest north west	0.1939	.0310	-0.009	1.002***	.126***	0.175***
	(0.3043)	(0.046)	(0.050)	(0.262)	(0.023)	(0.042)

Poorest southwest	-0.712	-.143	-1.176***	-1.365***	-.303***	-1.415***
	(0.475)	(0.109)	(0.353)	(0.374)	(0.093)	(0.341)
Richest southwest	-0.189	-.0333	-0.251***	0.449	.068	-0.143***
	(0.359)	(0.067)	(0.041)	(0.318)	(0.042)	(0.027)
Poorest north central	0.010	.002	-0.384***	-0.675***	-.135***	-0.623***
	(0.3320)	(0.0557)	(0.132)	(0.161)	(0.037)	(0.099)
Richest north central	-0.2030	-.0361	-0.030	0.426	.064	0.076***
	(0.3623)	(0.0674)	(0.044)	(0.331)	(0.044)	(0.033)
WEALTH AND RELIGION						
Poorest Christian	-0.004	-.001	-0.120**	-0.452***	-.086***	-0.302***
	(0.138)	(0.023)	(0.056)	(0.139)	(0.029)	(0.055)
Richest Christian	-0.200	-.0349	-0.191***	0.648***	.094***	0.060***
	(0.1602)	(0.029)	(0.028)	(0.146)	(0.017)	(0.022)
Poorest Muslim	-0.194***	-.034***	-0.317***	-0.709***	-.134***	-0.490***
	(0.0648)	(0.011)	(0.040)	(0.052)	(0.011)	(0.038)
Richest Muslim	-0.218	-.038	-0.22***	0.741***	.103***	0.021
	(0.200)	(0.037)	(0.029)	(0.191)	(0.021)	(0.025)
WEALTH AND RESIDENCE						
Poorest rural	0.062	.0103	-0.167**	-0.619***	-.116***	-0.453***
	(0.176)	(0.0289)	(0.086)	(0.051)	(0.011)	(0.034)
Richest rural	0.037	.006	0.089**	0.719***	.100***	0.164***
	(0.244)	(0.040)	(0.041)	(0.202)	(0.022)	(0.038)
No of observations	18187			18187		
Prob >chi2	0.0000			0.0000		
Pseudo R2	0.3446			0.3286		

*significance at 10%   **significance at 5%   ***significance at 1%   # missing value

Table 5.10b: Two-part Regression Model for Antenatal care Utilisation for NDHS 2008

	NDHS 2008					
	Wealth in quintiles/index			**Wealth index values/scores**		
	First		Second	First		Second
	Logit model		NB model	Logit model		NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.	Coef./Std Err	Mar. Effect	Coef./Std Err.
WEALTH VARIABLES						
Wealth				0.070***	.0153***	0.041***
				(0.014)	(0.003)	(0.012)
Poorest	-1.688***	-.388***	-0.784***			
	(0.154)	(0.033)	(0.048)			
Poorer	-1.193***	-.278***	-0.380***			
	(0.150)	(0.035)	(0.040)			
Middle	-0.699***	-.162***	-0.043			
	(0.148)	(0.035)	(0.033)			
Richer	-0.477***	-.109***	0.025			
	(0.148)	(0.035)	(0.027)			
EMPLOYMENT						
not employed	-0.137***	-.030***	-0.123***	-0.135**	-.029**	-0.174***
	(0.048)	(0.011)	(0.025)	(0.048)	(0.011)	(0.067)
PRICE VARIABLES						
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)						
big problem	-0.150**	-.033**	-0.101***	-0.233**	-.051***	-0.310**
	(0.0702)	(0.0156)	(0.0351)	(0.069)	(0.015)	(0.097)
TRANSPORT TO HEALTH FACILTY (REF: NOT A BIG PROBLEM)						
big problem	-0.209***	-.046***	0.004	-0.269***	-.059***	0.030
	(0.071)	(0.016)	(0.036)	(0.069)	(0.015)	(0.107)

NO PROVIDER (REF: NOT A BIG PROBLEM)

big problem	-0.112**	-.024**	-0.073***	0.131**	.028**	-0.049
	(0.0551)	(0.012)	(0.0277)	(0.055)	(0.012)	(0.076)

NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)

big problem	-0.299***	-.067***	-0.059	-0.309***	-.069***	0.007
	(0.063)	(0.015)	(0.036)	(0.062)	(0.014)	(0.094)

INSURANCE STATUS

no insurance	-1.189**	-.199***	0.022	-1.407**	-.222***	0.204
	(0.503)	(0.057)	(0.045)	(0.490)	(0.048)	(0.126)

EDUCATION VARIABLES

RESPONDENT'S EDUCATION (REF: HIGHIER)

No education	-1.895***	-.394***	-0.336***	-2.235***	-.455***	-.346***
	(0.318)	(0.058)	(0.046)	(0.314)	(0.054)	(0.119)
Primary	-1.279***	-.299***	-0.037	-1.565***	-.365***	-0.032
	(0.317)	(0.074)	0.039	(0.313)	(0.070)	(0.0970
Secondary	-0.844***	-.197***	-0.0175	-1.009**	-.236**	0.125
	(0.316)	(0.076)	(0.033)	(0.314)	(0.075)	(0.084)

PARTNER'S EDUCATION (REF: HIGHIER)

No education	-0.943***	-.209***	-0.466	-1.286***	-.284***	-0.729***
	(0.107)	(0.024)	(0.040)	(0.103)	(0.022)	(0.107)
Primary	-0.324***	-.073***	-0.099***	-0.569***	-.130***	-0.212
	(0.109)	(0.025)	(0.035)	(0.107)	(0.025)	(0.093)
Secondary	-0.248**	-.055**	-0.101***	-0.391***	-.088***	-0.092
	(0.108)	(0.0245)	(0.028)	(0.107)	(0.025)	(0.077)

AGE OF THE RESPONDENTS

Age	0.008*	.0019*	0.0019	0.010**	.002**	-0.001
	(0.005)	(0.001)	(0.002)	(0.005)	(0.001)	(0.008)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

Birth order	-0.023*	-.005*	0.005	-0.022	-.004	0.023

	(0.0138)	(0.003)	(0.007)	(0.014)	(0.003)	(0.021)

MARITAL STATUS (REF: MARIED)

Single	-0.095	-.0211	0.106*	-0.091	-.020	0.242
	(0.135)	(0.031)	(0.063)	(0.134)	(0.030)	(0.521)

ETHNICITY (REF. HAUSA)

Igbo	0.642**	.126**	0.178***	0.683***	.133***	0.343**
	(0.285)	(0.049)	(0.057)	(0.266)	(0.045)	(0.147)
Ijaw/izon	-0.561***	-.132***	-0.168**	-0.537***	-.126***	-0.174
	(0.165)	(0.041)	(0.081)	(0.162)	(0.040)	(0.260)
Kanuri/beriberi	-0.438***	-.101***	-0.291***	-0.435***	-.101***	-0.274
	(0.114)	(0.028)	(0.082)	(0.115)	(0.028)	(0.269)
Tiv	-0.185	-.042	-0.117	-0.363**	-.083**	-0.520***
	(0.1456)	(0.034)	(0.076)	(0.146)	(0.035)	(0.183)
Yoruba	0.770***	.149***	0.331***	0.856***	.163***	0.423***
	(0.167)	(0.027)	(0.057)	(0.159)	(0.025)	(0.160)
Others	0.509***	.107***	0.268***	0.538***	.113***	0.258**
	(0.071)	(0.0145)	(0.039)	(0.070)	(0.014)	(0.102)

REGION (REF SOUTH WEST)

North central	-0.680***	-.158***	-0.572***	-0.762***	-.177***	-0.432***
	(0.148)	(0.035)	(0.044)	(0.142)	(0.034)	(0.129)
North East	-0.855***	-.198***	-0.644***	-1.152***	-.268***	-0.642***
	(0.152)	(0.036)	(0.0509)	(0.147)	(0.035)	(0.141)
North West	-1.972***	-.449***	-1.219***	-2.148***	-.488***	-1.212***
	(0.155)	(0.0319)	(0.058)	(0.149)	(0.030)	(0.161)
South East	-0.579*	-.136*	-0.319***	-0.583***	-.136*	-0.474***
	(0.321)	(0.079)	(0.0503)	(0.298)	(0.073)	(0.145)
South South	-1.253***	-.299***	-0.438***	-1.189***	-.284***	-0.339**
	(0.169)	(0.040)	(0.051)	(0.165)	(0.039)	(0.140)

RESIDENCE

Urban	0.699***	.143***	0.237***	1.104***	.215***	0.482***
	(0.071)	(0.013)	(0.025)	(0.066)	(0.011)	(0.060)

RELIGION (REF:CHRISTIANITY)

Islam	-0.207**	-.045**	-0.005	-0.090	-.019	0.014
	(0.082)	(0.018)	(0.027)	(0.081)	(0.018)	(0.078)
Traditionalist	-0.583***	-.138***	-0.240***	-0.694***	-.165***	-0.264
	(0.154)	(0.038)	(0.083)	(0.156)	(0.039)	(0.227)
_Cons	5.624***		0.192***	5.320***		1.849***
	(0.596)		(0.024)	(0.589)		(0.305)

INTERRACTION VARIABLES

RELIGION AND EDUCATION

Christian no education	0.522**	.105*	0.548***	0.558*	.111*	0.613***
	(0.331)	(0.059)	(0.167)	(0.336)	(0.060)	(0.173)
Christian higher education	3.259***	.334***	-0.0929	3.208***	.332***	-0.060
	(0.957)	(0.027)	(0.622)	(0.954)	(0.028)	(0.599)
Muslim no education	0.012	.003	0.128	-0.017	-.003	0.196
	(0.328)	(0.072)	(0.165)	(0.333)	(0.073)	(0.171)
Muslim higher education	#	#	#	4.583***	.331***	0.090
				(1.357)	(0.010)	(0.601)

RELIGION AND REGION

Muslim Northwest	-1.610**	-.372**	0.280	-1.479*	-.343	0.300
	(0.8511)	(0.189)	(0.329)	(0.818)	(0.186)	(0.346)
Christian northwest	0.8617*	.157**	1.109***	0.801	0 .148	1.107**
	(0.5106)	(0.0730)	(0.317)	(0.510)	(0.076)	(0.335)
Muslim North East	-0.559	-.129	0.521	-0.554	-.127	0.570
	(0.876)	(0.2092)	(0.4464)	(0.833)	(0.199)	(0.432)
Christian North East	1.255**	.211***	0.944**	0.876	.161***	0.800**
	(0.534)	(0.062)	(0.437)	(0.516)	(0.076)	(0.423)
Muslim South West	-0.703	-.167	-0.321	-0.672	-.159	-0.394
	(1.079)	(0.2679)	(0.2973)	(1.045)	(0.259)	(0.296)
Christian South West	0.5494	.109	-0.056	0.397	.081	-0.187
	(0.813)	(0.145)	(0.277)	(0.803)	(0.153)	(0.278)
Muslim North Central	-2.221***	-.500***	-0.4283*	-1.960**	.453***	-0.330
	(0.799)	(0.1350)	(0.2337)	(0.765)	(0.146)	(0.235)
Christian North Central	0.083	.0180	-0.0827	-0.025	-.005*	-0.144
	(0.381)	(0.082)	(0.208)	(0.386)	(0.085)	(0.212)

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EDUCATION AND REGION

No education North East	-0.392**	-.090**	-0.226**	-0.236	-0.054	-0.079
	(0.189)	(0.045)	(0.093)	(0.185)	(0.213)	(0.087)
Higher education Northeast	0.0556	.012	-0.239**	0.156	.033	-0.093
	(1.1243)	(0.245)	(0.0997)	(1.116)	(0.234)	(0.100)
No education North West	-0.702***	-.163***	-0.746***	-0.652***	-.151***	-0.660***
	(0.190)	(0.046)	(0.102)	(0.185)	(0.044)	(0.098)
Higher education North West	1.108	.192	0.133	1.172	.199	0.173**
	(1.092)	(0.133)	(0.087)	(1.092)	(0.127)	(0.088)
No education North Central	-0.505**	-.119**	-0.109	-0.341*	-.078	0.048
	(0.195)	(0.048)	(0.092)	(0.189)	(0.045)	(0.087)
Higher education North Central	-0.5296	-.1255	-0.087	-0.482	-.113	-0.056
	(0.7645)	(0.189)	(0.067)	(0.760)	(0.188)	(0.072)
No education South West	-0.099	-.022	0.4009***	-0.041	-.009	0.539***
	(0.282)	(0.065)	(0.105)	(0.273)	(0.061)	(0.098)
Higher Southwest	-0.545	-.129	-0.251***	-0.634	-.151	-0.271***
	(0.832)	(0.206)	(0.065)	(0.831)	(0.207)	(0.070)

WEALTH AND REGION

Poorest North East	-1.039***	-.249***	-0.594***	0.083	-0.224	-0.652***
	(0.199)	(0.048)	(0.106)	(-11.240)	(#)	(0.054)
Richest North East	-0.171	-.039	-0.002	0.572	.113	0.146
	(0.526)	(0.123)	(0.101)	(0.476)	(0.082)	(0.095)
Poorest North West	-0.878***	-.210***	-0.894***	-0.804***	-.191***	-0.961***
	(0.207)	(0.051)	(0.1344)	(0.102)	(0.025)	(0.100)
Richest North West	0.292	.062	0.423***	0.979***	.177***	0.555***
	(0.3289)	(0.065)	(0.073)	(0.245)	(0.034)	(0.065)
Poorest South West	-0.4157	-.098	0.2720*	-0.388	-.091	0.144
	(0.3301)	(0.081)	(0.1451)	(0.279)	(0.068)	(0.117)
Richest South West	-0.467	-.109	-0.277***	0.183	.039	-0.192***
	(0.396)	(0.097)	(0.051)	(0.323)	(0.068)	(0.035)
Poorest north central	-0.429**	-.101**	-0.179	-0.388***	-.090***	-0.270***
	(0.209)	(0.051)	(0.1094)	(0.108)	(0.026)	(0.062)
Richest North Central	-0.187	-.043	-0.089	0.480	.097	0.010
	(0.373)	(0.088)	(0.055)	(0.298)	(0.055)	(0.043)

WEALTH AND RELIGION

	First Logit model Coef./Std Err	Mar. Effect	Second NB model Coef./Std Err.	First Logit model Coef./Std Err	Mar. Effect	Second NB model Coef./Std Err.
Poorest Christian	0.110	.024	0.110	-0.313***	-.071***	-0.312***
	(0.098)	(0.021)	(0.098)	(0.094)	(0.022)	(0.094)
Richest Christian	-0.130	-.0291	-0.1302	0.766***	.140***	0.722***
	(0.223)	(0.0512)	(0.2247)	0(.207)	(0.034)	(0.207)
Poorest Muslim	-0.444***	-.101***	-0.444***	-0.852***	-.199***	-0.852***
	(0.0747)	(0.018)	(0.0747)	(0.065)	(0.016)	(0.065)
Richest Muslim	-0.28285	-.0646	-0.2829	0.567***	.112***	0.568***
	(0.199)	(0.047)	(0.199)	(0.184)	(0.032)	(0.184)
WEALTH AND RESIDENCE						
Poorest rural	-0.116	-.0256	-0.425***	-0.656***	-.151**	-0.576***
	(0.1999)	(0.0447)	(0.114)	(0.054)	(0.013)	(0.038)
Richest rural	0.094	.0203	0.308***	0.767***	.146***	0.320***
	(0.28)	(0.059)	(0.048)	(0.232)	(0.036)	(0.041)
No of observations	15096			15096		
Prob >chi2	0.0000			0.0000		
Pseudo R2	0.387			0.4381		

*significance at 10%   **significance at 5%   ***significance at 1%   # missing values

Table 5.10c: Two-part Regression Model for Antenatal care Utilisation for NDHS 2003

	NDHS 2003					
	Wealth in quintiles/index			**Wealth index values/scores**		
	First Logit model		Second NB model	First Logit model		Second NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.	Coef./Std Err	Mar. Effect	Coef./Std Err.
WEALTH VARIABLES						
Wealth				0.035	.005	0.008
				(0.023)	(0.004)	(0.006)
Poorest	-2.863***	-.568***	-0.651***			

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	(0.369)	(0.065)	(0.081)			
Poorer	-2.627***	-.529***	-0.523***			
	(0.359)	(0.067)	(0.068)			
Middle	-1.884***	-.373	-0.141**			
	(0.355)	(0.074)	(0.063)			
Richer	-1.284***	-.241***	0.070			
	(0.350)	(0.071)	(0.048)			

EMPLOYMENT

not employed	-0.261**	-.040**	-0.119***	-0.237*	-.040**	-0.094**
	(0.1026)	(0.016)	(0.045)	(0.100)	(0.018)	(0.046)

PRICE VARIABLES

DISTANCE TO HEALTH FACILITY
(REF: NOT A BIG PROBLEM)

big problem	-0.416**	-.064**	-0.278***	0.566***	.096***	0.360***
	(0.166)	(0.026)	(0.088)	(0.167)	(0.029)	(0.090)

TRANSPORT TO HEALTH FACILTY
(REF: NOT A BIG PROBLEM)

big problem	-0.075	-.011	--0.028	0.100	.017	0.133
	(0.1675)	(0.025)	(0.088)	(0.167)	(0.028)	(0.090)
Small problem	-0.039	-.0059	0.058	0.064	.011	0.150
	(0.162)	(0.025)	(0.092)	(0.161)	(0.026)	(0.092)

NO FEMALE PROVIDER (REF NOT
A BIG PROBLEM)

big problem	-0.417***	-0 .067***	-0.286***	0.439***	.077***	0.272***
	(0.105)	(0.018)	(0.056)	(0.103)	(0.020)	(0.057)

EDUCATION VARIABLES

RESPONDENT'S EDUCATION (REF:
HIGHIER)

no education	-1.491	-0.227*	-0.254***	-2.169***	-.358***	-0.361***
	(0.814)	(0.121)	(0.081)	(0.781)	(0.121)	(0.081)
Primary	-0.752	-.128	0.009	1.375	-.272	-0.076
	(0.811)	(0.151)	(0.069)	(0.779)	(0.168)	(0.069)
Secondary	-0.593	-.099	0.039	-0.924	-.176	0.012

(0.806)	(0.147)	(0.060)	(0.772)	(0.162)	(0.061)

PARTNER'S EDUCATION (REF: HIGHIER)

no education	-0.802***	-.128***	-0.395***	-1.320***	-.237***	-0.537***
	(0.236)	(0.040)	(0.068)	90.22	(0.044)	(0.068)
Primary	-0.423*	-.0685*	-0.192***	-0.797***	-.148***	-0.256***
	(0.241)	(0.042)	(0.057)	(0.235)	(0.048)	(0.058)
Secondary	-0.078	-.012	-0.035	-0.317	-.055	-0.049
	(0.246)	(0.038)	(0.049)	(0.238)	(0.044)	(0.049)

AGE OF THE RESPONDENTS

age	0.028**	.004**	0.016***	0.034***	.005***	0.020***
	(0.011)	(0.002)	(0.005)	(0.011)	(0.002)	(0.005)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	-0.058**	-.009**	-0.028**	-0.068**	-.011**	-0.033***
	(0.028)	(0.004)	(0.012)	(0.027)	(0.005)	(0.013)

MARITAL STATUS (REF: MARIED)

Single	-0.091	-.016	0.037	-0.494*	-.093	-0.017
	(0.118)	(0.021)	(0.039)	(0.279)	(0.059)	(0.095)

REGION (REF SOUTH WEST)

North Central	-0.115	-.019	-0.479***	-1.887***	-.400***	-0.635***
	(0.138)	(0.024)	(0.029)	(0.333)	(0.072)	(0.063)
North East	0.181	.0294	-0.562***	-2.067***	-.424***	-1.268***
	(0.136)	(0.022)	(0.035)	(0.325)	(0.067)	(0.063)
North West	-0.736***	-.133***	-0.909***	-2.460***	-.484***	-1.217***
	(0.137)	(0.026)	(0.041)	(0.322)	(0.059)	(0.066)
South East	0.079	.0131	-0.207***	1.109	.138**	-0.430***
	(0.265)	(0.043)	(0.038)	(0.680)	(0.058)	(0.067)
South South	-1.159***	-.239***	-0.458***	-2.085***	-.459***	-0.417***
	(0.141)	(0.033)	(0.036)	(0.379)	(0.082)	(0.076)

RESIDENCE

Urban	0.184	.0275	0.049	0.790***	.124***	0.228***
	(0.1291)	(0.019)	(0.0434)	(0.113)	(0.017)	(0.040)

RELIGION (REF CHRISTIANITY)

Islam	-0.826***	-.1191***	-0.058	-0.46***	-.07***	0.068
	(0.163)	(0.0224)	(0.052)	(0.154)	(0.024)	(0.052)
Traditionalist	-0.841**	-.1594**	-0.129	-0.949**	-.197**	-0.293
	(0.369)	(0.0818)	(0.156)	(0.388)	(0.092)	(0.160)

REGION (REF SOUTH WEST)

North Central	-2.023***	-.411***	-0.702***	-1.887***	-.400***	-0.635***
	(0.349)	(0.074)	(0.064)	(0.333)	(0.072)	(0.063)
North East	-1.876***	-.3611***	-1.223***	-2.067***	-.424***	-1.268***
	(0.336)	(0.0683)	(0.066)	(0.325)	(0.067)	(0.063)
North West	-2.531***	-.47***	-1.276***	-2.460***	-.484***	-1.217***
	(0.338)	(0.061)	(0.067)	(0.322)	(0.059)	(0.066)
South East	1.221*	.1317***	-0.478***	1.109	.138**	-0.430***
	(0.689)	(0.0485)	(0.070)	(0.680)	(0.058)	(0.067)
South South	-2.37***	-.5085***	-0.552***	-2.085***	-.459***	-0.417***
	(0.401)	(0.083)	(0.078)	(0.379)	(0.082)	(0.076)
_cons	6.024***		2.069***	4.109***		1.585***
	(1.041)		(0.163)	(0.918)		(0.160)

INTERRACTION VARIABLES

RELIGION AND EDUCATION

Christian no education	0.472	.0689	0.111	0.239	.040	-0.009
	(0.808)	(0.103)	(0.269)	(0.793)	(0.128)	(0.271)
Christian higher education	#	#	0.032			0.152
			(0.114)		#	(0.115)
Muslim no education	0.161	.026	-0.423	-0.165	-.029	-0.466
	(0.7997)	(0.131)	(0.265)	(0.782)	(0.143)	(0.266)
Muslim higher education	#	#	#	#		#

EDUCATION AND REGION

No education Northeast	-0.828	-.1389	-0.469***	-0.700	-.125	-0.442***
	(0.5285)	(0.1027)	(0.079)	(0.517)	(0.103)	(0.080)
Higher education North East	#	#	-0.002		-.220	-0.014
			(0.0486)		#	(0.106)	(0.050)

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No education North West	-1.206**	-.207**	-0.812***	-1.185***	-.110	-0.777***
	(0.5217)	(0.105)	(0.0819)	(0.50839)	(0.108)	(0.083)
Higher education North West	#		0.108**			0.061
			(0.048)	#	-.815	(0.049)
No education North Central	-0.818	-.143	-0.342***	-0.608		-0.268***
	(0.538)	(0.112)	(0.077)	(0.526)		(0.077)
Higher education North Central	-14.53***	-.8387***	-0.0505	-14.48***		-0.059
	(1.211)	(0.010)	(0.073)	(0.932)		(0.079)
No education South West	-0.883	-.1600	0.0481	-0.847	-.164	0.076
	(0.844)	(0.182)	(0.074)	(0.818)	(0.184)	(0.071)
Higher South West	-15.93***	-.8457***	-0.075	-16.44***	-.824	-0.124**
	(1.351)	(0.010)	(0.054)	(0.993)	(#)	(0.049)
RELIGION AND REGION						
Muslim North West	-0.828	-.1389	-0.469***			
	(0.528)	(0.103)	(0.079)	15.200	.952	#
Christian North West	#	#	-0.002	31.260***	.312***	
			(0.047)	(0.924)	(0.030)	#
Muslim North East	-1.206**	-.207**	-0.812***	-0.527	-.091	
	(0.5217)	(0.105)	(0.0819)	(#)	(#)	#
Christian Northeast	#		0.108**	13.907***	.287***	
			(0.048)	(0.881)	(0.030)	#
Muslim South West	0.524**	.077***	0.1949**	1.663	.162	
	(0.210)	(0.026)	(0.095)	(#)	(#)	#
Christian South West	-0.888	-.1839	0.043	14.60***	.396***	
	(0.658)	(0.157)	(0.051)	(1.186)	(0.038)	#
Muslim North Central	0.181	.029	0.273**	0.779	.099	
	(0.277)	(0.042)	(0.112)	(#)	(#)	#
Christian North Central	-1.139	-.245	-0.171***	15.22***	.537***	
	(0.769)	(0.189)	(0.047)	(0.846)	(0.042)	#
WEALTH AND REGION						
Poorest North East	-0.004	-.007	-0.132	-0.641***	-.123***	-0.641***
	(0.305)	(0.052)	(0.100)	(0.177)	(0.039)	(0.177)
Richest North East	-0.374	-.079	-0.156***	1.982*	.180***	1.982*
	(0.395)	(0.080)	(0.053)	(1.092)	(0.041)	(1.092)

	(1)	(2)	(3)	(4)	(5)	(6)
Poorest North West	-0.104	-.0179	-0.323***	-1.096***	-.228***	-1.096***
	(0.301)	(0.053)	(0.103)	(0.227)	(0.056)	(0.227)
Richest North West	0.194	.0310	-0.009	2.644***	.206***	2.644***
	(0.304)	(0.046)	(0.050)	(0.750)	(0.020)	(0.750)
Poorest South West	-0.712	-.143	-1.176***	0.186	.029	0.186
	(0.475)	(0.109)	(0.353)	(0.683)	(0.103)	(0.683)
Richest southwest	-0.189	-.0333	-0.251***	0.306	.047	0.306
	(0.359)	(0.067)	(0.041)	(0.869)	(0.122)	(0.869)
Poorest North Central	0.010	.002	-0.384***	-0.451	-.084*	-0.451*
	(0.332)	(0.0557)	(0.132)	(0.242)	(0.050)	(0.242)
Richest North Central	-0.203	-.0361	-0.030	0.817	.107	0.817
	(0.362)	(0.067)	(0.044)	(0.547)	(0.053)	(0.547)
WEALTH AND RELIGION						
Poorest Christian	0.009	.0013	0.432	-0.346		
	(0.710)	(0.111)	(0.302)	(0.208)	#	#
Richest Christian	-1.631**	-.344**	-0.433***	0.708		
	(0.664)	(0.1586)	(0.075)	(0.455)	#	#
Poorest Muslim	-0.378	-.064	-0.202	-0.826***		-0.755***
	(0.697)	(0.1280)	(0.311)	(0.137)	#	(0.105)
Richest Muslim	#	#	#	2.241***		0.256***
				(0.485)	#	(0.063)
WEALTH AND RESIDENCE						
Poorest rural	-0.293	-.047	-0.411**	-0.646***	-.110***	-0.417***
	(0.358)	(0.060)	(0.168)	(0.118)	(0.023)	(0.067)
Richest rural	-0.472	-.082	-0.124	1.591**	.150***	0.115*
	(0.7567)	(0.146)	(0.085)	(0.655)	(0.032)	(0.068)
Poorest urban	#	#	#	-0.758	-0.142	-0.172
				(0.337)	(0.074)	(0.157)
Richest urban	#	#	#	1.677***	.175***	0.048
				(0.402)	(0.024)	(0.055)
No of observations	3497		3497	3497		
Prob >chi2	0.0000		0.0000	0000		0.0000
Pseudo R2	0.375					

Table 5.10d: Two-part Regression Model for Antenatal Care Utilization for NDHS 1999

	NDHS 1999					
	Wealth in quintiles/index			Wealth index values/scores		
	First		Second	First		Second
	Logit model		NB model	Logit model		NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.	Coef./Std Err	Mar. Effect	Coef./Std Err.
WEALTH VARIABLES						
Wealth				0.314***	.047***	0.105***
				(0.049)	(0.007)	(0.013)
Poorest	-1.340**	-0.251***	-0.594***			
	(0.286)	(0.061)	(0.081)			
Poorer	-0.884***	-0.159***	-0.226***			
	(0.279)	0.056)	(0.073)			
Middle	-0.582**	-0.099**	-0.056			
	(0.271)	(0.050)	(0.059)			
Richer	-0.124	-0.019	0.058			
	(0.285)	(0.046)	(0.052)			
EMPLOYMENT						
not employed	-0.2634**	-0.0406**	-0.181***	-0.264**	-.039**	-0.198***
	(0.129)	(0.020)	(0.045)	(0.130)	(0.020)	(0.046)
EDUACTION VARIABLE						
RESPONDENT'S EDUCATION(REF: HIGHIER)						
no education	-1.483	-0.229	-0.368***	-1.216	-.184	-0.211**
	(1.098)	(0.1683)	(0.095)	(1.084)	(0.163)	(0.095)
Primary	-0.451	-0.075	0.014	-0.194	-.030	0.172
	(1.089)	(0.1918)	(0.081)	(1.075)	(0.173)	(0.080)
Secondary	0.090	0.014	0.019	0.312	.044	0.133**
	(1.084)	(0.1621)	(0.071)	(1.074)	(0.146)	(0.071)

PARTNER'S EDUCATION (REF: HIGHIER)

no education	-1.760***	-.297***	-0.555**	-1.679***	-.278***	-0.466***
	(0.389)	(0.068)	(0.245)	(0.406)	(0.070)	(0.079)
Primary	-1.205***	-.220**	-0.108	-1.131***	-.202**	-0.071
	(0.406)	(0.083)	(0.155)	(0.421)	(0.084)	(0.067)
Secondary	-0.967**	-.171**	0.139	-0.895**	-.154**	-0.009
	(0.447)	(0.079)	(0.1459)	(0.422)	(0.080)	(0.057)
AGE OF THE RESPONDENTS						
age	0.004	0.001	0.002	0.004	.005	0.003
	(0.013)	(0.003)	(0.005)	(0.013)	(0.002)	(0.005)
OTHER VARIABLES						
NUMBER OF CHILDREN OR BIRTH ORDER						
birth order	0.027	0.004	0.004	0.025	.003	0.000
	(0.034)	(0.005)	(0.013)	(0.034)	(0.005)	(0.013)
MARITAL STATUS (REF: MARIED)						
Single	0.622	0.079*	0.380***	0.642	0.079*	0.365***
	(0.433)	(0.044)	(0.123)	(0.440)	(0.043)	(0.121)
REGION (REF SOUTH WEST)						
North Central	-1.23***	-0.231***	-0.498***	-1.189***	-.218***	-0.452***
	(0.271)	(0.054)	(0.052)	(0.268)	(0.053)	(0.051)
North East	-2.202***	-0.438***	-0.902***	-2.181***	-.428***	-0.903***
	(0.263)	(0.051)	(0.072)	(0.259)	(0.051)	(0.071)
North West	-2.485***	-0.506***	-0.958***	-2.473***	-.499***	-0.927***
	(0.269)	(0.0516)	(0.084)	(0.266)	(0.051)	(0.085)
South East	-1.186***	-0.226***	-0.371***	-1.152***	-.215***	-0.326***
	(0.351)	(0.075)	(0.054)	(0.348)	(0.073)	(0.052)
South South						
RESIDENCE						
Urban	1.162***	0.154***	0.247***	1.100***	.143***	0.226***
	(0.166)	(0.019)	(0.046)	(0.168)	(0.019)	(0.047)
RELIGION (REF: CHRISTIANITY)						
Islam	-0.489**	-0.083**	-0.019	-0.475**	-.079*	-0.002
	(0.259)	(0.048)	(0.047)	(0.259)	(0.047)	(0.046)
Traditionalist	-0.827***	-0.124***	-0.129**			-0.117**
				-0.813***	-.119***	(0.053)

	(0.194)	(0.028)	(0.054)	(0.193)	(0.027)	
_cons	5.722***		2.409***	4.870***		2.064&***
	(1.124)		(0.157)	(1.140)		(0.154)

INTERRACTION VARIABLES

RELIGION AND EDUCATION

Christian no education	0.116***	0.569***	#	0.968***	.113***	0.554***
	(0.027)	(0.114)		(0.336)	(0.028)	(0.111)
Christian higher education	#	0.372**		-10.33***	-.836	0.370**
		(0.163)		(1.135)	(#)	(0.158)
Muslim no education	0.118***	0.543***	#	1.090**	.120***	0.589***
	(0.039)	(0.143)		(0.528)	(0.037)	(0.144)
Muslim higher education	#	0.391***	#			0.434**
		(0.179)		#		(0.180)

RELIGION AND REGION

Muslim North West	1.107***	0.123**	0.629**	1.164	.123**	0.688**
	(0.862)	(0.061)	(0.258)	(0.866)	(0.057)	(0.265)
Christian North West	1.260**	0.133	0.625***	1.344**	.135***	0.677***
	(0.651)	(0.042)	(0.179)	(0.655)	(0.039)	(0.178)
Muslim North East	1.667	0.154***	-0.518**	1.721**	.152***	0.556**
	(0.877)	(0.040)	(0.224)	(0.866)	(0.037)	(0.208)
Christian North East	1.326**	0.139***	0.559***	1.361***	.137***	0.527***
	(0.493)	(0.032)	(0.134)	(0.487)	(0.031)	(0.133)
Muslim South West	-1.035	-0.206	-0.153	-0.956	-.185	-0.125
	(0.688)	(0.159)	(0.1205)	(0.676)	(0.153)	(0.116)
Christian South West	-1.015	-0.202	0.082	-0.945	-.182	0.055
	(0.677)	(0.1576)	(0.121)	(0.669)	(0.152)	(0.113)
Muslim North Central	1.364	.1301	0.6889			
	(3.514)	(0.204)	(0.662)			
Christian North Central	16.10***	.517***	0.789			
	(1.094)	(#)	(0.603)			

EDUCATION AND REGION

No education North East	-0.454	-0.071	-0.518***	-0.434	-.066	-0.513***
	(0.3563)	(0.061)	(0.122)	(0.355)	(0.059)	(0.123)

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Higher education North East	#	#	0.20184			0.069
			(0.224)	#		(0.214)
No education Northwest	-0.3134	-0.048	-0.812***	-0.347	-.051	-0.849***
	(0.403)	(0.0658)	(0.146)	(0.404)	(0.065)	(0.147)
Higher education North West	#		-0.296			-0.376*
			(0.199)	#		(0.213)
No education North Central	0.916*	0.098**	0.479***			
	(0.531)	(0.041)	(0.117)			
Higher education North Central	-13.89***	-0.853***	-0.1499			
	(0.934)	(0.008)	(0.127)			
No education South West	0.916*	0.098**	0.479***	0.916*	.095**	0.467***
	(0.531)	(0.041)	(0.117)	(0.526)	(0.039)	(0.113)
Higher SouthWest	-13.89***	-0.852***	-0.149	-14.30***	-.858***	-0.149
	(0.934)	(0.008)	(0.127)	(0.928)	(0.002)	(0.128)

WEALTH AND REGION

Poorest North East	0.482	0.069*	-0.467	0.081	.012	-0.672***
	(0.311)	(0.038)	(0.184)	(0.229)	(0.035)	(0.158)
Richest North East	0.409	0.058	0.519***	-0.306	-.053	0.245**
	(0.659)	(0.083)	(0.116)	(0.535)	(0.100)	(0.118)
Poorest North West	0.044	0.007	-1.136***	-0.387	-.067	-1.343***
	(0.374)	(0.059)	(0.280)	(0.302)	(0.058)	(0.262)
Richest North West	0.158	0.024	0.501***	-0.519	-.095	0.256*
	(0.628)	(0.093)	(0.160)	(0.494)	(0.101)	(0.154)
Poorest southwest	1.323**	0.143***	0.616***	0.890	.108**	0.390***
	(0.621)	(0.049)	(0.145)	(0.573)	(0.050)	(0.113)
Richest South West	-1.092	-0.222	0.015	-1.655***	-.355**	-0.226***
	(0.698)	(0.164)	(0.074)	(0.577)	(0.139)	(0.067)
Poorest North Central	-1.836	-.401	-0.272**	#	#	
	(1.343)	(0.319)	(0.103)			
Richest North Central	-1.219	-.252	0.174	#	#	
	(1.169)	(0.284)	(0.131)			

WEALTH AND RELIGION

Poorest Christian	0.019	0.003	0.769***	-0.143	-.023	0.249**
	(0.351)	(0.055)	(0.142)	(0.332)	(0.056)	(0.107)
Richest Christian	-0.469	-0.082	-0.233**	-0.72	-.132	-0.509***
	(0.633)	(0.124)	(0.089)	(0.588)	(0.125)	(0.070)
Poorest Muslim	-0.125	-0.020	0.809***	-0.336	-.057	0.270**
	(0.522)	(0.088)	(0.169)	(0.509)	(0.094)	(0.143)
Richest Muslim	-1.110*	-0.224*	-0.201**	-1.360	-.282	-0.463***
	(0.664)	(0.158)	(0.102)	(0.611)	(0.149)	(0.082)
WEALTH AND RESIDENCE						
Poorest rural	0.993***	0.139***	-0.722***	-0.235	-.037	-0.338***
	(0.3146)	(0.036)	(0.2033)	(0.177)	(0.030)	(0.084)
Richest rural	1.964***	0.181***	0.099	0.411	.056	-0.228***
	(0.556)	(0.022)	(0.084)	(0.572)	(0.069)	(0.082)
Poorest rural	#	#	#	0.627	.079	0.427**
				(0.519)	(0.053)	(0.194)
Richest rural	#	#	#	-1.023**	-.194**	-0.354***
				(0.405)	(0.090)	(0.085)
No of observations	2839		2839	2839		
Prob >chi2	0.0000		0.000	0.0000		0.0000
Pseudo R2	0.454					

*significance at 10% **significance at 5% ***significance at 1% # missing values

Table 5.10e: Two-part Regression Model for Antenatal Care Utilisation for NDHS 1990

	NDHS 1990					
	Wealth in quintiles/index			Wealth index values/scores		
	First		Second	First		Second
	Logit model		NB model	Logit model		NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.	Coef./Std Err	Mar. Effect	Coef./Std Err.
WEALTH VARIABLES						
Wealth				0.321***	.047***	0.108***
				(0.050)	(0.007)	(0.013)
Poorest	-2.332***	-0.487***	-0.786***			
	(0.169)	(0.034)	(0.048)			
Poorer	-2.298***	-0.489***	-0.819***			
	(0.167)	(0.034)	(0.052)			
Middle	-1.635***	-0.338***	-0.349***			
	(0.161)	(0.036)	(0.042)			
Richer	-0.912***	-0.175***	-0.112***			
	(0.156)	(0.033)	(0.029)			
EMPLOYMENT						
not employed	-0.389***	-0.068***	-0.187***	-0.401***	-0.059***	-0.264***
	(0.069)	(0.013)	(0.029)	(0.124)	(0.019)	(0.044)
EDUCATION VARIABLES						

RESPONDENT'S EDUCATION(REF: HIGHIER)

no education	0.341	0.058	0.161**	-1.294	-.193	-0.226**
	(0.648)	(0.112)	(0.075)	(1.095)	(0.163)	(0.095)
Primary	0.786	0.118	0.249***	-0.201	-.030	0.192*
	(0.649)	(0.0866)	(0.071)	(1.087)	(0.172)	(0.080)
Secondary	1.106*	0.145**	0.151**	0.250	.035	0.129*
	(0.659)	(0.065)	(0.068)	(1.085)	(0.148)	(0.071)

PARTNER'S EDUCATION(REF: HIGHIER)

no education	-1.51***	-0.25***	-0.359***	-1.588***	-.258***	-0.453***
	(0.354)	(0.059)	(0.049)	(0.396)	(0.068)	(0.075)
Primary	-1.061***	-.199**	-0.157***	-0.930**	-.159**	-0.032
	(0.358)	(0.072)	(0.044)	(0.409)	(0.078)	(0.064)
Secondary	-1.104***	-.219**	-0.0826**	-0.821**	-.138*	0.018
	(0.362)	(0.080)	(0.042)	(0.410)	(0.076)	(0.055)

AGE OF THE RESPONDENTS

age	0.003**	0.001	-0.001	0.014	.002	0.006
	(0.006)	(0.001)	(0.003)	(0.012)	(0.002)	(0.005)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	-0.008	-0.001	0.003	-0.006	-.0008	-0.010
	(0.018)	(0.003)	(0.008)	(0.033)	(0.005)	(0.012)

MARITAL STATUS (REF: MARIED)

Single	-0.397**	-0.073*	-0.042	0.595	.073*	0.327***
	(0.196)	(0.039)	(0.066)	(0.417)	(0.042)	(0.114)

REGION (REF SOUTH WEST)

North Central

North East	-1.224***	-0.238***	-0.736***	1.720***	.185***	0.587***
	(0.129)	(0.0268)	(0.042)	(0.260)	(0.017)	(0.051)
North West	-1.443***	-0.287***	-0.774***	0.351	.048	0.237***
	(0.127)	(0.0267)	(0.039)	(0.254)	(0.033)	(0.056)
South East	-0.288**	-.050**	0.063**	-0.210*	-.032	-0.219***

	(0.142)	(0.025)	(0.032)	(0.124)	(0.020)	(0.068)
South South						
RESIDENCE						
Urban	0.592***	0.094***	0.266***	1.209***	.153***	0.241***
	(0.106)	(0.016)	(0.033)	(0.166)	(0.019)	(0.047)
RELIGION (REF :CHRISTIANITY)						
Islam	-1.033***	-0.17***	-0.314***	-0.553**	-.092**	-0.011
	(0.102)	(0.016)	(0.030)	(0.259)	(0.048)	(0.046)
Traditionalist	-0.044	-0.007	0.081	-1.192***	-.170***	-0.191***
	(0.206)	(0.035)	(0.075)	(0.184)	(0.025)	(0.053)
_cons	4.531***		2.260***	3.148***		1.439***
	(0.662)		(0.102)	(1.083)		(0.145)

INTERRACTION VARIABLES

RELIGION AND EDUCATION

Christian no education	-0.279	-.050	0.472**	1.615***	.184***	0.518***
	(0.386)	(0.074)	(0.205)	(0.468)	(0.017)	(0.127)
Christian higher education	-10.601	-.863	-0.132	-8.229***	-.807	0.675***
	(#)	(0.011)	(0.314)	(1.166)	(#)	(0.132)
Muslim no education	-0.654*	-.113*	0.3554*	0.643	.102	0.020
	(0.379)	(0.0677)	(0.203)	(0.465)	(0.070)	(0.128)
Muslim higher education	-11.396	-.814	-0.172	-8.25***	-.796	0.973***
	(#)	(0.014)	(0.315)	(1.471)	(#)	(0.171)

EDUCATION AND REGION

No education Northeast	-1.076***	-0.206***	-1.076	-1.098***	-0.21***	-1.05***
	(0.21)	(0.042)	(#)	(0.197)	(0.044)	(0.212)
Higher education North East			0.209	#	-0.17***	(#)
	#	#			(0.044)	
No education North West	-0.794***	-.147***	-0.794***	-0.879***	#	-0.83***
	(0.217)	0.045)	(000)	(0.203)		(0.2178)
Higher education North West	#		#	#	0.0000	0.0000

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No education North Central				#	#	0.147
	#	#	#			(0.262)
Higher education North Central						-13.585
No education South West	0.181	.028	0.180	#		#
	(0.263)	(0.039)	(0.263)			
Higher South West	-12.411***	-.817***	-12.412***	#		#
	(0.761)	(0.011)	(0.760)			
RELIGION AND REGION						
Muslim North West	0.629**	13.829***	0.859***	13.829***	0.859***	#
	(0.258)	(0.437)	(0.015)	(0.437)	(0.015)	
Christian North West	0.625***	16.125***	0.263***	16.125***	0.263***	#
	(0.1799)	(0.482)	(0.015)	(0.482)	(0.015)	
Muslim North East	-0.518**	-2.028***	-0.430***	-2.028***	-0.430***	#
	(0.224)	(0.472)	(0.104)	(0.472)	(0.104)	
Christian Northeast	0.559***	-0.201	0.253	-0.201	0.253	#
	(0.134)	(0.400)	(0.075)	(0.4000)	(0.075)	
Muslim southwest	-0.153	-0.018	-0.003	-0.018	-0.003	#
	(0.121)	(0.493)	(0.085)	(0.493)	(0.085)	
Christian South West	0.082	-0.105**	-0.018	-0.105**	-0.018	#
	(0.121)	(0.395)	(0.070)	(0.395)	(0.070)	
WEALTH AND REGION						
Poorest North East	0.619***	0.094***	0.188**	0.751***	.104***	0.115
	(0.184)	(0.0234)	(0.091)	(0.131)	(0.014)	(0.079)
Richest North East	0.666*	0.099*	0.845***	-0.627**	-.123**	0.412***
	(0.493)	(0.059)	(0.082)	(0.280)	(0.061)	(0.078)
Poorest North East	-1.134***	-0.246***	-1.47***	-1.001***	-.208***	-1.572***
	(0.254)	(0.062)	(0.226)	(0.220)	(0.053)	(0.220)
Richest North West	1.818***	0.192***	0.725***	0.706**	.098***	0.277***
	(0.517)	(0.0280	(0.067)	(0.317)	(0.035)	(0.058)
Poorest South West	0.274**	0.045**	0.345***	0.466*	.069**	0.230***
	(0.3026)	(0.046)	(0.089)	(0.274)	(0.035)	(0.077)
Richest South West	0.073**	0.012**	0.198***	-1.112***	-.228***	-0.287
	(0.498)	(0.086)	(0.053)	(0.297)	(0.068)	(0.039)

WEALTH AND RELIGION

Poorest Christian	-0.717**	-0.144**	-0.161	0.261*	.041**	0.077
	(0.285)	(0.063)	(0.127)	(0.141)	(0.021)	(0.047)
Richest Christian	0.8590	0.123	0.292*	-1.624***	-.351***	-0.619
	(0.7690)	(0.088)	(0.166)	(0.295)	(0.069)	(0.048)
Poorest Muslim	-0.879***	-0.180***	-0.70***	0.047	.008	-0.461
	(0.275)	(0.064)	(0.147)	(0.123)	(0.020)	(0.088)
Richest Muslim	2.326***	0.234***	0.893***	-0.047	-.008	0.018
	(0.758)	(0.038)	(0.168)	(0.224)	(0.035)	(0.050)

WEALTH AND RESIDENCE

Poorest rural	0.993***	0.138***	0.070	0.325***	.049***	-0.040
	(0.315)	(0.036)	(0.127)	(0.097)	(0.013)	(0.044)
Richest rural	1.964***	0.181***	0.434***	1.112	.128***	0.103
	(0.556)	(0.022)	(0.062)	0.560)	(0.041)	(0.069)
Poorest Urban	#	#	#	-0.453	-.082	-0.113
				(0.320)	(0.062)	(0.124)
Richest Urban	#	#	#	-0.828***	-.154***	-0.398***
				(0.219)	(0.045)	(0.047)
No of observations	7468	7468		7468		
Prob >chi2	0.000	0.000		0.0000		0.0000
Pseudo R2	0.365			0.4381		

*significance at 10%   **significance at 5%   ***significance at 1%   # missing values

Each of the regressions in each table was estimated to reflect the two ways (wealth and wealth index) by which the long run income was represented as discussed in the methodology. The two regressions in each of the tables are similar except that wealth and wealth index were regressed differently. The results show that wealth index and wealth were significant in the decision to use or not to use antenatal care as well as the frequency of visits in both models. Wealth was positively related to the decision to use antenatal care and the frequency of use. The wealthier a woman was, the higher the probability that she will decide to attend antenatal care during pregnancy and as well have more antenatal visits. This was more pronounced in 1999 and 2008 but less pronounced in 2013, in 1999, about 4.7% women with higher wealth had higher probability of deciding to attend antenatal care and 4.1% of more wealthy women in 2008 had higher probability achieving more antenatal visits. The result is in line with the apriori expectation in chapter 4, this implies that when a woman is pregnant, the probability that she will report to the nearest health facility for her first antenatal visit and then sustain at least four visits recommended by WHO increases with the wealth status of the woman; poor women are less likely to report for antenatal care and subsequently sustain the visits to ensure regular checkups of the state of their health and that of their baby before delivery.

The wealth index in the regression model in each of the tables shows negative sign for all categories of wealth index given the richest as the reference category, this means that poorest women among all other women have lower probability of deciding to use antenatal care and were likely to have fewer visits compared to women from other categories of wealth index. This was more pronounced in 2003 and 1990 when 56% of poorest women had lower probability of deciding to attend antenatal care and about 80% of poorest women had lower probability of attending antenatal care

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frequently with fewer antenatal visits in 1990 as indicated by the logit and negative binomial results.

The respondent's employment status in the empirical model was found to be significant. The signs of the coefficient for women who were not employed were negative with those employed as the reference category. Employment status which is one of the characteristics of the respondents that influenced antenatal care utilisation also buttressed the role of income and wealth in antenatal care utilisation. Women without employment do not earn income as such they have less probability of attending antenatal care and undertaking frequent visits. This is more pronounced in 1999 as 39% and 20% of women without employment had recorded lower probability of attending antenatal care and attaining more antenatal visits.

"Distance to health facility" and "transport to health facility" which represented the price for accessing antenatal care in the model, were statistically significant. Women who found "distance to health facility" and "transport to health facility" as a big problem have lower probability of deciding to go for antenatal care as well as undertaking the required number of antenatal visits compared to those that do not see these factors as a problem. This is more pronounced in 2013 when 9.7% of women indicated less probability of deciding to use antenatal care because "distance to health facility" was a big problem. Also in 2013, about 32% of women had lower probability of attaining regular visits because "distance to health facility" was a big problem. "Transport to health facility" was significant for only 2008 results for the logit model. In 2008, 4.6% of women had lower probability of deciding to go for antenatal care because "transport to health facility" was a big problem. Insurance status in the empirical model was significant for only the logit model given the 2013 and 2008 results. Women without insurance were less likely to attend antenatal care; this is more noticeable in 2008 as about 20% of women with no insurance had lower probability of attending antenatal care.

The results on the variables "no provider" and "no female provider" which reflect availability of health personnel based on Andersen (1968) model were significant in the empirical model. The results show that women who viewed "no provider" and "no female provider" as a big problem were less likely to utilise antenatal care compared to those who do not view it as a problem. This was more pronounced in 2008 when 2.4% and 7.3% of women had less probability of attending

antenatal care because "no provider" was a big problem. Also, about 29% women had lower probability of visiting health facilities regularly for antenatal care.

In line with the a priori expectation, respondents educational is positively and significantly correlated with the decision to use or not use antenatal care as well as attaining regular frequency of antenatal visits. With higher education as the reference category, the signs and coefficient for other educational status were negative and significant. This implies that women with "no education" and other lower educational status compared to the reference category were less likely to go for antenatal than women with higher education. This is more evident in 2008 when 39.4% of women with "no education" had lower probability of deciding to go for antenatal care compared to other respondents with primary, secondary and higher education. Lower probability of frequent antenatal visits was also evident with women with "no education" in 2008 when 34% of women with no education had lower probability of going for antenatal care frequently. The result for 1990 survey was conflicting with other results. This may be due to the fact that the individuals interviewed for higher education were very few compared to the other categories of educational attainment during the 1990 survey. The 1990 results indeed show that women with no education and those with primary as well as secondary education were more likely to decide on attending antenatal care as well as attaining more antenatal visits than women with higher education although education is not significant for the logit model. In addition to respondent's education, partner's education is also found to be significant for some of the years. This means that the education of husbands was also important in determining antenatal care utilisation of a woman, this is evident in 1999 of which about 30% and 56% of women who their partners have "no education" have lower probability of attending antenatal care and frequent antenatal visits. To buttress the role of partner's decision in the utilisation of antenatal care by a woman in 1999, about 38% of women who were single as at the time of the survey had lower probability of visiting health facilities frequently compared to women who were married.

Among the characteristics of mother mentioned in the methodology, is ethnicity, The regression results in Table 5.11a also show that ethnicity is a major factor in determining the decision to go for antenatal care and attaining more frequent antenatal visits in Nigeria. Based on the a priori expectation, the signs of the coefficient for the Yoruba and Igbo women in the antenatal care utilisation model were positive, this shows that, the Yoruba and Igbo women have higher probability utilising

antenatal care compared to the Hausa, Ijaw/Izon, Kanuri/beriberi and Tiv This implies that Hausa women and those from minority tribes were less likely to report for examination when pregnant and less likely to meet up with the requirements for antenatal care visits compared to the Yoruba and the Igbo women. In line ethnicity, regional differences in antenatal care utilisation were also observed. Given that the South West was the reference category, women from other regions were less likely to utilise antenatal care compared to them. This is more evident in 1999 when 51% and 95% of women from the North West have lower probability of attending antenatal care and achieving regular visits compared to other regions of the country. Age of the respondent in line with priori expectation has positive sign and it is significant, implying that the probability of deciding to go for antenatal care and sustaining regular visits increased with the age of the respondents, older women were more likely to go for antenatal care compared to younger women, this was more evident in 2003.

The results on residence show that it is positive and significant at 1% for all the years except 2003. The level of significance applies to the logit and negative binomial models. The positive sign and the level of significance suggest that the location in terms of rural -urban settlement greatly determines the probability of a woman's decision on antenatal care utilisation. This means that if women residing in the rural areas were to move to the urban areas, their probability of intensifying the use of antenatal care will increase. This is more evident in 1999 when between 15% and 25% of urban women were more likely to attend antenatal clinics and had regular visits compared to women from the rural areas. Religion is also a factor that determines antenatal care utilisation. The results also show that christians which is the reference category are more likely to utilise antenatal care compared to other religions. This is evident in 1990, when between 17% and 31% of muslim women were less likely to attend antenatal care compared to Christian women. Birth order is also significant with negative sign for most of the results this suggesting that, the probability of antenatal care utilisation is decreasing with birth order. This implies that women with more children have less probability of deciding to go for antenatal care as well as regular antenatal visits.

To see the role of interactive terms in looking at the place of religion and education in antenatal care utilisation, christianity and islam were interacted with "no education" and "higher education". The results for most of the survey shows that a christian woman with no education and a Muslim woman with no education have

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higher probability for antenatal visits but less probability of deciding to go for antenatal care this is more pronounced in 1999. The relationship between antenatal care utilisation, education and region shows negative and significant signs for women with "no education" and "higher education" from the North East and also those with hi. This implies that it is the region that actually plays a major role in impacting antenatal care utilisation and not education in the North East. The interactive terms results for other regions seem to be significant for either the logit or negative binomial model. Meanwhile, the expected sign for the interactive terms were not met for most of the years. In interacting religion and region, most coefficients and marginal effect in the logit and negative binomial model for all the years show either negative or positive signs depending on the year, the religion and region interacted. The positive signs show that religion and region have positive effect on antenatal care utilisation, while the negative signs shows that religion and region have negative impact on antenatal care utilisation.

The interaction of wealth and region is meant to establish that regional antenatal care utilisation is influenced by wealth. Each of the regions is interacted with the poorest and richest wealth index. Most of the results obtained in the interaction were negative for the poorest and richest wealth index for each region except the 1990 results, which was positive. Also, the negative binomial and logit model for the 1999 results for both categories of wealth were also positive. The results for 2013 were significant but negative for the negative binomial model of the richest in the North East region. The positive but negative signs show that the interactive terms exhibit an ambiguous relationship between wealth and region for all the years. This implies that the impact of wealth on region depends on the respondents sampled for each of the years. When the interactive terms have positive signs, it means wealth and religion have positive relationship on antenatal care utilisation and vice versa. For instance, for the poorest in North West, interaction had negative sign while for the richest in the North West, interaction has positive sign. These signs buttressed the fact that the poorest women from the North West have lower probability of antenatal care utilisation, while the richest women from the region have higher probability of antenatal care utilisation (please check details on other regions in Table 5.11a

The interaction between religion and region is meant to establish if antenatal care utilisation is influenced by the combined effect of religion and region. The results for the years show that not all coefficients were significant. Also, the signs of the

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coefficients and marginal effects for both models were either negative or positive, depending on the year although most of the signs were negative for both models. A negative sign for the poorest christian and muslim women for any of the models shows that poverty and religion have negative effect on antenatal care utilisation although wealth has greater influence. For most of the years, the interaction between the richest Muslim women and antenatal care utilisation shows significant but negative signs. This means that what matters is not just the wealth but also the influence of religion. Therefore, the interaction between the islam and wealth is generally negative for the poorest muslim but ambiguous for the richest muslim depending on whether it is a logit model or negative binomial model and the years. The interaction of wealth and residence was intended to establish if the low utilisation of antenatal care by the rural women was due to wealth differences. The results show that for the 2013 and 2008 results, the poorest rural women recorded less antenatal visits while the richest rural women have more. Other survey results shows similar pattern of behaviour for the interaction between wealth and region. In general wealth and rural residence have negative effect on antenatal care utilisation except 1999 results, which were positive for the richest rural residence.

Regional analysis of the determinants of antenatal utilisation in Nigeria

In this section an analysis of determinants of antenatal care is carried out on regional basis to find out which factor is most important in each region. Appendix 1 presents the regression results for the North Central, North East, North West, South East, South South and South West by each NDHS.

North Central

The regression analysis for the North Central region shows that wealth index was a significant factor in the determinant of antenatal care utilisation for the logit and negative binomial models. The negative signs of the coefficient show that women belonging to the richest wealth index the reference category has higher probability for antenatal care utilisation although some of the coefficients for some of the years were not significant. The coefficients and marginal effects for age and residence were significant with similar signs like the national regression. However, age and residence were not significant for some of the years. The results on religion shows that the

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muslims were more likely to utilise antenatal care compared to any other religion although most of the coefficients and marginal effect are not significant.

The education of the women and that of their partner's were found to have the expected signs for all the models in all the years although some of the coefficients were not significant. Also marital status was found to be significant for 2013 and 2008 survey data with the expected negative signs. The results for the North Central region also show that employment status was significant for the negative binomial model than the logit model except for the 2003 results. This implies that employment status was very important in determining the frequency of antenatal visits. Women with employment will tend to go for more antenatal visits compared to women without employment in the North Central. Birth order was also found to be significant in 2013, while the 2008 and the 2003 results were significant for the negative binomial model.

"Distance to health facility" and transport to health facility had the expected signs and were found to be significant for all the years. Distance to health facility and transport to health facility were major challenges that hindered antenatal health utilisation in the North Central region. The variable "no provider" had the expected signs but was not significant. The variable "No female" provider shows a high level of significance for the logit models. This implies that the decision to go for antenatal care among women in the North Central was determined by the availability of the female health workers.

North East

The regression results for the North East in Tables A5 to A9 in Appendix 1 show a similar pattern with that of the North Central. Wealth was found to be significant for both models for the various years' results except the middle and richer wealth indexes. The negative signs like that of the other regressions shows that poorer women had less probability of utilising antenatal care compared to the women from the richest wealth index. Age was significant but varied in signs depending on the year. The positive sign shows that antenatal care utilisation is increased with age, while the negative sign depicts that antenatal care utilisation decreased in age. Residence in the North East had a positive and significant sign for some years. This implies that in the North East, women from the urban areas were more likely to go for antenatal care than women from the rural areas. Religion, respondent's education and partner's education are also among the significant factors that determine antenatal care utilisation in the North East.

Other variables significant for some of the years include; insurance and employment status, birth order, distance to health facilities, "no provider" and "no female provider".

North West

The logit and the negative binomial models for North West in Tables A10 to A13 in Appendix 1 show a similar level of significance with other results obtained although not all the coefficients in the survey were significant. Wealth in the result had the expected sign and shows significance for the logit and the negative binomial models. In essence, the North West women belonging to the richest wealth index categories were more likely to utilise antenatal care compared to other wealth index categories. Other variables found to be significant in the North West regression model include; residence, religion, respondent's education, partner's education, employment status, marital status, distance to health facility as well as "no female provider".

South East

The regression results for the South East region in tables A14 to A18 in appendix 1 show that wealth index determined antenatal care utilisation. In some of the surveys for the South East region, only variables in the negative binomial models were significant. This means that a woman can decide to go for antenatal care without considering money as a barrier. But the ability for her to have sustained required frequency of visits was determined by her wealth status. The fact that wealth was not significant for some of the years in the South East region shows that other factors apart from wealth determined antenatal care utilisation in the South East region. Age of the respondents was only significant for both models in 2013. This shows that the decision to utilise antenatal care and attain the required frequency of visits increased with age for the South East region. Religion for the South East logit and negative binomial regression models has several missing observations. This may be because there were very few muslims in the South East region. However, the logit model for the 2003 and the 1990 negative binomial model show that religion was significant with the a priori negative sign. The results for the traditional religion were more robust because there were more respondents practicing traditional religion in the South East region. Respondents who are practicing traditional religion had less probability of utilizing antenatal care compared to the christian women. Respondents' and partners' education were also significant for some of the surveys as presented in Table 5.11d. This result implies that respondent's education and the education of their partners

determines antenatal care utilisation. In addition, women who are married based on the 2013 results recorded higher probability of deciding to go for antenatal compared to single pregnant women. This was also buttressed by the role of husbands in the household decision on antenatal care utilisation. Insurance was only significant for the negative binomial model in 2013 and 2008. Also, employment status, birth order, insurance, transport to health facilities and "no female provider" were significant in some of the surveys.

South South

The regression results for the South South region shows that wealth was significant for all the surveys for each of the models except the negative binomial model for the richer categories in 2013 and 2003. The results for the South South region are presented in Tables A19 to A21 in Appendix 1. The results show that the decision to go for antenatal care and have regular visits increased with wealth for the women in the South South region although antenatal visits was not influenced by wealth for individuals sampled in 2013 and 2003 survey. In this context, poverty was detrimental to antenatal care utilisation as the poorer women were less likely to utilise antenatal care compared to the rich women. Age was also found to be significant for all the models in the survey results except the 2008 negative binomial model. This means that in the South South region, older women are more likely to go for antenatal care compared to younger women. Residence for the South South region is also found to be a major determinant of antenatal care utilisation for the respondents sampled in 2013. Religion for the South South region was significant for the negative binomial model for 2013 survey and both models for the 2008 survey. The signs were however different from the signs obtained in other regions. In this case, a positive sign is obtained indicating that other religion utilised antenatal care more when compared to Christian women. This was quite questionable as there were more christians compared to other religions. In essence, it may be that antenatal care utilisation by women in this region was generally low which can be due to results obtained on "distance" and "transport to health facilities". Respondent's education was also a major determinant of antenatal care utilisation especially with respect to the frequency of visits. Other variables significant for the South South regression model include; employment status, birth

order and "no female provider". Marital and insurance statuses were less important in determining antenatal care utilisation in the South South region.

South West

The results for the South West region are presented in Tables A22 to A26 in Appendix1. The results show that wealth was a significant determinant of antenatal care utilisation except in 1999 and 2003. Age for the South West is also significant in 2013 and 2008. Age is positively related to antenatal care utilisation as older women attended antenatal care more compared to younger women. The results for residence reveals that in 2013, urban women in the South West had higher probability of deciding to go for antenatal care compared to the rural women. The negative binomial model shows a contrast in the signs for 2013 and 2008 results. This implies that rural women are more likely to have more antenatal visits than the urban women. The reverse was the case for the 1990 logit and negative binomial model. Religion was also significant in 2013 and 2008 logit model for islam. Given the positive sign, the result depicts that muslim women in the South West are more likely to go for antenatal care compared to christian women. This is in contrast to some of the findings obtained in other regressions. In the South West, education seems not to be a strong determinant of antenatal care utilisation for all the respondents. Education was only significant for the logit model for women with no education in 2013 and the negative binomial model in 2008. Meanwhile, partner's education was significant for the 2003 logit model, 2008 logit model for "no education" and 2008 negative binomial model for "secondary education". Marital status was also significant only for the 2013 negative binomial model with a positive sign. Employment status is only significant for the logit model of 2013 and the negative binomial model of 2003 1999, and 1990. Birth order was significant in 2013 for the two models and 2008 logit model. Distance to health facility was significant for both models in 2013 and 2008 results. "Transport to health facility" was significant for the 2008 negative binomial model while "no provider" was significant at 10% for the 2008 survey, while "no female provider" was significant at 1% for the logit model in 2003 survey.

Regional results compared

In comparing the regional and national regression results, all variables significant in the national regression were also significant for most of the regions with

few exceptions. In some of the results for the South East regional regression, wealth was significant for only the negative binomial models. This means that a woman can decide to go for antenatal care without considering money as a barrier. But the ability for her to have sustained required frequency of visits was determined by her wealth status. The regional regression results for the South West region shows that muslim women were more likely to go for antenatal care compared to Christian women. This is in contrast to some of the findings obtained for the regressions for North West, North Central, South East, and South South. In the South West, education seems not to be a strong determinant of antenatal care utilisation; this is also in contrast with other findings.

(B) Determinants of skilled delivery utilisation in Nigeria

As stated in the methodology in chapter 4, skilled delivery utilisation is estimated using the logit model. The categorisation of skilled delivery in this study is similar to that of Goland et al (2012) and Bonfruer et al (2012). The results are presented in Table 5.11a to 5.11e.

Table 5.11a The Logit Model for Skilled Delivery Utilisation for NDHS 2013

	NDHS 2013			
	Wealth in quintiles/index		Wealth index values/scores	
Variable	Coef./St d Err	Mar. Effect	Coef./St d Err	Mar. Effect
WEALTH VARIABLES				
Wealth			0.033***	.0007***
			(0.005)	(0.0001)
Poorest	-1.656***	-.024***		
	(0.075)	(0.0009)		
Poorer	-0.978***	-.015***		
	(0.056)	(0.0008)		
Middle	-0.565***	-.0095***		
	(0.043)	(0.0007)		
Richer	-0.277***	-.005***		
	(0.035)	(0.0006)		
EMPLOYMENT				
not employed	0.199***	.0039***		
	(0.032)	(0.0007)		
PRICE VARIABLES				
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)				

big problem	-0.355***	-.007***	-0.458***	-.009***
	(0.033)	(0.0006)	(0.032)	(0.0015)
INSURANCE STATUS				
no insurance	-0.183**	-.004**	0.197***	.004***
	(0.068)	(0.0016)	(0.031)	(0.0013)

EDUCATION VARIABLES

RESPONDENT'S EDUCATION (REF:HIGHIER)				
no education	-1.655***	-.036***	-1.930***	-.047***
	(0.062)	(0.0017)	(0.061)	(0.0029)
Primary	-1.248***	-.0186***	-1.416***	-.0224***
	(0.051)	(0.0007)	(0.050)	(0.0015)
Secondary	-0.684***	-.011***	-0.718***	-.012***
	(0.044)	(0.0006)	(0.044)	(0.00009)
PARTNER'S EDUCATION				
no education	-0.587***	-.011***	-0.913***	-.019***
	(0.054)	(0.001)	(0.053)	(0.0013)
Primary	-0.431***	-.008***	-0.596***	-.010***
	(0.043)	(0.0007)	(0.043)	(0.00092)
Secondary	-0.176***	-.004***	-0.246***	-.0049***
	(0.036)	(0.0006	(0.036)	(0.00084)

AGE OF THE RESPONDENTS

Age	0.015***	.002***	-0.232***	-.005***
	(0.005)	(0.001)	(0.002)	(0.003)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER				
birth order	0.5037***	.0097***	0.491***	.0104***
	(0.0071)	(0.0002)	(0.007)	(0.0008)
MARITAL STATUS (REF: MARIED)				
Single	-0.2373***	-.0046***	-0.494***	-.008***
	(0.0025)	(0.0001)	(0.064)	(0.0009)
ETHNICITY (REF. HAUSA)				

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Igbo	0.946***	.027***	1.024***	.032***
	(0.084)	(0.0034)	(0.086)	(0.004)
ijaw/izon	-0.777***	-.0109***	-0.743***	-.011***
	(0.101)	(0.001)	(0.102)	(0.001)
kanuri/beriberi	-0.125	-.0022	0.015	.0003
	(0.134)	(0.002)	(0.132)	(0.003)
Tiv	0.487***	.0119***	0.278**	.006
	(0.109)	(0.003)	(0.108)	(0.003)
Yoruba	0.873***	.0240***	0.896***	.027***
	(0.071)	(0.003)	(0.071)	(0.003)
Others	0.532***	.0116***	0.542***	.012***
	(0.057)	(0.001)	(0.057)	(0.002)
REGION (REF SOUTH WEST)				
North Central	-0.115	-.019	-0.277***	-.005***
	(0.138)	(0.024)	(0.051)	(0.001)
North East	0.181	.0294	-1.216***	-.019***
	(0.136)	(0.0215)	(0.063)	(0.001)
North West	-0.736***	-.133***	-1.589***	-.028***
	(0.137)	(0.026)	(0.074)	(0.001)
South East	0.079	.0131	-0.169**	-.003**
	(0.265)	(0.043)	(0.071)	(0.001)
South South	-1.159***	-.239***	-0.393***	-.007***
	(0.141)	(0.033)	(0.057)	(0.001)
RESIDENCE				
Urban	0.427***	.009***	0.673***	.016***
	(0.0310)	(0.0007)	(0.029)	(0.00113)
RELIGION (REF :CHRISTIANITY)				
Islam	-0.104**	-.002**	-0.021	-.0004
	(.038)	(.0008)	(0.037)	(0.0028)
Traditionalist	-0.751***	-0.01046***	-0.898***	-.0128***
	(0.1614)	(0.0016)	(0.163)	(0.0029)
_cons	5.9365***		5.557***	
	(0.131)		(0.129)	

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INTERACTION VARIABLES

EDUCATION AND REGION

Northeast with no education	-0.187	-.003	-0.159	-.003
	(0.129)	(0.002)	(0.130)	(0.002)
Northeast with higher education	-0.099	-.0018	-0.014	-.0002
	(0.139)	(0.002)	(0.138)	(0.003)
Northwest no education	-0.212	-.0039*	-0.287	-.005**
	(0.130)	(0.002)	(0.130)	(0.002)
Northwest higher education	-0.065	-.0012	-0.062	-.001***
	(0.174)	(0.003)	(0.173)	(0.003)
North central no education	0.191	.0039	0.323**	.007
	(0.126)	(0.003)	(0.126)	(0.003)
North central higher education	-0.006	-.0001	-0.064	-.001
	(0.103)	(0.002)	(0.103)	(0.002)
Southwest no education	0.635***	0.016***	0.690***	.019***
	(0.144)	(0.005)	(0.145)	(0.006)
Southwest higher education	-0.115	-.002	-0.221**	-.004***
	(0.092)	(0.002)	(0.093)	(0.002)

RELIGION AND REGION

Muslim North West	-0.851	-.014	-1.043	-.018*
	(0.673)	0.010)	(0.676)	(0.011)
Christian Sorth West	0.764	.021	0.654	.018
	(0.655)	(0.025)	(0.659)	(0.025)
Muslim North East	-1.304**	-.017***	-1.580***	-.021***
	(0.563)	(0.005)	(0.549)	(0.005)
Christian North East	-0.602	-.009	-1.032**	-.014***
	(0.539)	(0.006)	(0.526)	(0.004)
Muslim South West	-1.050**	-.013***	-1.485***	-.017***
	(0.481)	(0.004)	(0.475)	(0.003)
Christian South West	-0.559	-.009	-0.999**	-.014***
	(0.449)	(0.005)	(0.443)	(0.004)

Muslim North Central	-0.699	-.0101	-0.780*	-.011**
	(0.469)	(0.005)	(0.472)	(0.005)
Christian North Central	-0.2146	-.0037	-0.397	-.007
	(0.438)	(0.007)	(0.441)	(0.007)

WEALTH AND REGION

Poorest North East	-0.825	-.012***	-1.032	-.013***
	(0.173)	(0.002)	(0.102)	(0.001)
Richest north East	0.0056	.0001	0.547***	.014***
	(0.105)	(0.002)	(0.096)	(0.003)
Poorest North West	-0.699***	-.011***	-0.917***	-.013***
	(0.174)	0.002	(0.104)	(0.001)
Richest North West	0.046	.0009	0.615***	.016***
	(0.107)	(0.002)	(0.098)	(0.003)
Poorest South West	-1.119**	-.013***	-1.441***	-.015***
	(0.448)	(0.003)	(0.426)	(0.002)
Richest South West	-0.424***	-.007***	0.006	.0001
	(0.070)	(0.0009)	(0.052)	(0.001)
Poorest North Central	-0.477**	-.007***	-0.754***	-.010***
	(0.2082)	(0.0025)	(0.156)	(0.002)
Richest North Central	-0.245***	-.004***	0.205***	.004***
	(0.081)	(0.001)	(0.068)	(0.002)

WEALTH AND RELIGION

Poorest Christian	0.525	.0128	-0.672***	-.009***
	(0.4895)	((0.015)	(0.099)	(0.001)
Richest Christian	0.589	.014	0.434***	.010***
	(0.461)	(0.014)	(0.040)	(0.001)
Poorest Muslim	0.050	.0009***	-1.048***	-.015***
	(0.486)	(0.0096)	(0.075)	(0.001)
Richest Muslim	0.406	.009	0.226***	.004***
	(0.462)	(0.013)	(0.053)	(0.001)

WEALTH AND RESIDENCE

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	Coef./Std Err	Mar. Effect		
Poorest rural	-0.682***	-.012***	#	#
	(0.141)	(0.002)		
Richest rural	0.275***	.006***		
	(0.071)	(0.002)		
No of observations	113320		113320	
Prob >chi2	0.0000		0.0000	
Pseudo R2	0.3689		0.3689	

*significance at 10%   **significance at 5%   ***significance at 1%   # missing values

Table 5.11b The Logit Model for Skilled Delivery Utilisation for NDHS 2008

	NDHS 2008			
	Wealth in quintiles		Wealth index values	
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
WEALTH VARIABLES				
Wealth			0.050***	.0009***
			(0.005)	(0.00009)
Poorest	-1.540***	0-.021***		
	(0.072)	(0.0009)		
Poorer	-1.033***	-0.014***		
	(0.059)	(0.0007)		
Middle	-0.644***	-0.009***		
	(0.0494)	(0.0006)		

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Richer	-0.246***	-0.0039***		
	(0.041)	(0.0006)		
EMPLOYMENT				
not employed	0.072**	.0013**	0.081**	.002**
	(0.034)	(0.0006)	(0.033)	(0.0007)
PRICE VARIABLES				
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)				
big problem	-0.145***	-0.0025***	-0.214***	-.003***
	(0.0431)	(0.0007)	(0.043)	(0.0007)
TRANSPORT TO HEALTH FACILTY (REF : NOT A BIG PROBLEM)				
big problem	-0.162***	-.0028***	-0.228***	-.004***
	(0.0455)	(0.0008)	(0.045)	(0.001)
NO PROVIDER (REF : NOT A BIG PROBLEM)				
big problem	-0.0302	-0.0005	-0.029	-.001
	(0.0361)	(0.0006)	(0.036)	(0.001)
INSURANCE STATUS				
no insurance	-0.2162**	-0.0041**	-0.239***	-.005**
	(0.082)	(0.002)	(0.083)	(0.0019)
NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)				
big problem	-0.061	-.001	-0.062	-.001
	(0.047)	(0.001)	(0.046)	(0.001)
EDUCATION VARIABLES				
RESPONDENT'S EDUCATION (REF: HIGHIER)				
no education	-1.599***	-.033***	-1.803***	-.042***
	(0.070)	(0.0019)	(0.070)	(0.002)
Primary	-1.148***	-.0156***	-1.292***	-.018***
	(0.059)	(0.0007)	(0.059)	(0.00078)
Secondary	-0.564***	-.0082***	-0.590***	-.009***
	(0.053)	(0.0007)	(0.053)	(0.0007)

PARTNER'S EDUCATION

no education	-0.637***	-.011***	-0.933***	-.0197***
	(0.060)	(0.001)	(0.059)	0.0012)
Primary	-0.374***	-.006***	-0.545	-.0089***
	(0.050)	(0.0007)	(0.049)	(0.0007)
Secondary	-0.206***	-.003***	-0.290***	-.005***
	(0.043)	(0.0007)	(0.043)	(0.0007)

AGE OF THE RESPONDENTS

age	-0.234***	-.004***	-0.227***	-.004***
	(0.003)	(0.0001)	(0.003)	(0.00005)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	0.477***	.008***	0.467***	.0087***
	(0.008)	(0.0002)	(0.007)	(0.0001)

MARITAL STATUS (REF: MARIED)

Single	-0.393***	-.006***	-0.420***	-.0066***
	(0.074)	(0.0009)	(0.074)	(0.00098)

ETHNICITY (REF. HAUSA)

Igbo	1.061***	.028***	1.156***	.035***
	(0.089)	(0.004)	(0.089)	(0.004)
ijaw/izon	-0.404***	-.006***	-0.432***	-.007***
	(0.111)	(0.001)	(0.111)	(0.001)
kanuri/beriberi	-0.330**	-.005***	-0.283**	-.005***
	(0.122)	(0.0016)	(0.121)	(0.002)
Tiv	1.203***	.0375***	0.965***	.029***
	(0.099)	(0.006)	(0.098)	(0.004)
Yoruba	0.918***	.023***	0.998***	.028***
	(0.082)	(0.003)	(0.082)	(0.003)
Others	0.652***	.0128***	0.665***	.014***
	(0.061)	(0.001)	(0.061)	(0.002)

REGION (REF SOUTH WEST)

North Central	-0.541***	-.008***	-0.606***	-.009***
	(0.0605)	(0.0008)	(0.060)	(0.001)

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	(1)	(2)	(3)	(4)
North East	-1.070***	-.015***	-1.352***	-.019***
	(0.0755)	(0.0009)	(0.074)	(0.001)
North West	-1.6622***	-.022***	-1.802***	-.025***
		(0.001)		(0.001)
	(0.088)		0.087	
South East	-0.127*	-.002*	-0.123	-.002*
	(0.078)	(0.0012)	(0.078)	(0.001)
South South	-0.465***	-.007***		
	(0.068)	(0.0009)	-0.411***	-.007***
			(0.068)	(0.001)
RESIDENCE				
Urban	0.321***	.006***	0.625***	.013***
	(0.034)	(0.0007)	(0.031)	(0.0009)
RELIGION (REF :CHRISTIANITY)				
Islam	0.0109	0.0002	0.125***	.0023***
	(.043)	(.0007)	(0.042)	(0.0008)
Traditionalist	-.738***	-.0092***	-0.936***	-.012***
	(.1431)	(.0013)	(0.142)	(0.0012)
_cons	5.893***		5.306***	
	(0.152)		(0.149)	

INTERACTION VARIABLES

	(1)	(2)	(3)	(4)
RELIGION AND EDUCATION			0.759**	.019*
			(0.309)	(0.010)
Christian no education	0.615**	.0136**	0.233	.004**
	(0.306)	(0.0085)	(0.995)	(0.023)
Christian higher education	0.1650	0.003		
	(0.963)	(0.019)	0.516*	.009***
			(0.307)	(0.006)
Muslims no education	0.384	.0068	0.508	.012**
	(0.303)	(0.006)	(0.999)	(0.030)
Muslims higher education	0.483	.011		
	(0.967)	(0.026)		

EDUCATION AND REGION

	(1)	(2)	(3)	(4)
Northeast with no education	-0.341**	-.005***	-0.186	-.003***
	(0.136)	(0.0019)	(0.136)	(0.002)
Northeast with higher education	0.426**	.0089*	0.537**	.012**
	(0.208)	(0.005)	(0.216)	(0.007)
Northwest no education	-0.271*	-.004**	-0.217	-.003
	(0.146)	(0.002)	0.146	(0.002)
Northwest higher education	0.699***	.017***	0.770***	.020***
	(0.181)	(0.0059)	(0.183)	(0.007)
North central no education	-0.201*	-.003*	0.000	1.50
	(0.129)	(0.0019)	(0.129)	(0.002)
North central higher education	0.113	0.002	0.166	.003
	(0.118)	(0.002)	(0.118)	(0.003)
Southwest no education	0.4031***	.0082**	0.573***	.013***
	(0.145)	(0.004)	(0.144)	(0.004)
Southwest higher education	-0.130	-.0021	-0.162	-.002
	(0.1097)	(0.0016)	(0.110)	(0.002)
RELIGION AND REGION				
Muslim North West	-0.373	-.0058	-0.496	-.008
	(0.755)	(0.011)	(0.750)	(0.011)
Christian North West	0.846	.022	0.726	.019
	(0.743)	(0.026)	(0.738)	(0.027)
Muslim North East	-1.476***	-.017***	-1.708***	-.021***
	(0.457)	(0.0039)	(0.447)	(0.004)
Christian North East	-0.843**	-.010***	-1.245***	-.014***
	(0.434)	(0.004)	(0.423)	(0.003)
Muslim South West	-0.647**	-.008**	-0.884**	-.011***
	(0.432)	(0.004)	(0.437)	(0.004)
Christian South West	-0.502	-.007	-0.713	-.010*
	(0.3985)	(0.0045)	(0.404)	(0.004)
Muslim North Central	-1.115***	-.012***	-1.037**	-.013***
	(0.414)	(0.0030)	(0.415)	(0.003)
Christian North Central	-0.665**	-.0089**	-0.704*	-.010**
	(0.379)	(0.004)	(0.381)	(0.004)

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WEALTH AND REGION

Poorest North East	-0.975***	-.011***	-1.229***	-.013***
	(0.161)	(0.0013)	(0.099)	(0.001)
Richest North East	0.241*	.0043*	0.750***	.018***
	(0.143)	(0.003)	(0.1340)	(0.005)
Poorest North West	-0.752***	-.009***	-1.017***	-.011***
	(0.206)	(0.0019)	(0.162)	(0.001)
Richest North West	0.604***	0.013***	1.076***	.030***
	(0.121)	(0.0034)	(0.111)	(0.005)
Poorest South West	0.4797**	.0098*	0.078	.001
	(0.211)	(0.005)	(0.172)	(0.003)
Richest South West	-0.44****	-.0059***	-0.060	-.0009
	(0.0793)	(0.0009)	(0.061)	(0.001)
Poorest North Central	-0.109	-.0017	-0.404***	-.005***
	(0.154)	(0.002)	(0.089)	(0.001)
Richest North Central	-0.008	-.0001	0.424***	.008***
	(0.089)	(0.0014)	(0.075)	(0.002)

WEALTH AND RELIGION

Poorest Christian	0.872**	.022*	-0.113	-.001
	(0.3560)	(0.0127)	(0.073)	(0.001)
Richest Christian	0.0000	5.891	0.000***	6.94***
	(0.0000)	(0.0000)	(0.000)	(.000)
Poorest Muslim	0.307	.0057	-0.662***	-.009***
	(0.359)	(0.007)	(0.089)	(0.001)
Richest Muslim	0.0000***	8.931	0.000***	1.01***
	(0.0000)	(0.0000)	(0.000)	(0.000)

WEALTH AND RESIDENCE

Poorest rural	0.189	.004	-0.672***	-.010***
	(0.185)	(0.004)	(0.055)	(0.001)
Richest rural	0.356***	.008***	0.785***	.020***
	(0.073)	(0.0018)	(0.061)	(0.002)
Poorest urban	(#)	(#)	-1.051***	-.012***
			(0.179)	(0.001)
Richest urban	(#)	(#)	0.238***	.004***

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	Wealth in quintiles/index		Wealth index values/scores	
		(0.045)		(0.001)
No of observations	97187		97187	
Prob >chi2	0.0000		0.0000	
Pseudo R2	0.3584		0.3584	

Table 5.11c The Logit Model for Skilled Delivery Utilisation for NDHS 2003

NDHS 2003

Variable	Wealth in quintiles/index		Wealth index values/scores	
	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
WEALTH VARIABLES				
Wealth			0.022***	.00049***
			(0.008)	(0.0002)
Poorest	-1.294***	-.021***		
	(0.129)	(0.0018)		
Poorer	-0.8678***	-.015***		
	(0.1106)	(0.0016)		
Middle	-0.644***	-.0113***		
	(0.099)	(0.002)		
Richer	-0.260***	-.005**		
	(0.081)	(0.002)		
EMPLOYMENT				
not employed	0.045	0.0009	0.093	.002
	(.064)	(.0014)	(0.065)	(0.0026)
PRICE VARIABLES				
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)				
big problem	-0.373***	-.008***	0.463***	0.010***
	(0.116)	(0.0024)	(0.117)	(0.0033)
Small problem	-0.2708**	-.006**		
	(0.122)	(0.003)		

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TRANSPORT TO HEALTH FACILTY (REF : NOT A BIG PROBLEM)

big problem	-0.235**	-.005**	0.406***	.009***
	(0.122)	(0.003)	(0.123)	(0.003)
Small problem	0.291**	.007**	0.412***	.010***
	(0.126)	(0.003)	(0.128)	(0.004)

NO PROVIDER (REF : NOT A BIG PROBLEM)

big problem	-0.235**	-.005**		
	(0.122)	(0.003)	#	3

NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)

big problem	-0.323***	-.006***	0.334***	.007***
	(0.088)	(0.002)	(0.088)	(0.002)

INSURANCE STATUS

no insurance	.

EDUCATION VARIABLES

RESPONDENT'S EDUCATION (REF: HIGHIER)

no education	-1.537***	-.040***	-1.784***	-.051***
	(0.145)	(0.0049)	(0.142)	(0.0056)
Primary	-0.891***	-.015***	-1.096***	-.019***
	(0.125)	(0.0019)	(0.122)	(0.0019)
Secondary	-0.323***	-.006**	-0.365***	-.0072***
	(0.115)	(0.0019)	(0.114)	(0.0020)

PARTNER'S EDUCATION

no education	-0.708***	-.015***	-0.934***	-.021***
	(.109)	(.002)	(0.108)	(0.0016)
Primary	-0.564***	-.010***	-0.669***	-.012
	(0.094)	0.0016	(0.093)	(0.0016)
Secondary	-0.281***	-.005***	-0.311***	-.006***
	(0.085)	(0.002)	(0.084)	(0.0003)

AGE OF THE RESPONDENTS

	(1)	(2)	(3)	(4)
age	-0.233***	-.0049***		
	(0.006)	(0.0002)	-0.223***	-.004***
			(0.006)	(0.0001)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

	(1)	(2)	(3)	(4)
birth order	0.478***	.0099***	0.464***	.0103***
	(0.015)	(0.0005)	(0.015)	(0.0026)

MARITAL STATUS (REF: MARIED)

	(1)	(2)	(3)	(4)
Single	-0.222*	-.0042*		-.0059***
	(0.138)	0.002)	-0.300**	
			(0.138)	(0.0024)

REGION (REF SOUTH WEST)

	(1)	(2)	(3)	(4)
North Central	-0.571***	-.010***	-0.634***	-.012***
	(0.099)	(0.0015)	(0.097)	(0.002)
North East	-1.36***	-.0215***		
	(0.117)	(0.0018)	-1.545***	-.025***
			(0.114)	(0.002)
North West	-1.831***	-.031***		
	(0.1243)	(0.0022)	-1.874***	-.032***
			(0.122)	(0.002)
South East	-0.004	-.00009		
	(0.106)	(0.0022)	-0.053	-.001
			(0.104)	(0.002)
South South	-0.831***	-.013***		
	(0.109)	(0.0014)	-0.794***	-.013***
			(0.107)	(0.001)

RESIDENCE

	(1)	(2)	(3)	(4)
Urban	0.221***	.0047***		
	(0.0649)	(0.0015)	0.505***	.012***
			(0.060)	(0.0016)

RELIGION (REF :CHRISTIANITY)

Islam	-0.423***	-.009***	-0.262***	-.006***
	(0.090)	(0.002)	(0.089)	(0.0021)
Traditionalist	-0.5896*	-.0095**	-0.810**	-.0128***
	(0.314)	(0.0038)	(0.313)	(0.0034)
_cons	5.665***		4.748***	
	(0.255)		(0.238)	

INTERACTION VARIABLES

RELIGION AND EDUCATION

Christian no education	0.0117	.0002	0.044	.001
	(0.626)	(0.0130)	(0.628)	(0.014)
Christian higher education	-0.700***	-.0106***	-0.602**	-.010***
	(0.252)	(0.0028)	(0.248)	(0.003)
Muslims no education	-0.678	-.0136	-0.553	
	(0.625)	(0.013)	(0.627)	#
Muslims higher education	#	#		-.012
			#	(0.014)

EDUCATION AND REGION

Northeast with no education	-0.208	-.0038	-0.100	-.002
	(0.239)	(0.004)	(0.239)	(0.005)
Northeast with higher education	0.591**	.0153**	0.604*	.016
	(0.3256)	(0.0110)	(0.321)	(0.012)
Northwest no education	-0.6713**	-.0111***	-0.584**	-.010
	(0.2498)	(0.0035)	(0.248)	(0.004)
Northwest higher education	1.2709***	.0470**	1.189***	.044**
	(0.3235)	(0.0202)	(0.328)	(0.020)
North central no education	0.5769**	.0142**	0.713***	.019**
	(0.2336)	(0.0072)	(0.232)	(0.009)
North central higher education	0.1180	.0024	0.106	.002
	(0.3290)	(0.0071)	(0.327)	(0.008)
Southwest no education	0.8039***	.0228**	0.821***	.025**
	(0.2715)	(0.0108)	(0.268)	(0.012)
Southwest higher education	0.1896	.0040	0.066	.001

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	(0.2583)	(0.0060)	(0.257)	(0.006)

RELIGION AND REGION

Muslim North West	11.898***	.991***	10.575***	.978***
	(0.9051)	(0.006)	(0.861)	(0.012)
Christian North West	12.768***	.984***	11.574***	.981***
	(0.737)	(.0007)	(0.651)	(0.002)
Muslim North East	-0.202	-.004	-0.640	-.011
	(1.190)	(.021)	(1.209)	(0.018)
Christian North East	0.542	.014	0.128	.002
	(1.048)	(.035)	(1.061)	(0.025)
Muslim South West	1.181	0.0411	1.142	.041
	(0.9997)	(.056)	(0.997)	(0.057)
Christian South West	0.545	.014	0.621	.017
	(0.821)	(.026)	(0.805)	(0.029)
Muslim North Central	#	#	2.821**	.220
			(1.161)	(0.199)
Christian North Central	#	#	2.484**	.154
			(1.001)	(0.128)

WEALTH AND REGION

Poorest North East	-0.476**	-.008**	-0.985***	-.013***
	(0.281)	(0.004)	(0.216)	(0.002)
Richest North East	0.642***	.017***	0.781***	.022***
	(0.218)	(0.008)	(0.199)	(0.008)
Poorest North West	-0.707	-.010**	-1.280***	-.015***
	(0.462)	(0.0049)	(0.428)	(0.003)
Richest North West	1.4100***	.055***	1.474	.061***
	(0.199)	(0.014)	(0.174)	(0.013)
Poorest South West	0.637**	.017*	0.089	.002
	(0.290)	(0.010)	(0.230)	(0.005)
Richest Suth West	-0.242	-.004	-0.112	-.002
	(0.181)	(0.003)	(0.147)	(0.003)
Poorest North Central	-0.195	-.004	-0.766***	-.011***
	(0.261)	(0.004)	(0.195)	(0.002)
Richest North Central	0.350**	.018	0.477***	.012**

	(0.184)	(0.005)	(0.156)	(0.005)
WEALTH AND RELIGION				
Poorest Christian	-0.438	-0.008	-0.610***	-.010***
	(0.606)	(0.009)	(0.122)	(0.002)
Richest Christian	11.050***	0.991***	0.120	.002
	(0.594)	(0.002)	(0.088)	(0.002)
Poorest Muslim	-0.832*	-.013*	-0.997***	-.015***
	(0.6237)	(0.0076)	(0.186)	(0.002)
Richest Muslim	12.053***	.988***	1.019***	.033***
	(0.585)	(0.002)	(0.120)	(0.006)
WEALTH AND RESIDENCE				
Poorest rural	-0.373	-.007	-0.685***	-.012***
	(0.252)	(0.004)	(0.109)	(0.002)
Richest rural	-0.157	-.003	0.437***	.011***
	(0.145)	(0.003)	(0.124)	(0.004)
Poorest urban			-0.458**	-.008**
			(0.230)	(0.003)
Richest urban			0.419***	.010***
			(0.090)	(0.003)
No of observations	22383		22383	
Prob >chi2	0.0000		0.0000	
Pseudo R2	0.3424		0.3424	

Table 5.11d The logit model for skilled delivery utilisation for NDHS 1999

	NDHS 1999			
	Wealth in quintiles		**Wealth index values**	
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
WEALTH VARIABLES				
Wealth			0.099***	.001***
			(0.021)	(0.0003)
Poorest	-0.711***	-.008***		
	(0.140)	(0.001)		

Poorer	-0.353**	-.004***		
	(0.129)	(0.001)		
Middle	-0.302**	-.004***		
	(0.109	(0.002)		
Richer	-0.031	-.0004		
	(0.091)	(0.001)		
EMPLOYMENT				
not employed	-0.077	-0.0009	-0.085	-.0010
	(.089)	(.001)	(0.090)	(0.0011)

EDUCATION VARIABLES

RESPONDENT'S EDUCATION (REF: HIGHIER)

no education	-1.888***	-0.031***	-1.810***	-.029***
	(0.187)	(0.004)	(0.190)	(0.0040)
Primary	-1.039***	-.011***	-0.955***	-.0102***
	(0.154)	(0.001)	(0.155)	(0.0015)
Secondary	-0.371**	-.004***	-0.295**	-.003**
	(0.141)	(0.0014)	(0.141)	(0.0015)

PARTNER'S EDUCATION

no education	-.395** (0.152)	-.005**	-0.413***	-.005***
		(.0019)	(0.152)	(0.0020)
Primary	-0.052	-.0007	-0.040	-.0005
	(0.117)	(0.0015)	(0.118)	(0.0015)
Secondary	-0.032	-.0004	-0.018	-.0002
	(0.108)	(0.0014)	(0.108)	(0.0014)

AGE OF THE RESPONDENTS

age	-0.231***	0029***	-0.230***	-.002***
	(0.008)	(0.0002)	(0.008)	(0.0002)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	0.4765***	.006***	0.475***	.0061***
	(0.019)	(0.0004)		(0.0004)

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				(0.018)

MARITAL STATUS (REF: MARIED)

Single	-0.429**	-.0046**	-0.456**	-.0048***
	0.200**	(0.0018)	(0.199)	(0.0018)

REGION (REF SOUTH WEST)

North Central	-0.492***	-.006***	-0.477***	-.005***
	(0.098)	(0.001)	(0.097)	(0.001)
North East	-1.417***	-.013***	-1.457***	-.013***
	(0.166)	(0.001)	(0.165)	(0.001)
North West	-1.711***	-.014***	-1.726***	-.014***
	(0.186)	(0.001)	(0.186)	(0.001)
South East	-0.547***	-.006***	-0.525***	-.005***
	(0.096)	(0.001)	0.096	(0.001)

RESIDENCE

Urban	0.191**	.003**	0.201**	.0027**
	(0.0838)	(0.0012)	(0.085)	(0.0012)

RELIGION (REF :CHRISTIANITY)

Islam	-0.262***	-.003***	-0.257	-.003***
	(0.085)	(0.001)	(0.085)	(0.0010)
Traditionalist	-0.425***	-.005***	-0.411***	-.0053***
	(0.107)	(0.001)	(0.106)	(0.0014)
_cons	5.013***		4.662***	
	(0.276)		0.271	

INTERACTION VARIABLES

RELIGION AND EDUCATION

Christian no education	0.629***	.010**	0.599***	.009**
	(0.203)	(0.004)	(0.205)	(0.004)
Christian higher education	0.143	.0019	0.169	.002
	(0.359)	(0.005)	(0.361)	(0.005)
Muslims no education	-0.047	-.0006	-0.089	-.001
	(0.346)	(0.004)	(0.347)	(0.004)

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Muslims higher education	0.591	.0099	0.626	.010
	(0.378)	(0.008)	(0.380)	(0.009)
EDUCATION AND REGION				
Northeast with no education	-1.670***	-.012***	-1.659***	-.012***
	(0.296)	(0.002)	(0.296)	(0.002)
Northeast with higher education	-0.165	-.0017	-0.194	-.002
	(0.481)	(0.005)	(0.473)	(0.005)
Northwest no education	-0.536	-.005**	-0.594*	-.005**
	(0.333)	(0.003)	(0.333)	(0.003)
Northwest higher education	0.872	.016	0.883	.016
	(0.587)	(0.016)	(0.584)	(0.016)
North central no education	0.453**	.007*		
	(0.206)	(0.004)		
North central higher education	-0.187	-.002		
	(0.251)	(0.0025)		
Southwest no education	0.865***	.016***	0.441**	.006*
	(0.256)	(0.007)	(0.205)	(0.003)
Southwest higher education	-0.255	-.0028	-0.214	-.002
	(0.179)	(0.0018)	(0.252)	(0.002)
RELIGION AND REGION				
Muslim North West	0.814	.016	0.818	.014
	(0.652)	(0.017)	(0.657)	(0.017)
Christian North West	1.191***	.026***	1.165***	0 .025*
	(0.387)	(0.014)	(0.387)	(0.014)
Muslim North East	2.223***	.088***	2.188***	.085**
	(0.5014)	(0.0451)	(0.504)	(0.044)
Christian North East	2.366***	.099***	2.293***	.092***
	(0.277)	(0.026)	(0.279)	(0.025)
Muslim South West	0.295	.004	0.220	.002
	(0.210)	(0.003)	(0.221)	(0.003)
Christian South West	-0.098	-.0011	-0.203	-.002

	(0.183)	(0.002)	(0.197)	(0.002)
Muslim North Central	#	#	#	#
Christian North Central	#	#	#	#

WEALTH AND REGION

Poorest North East	0.050	.0006	-0.325	-0.003
	(0.3655)	(0.0046)	(0.320)	(0.002)
Richest North East	1.0361***	.0209**	0.841***	.015**
	(0.2813)	(0.0089)	(0.275)	0.007)
Poorest North West	-1.414**	-.010***	-1.769**	-.0109***
	(0.758)	(0.003)	(0.738)	(0.002)
Richest North West	1.243***	.028**	1.126***	.024**
	(0.333)	(0.013)	(0.323)	(0.011)
Poorest South West	0.360	.005	-0.012	-.0001
	(0.275)	(0.0046)	(0.213)	(0.003)
Richest South West	-0.033	-.0004	-0.203	-.002
	(0.160)	(0.002)	(0.136)	(0.001)
Poorest North Central	0.790***	.0143**		
	0.260	(0.0065)	#	#
Richest North Central	-0.288	-.003*		
	(0.182)	(0.0018)	#	#

WEALTH AND RELIGION

Poorest Christian	0.193	.003	0.250	.003
	(0.353)	(0.005)	(0.187)	(0.003)
Richest Christian	-0.162	-.0019	-0.351**	-.003***
	(0.202)	(0.002)	(0.134)	(0.001)
Poorest Muslim	0.664	.011	-0.364	-.003
	(0.579)	(0.011)	(0.302)	(0.003)
Richest Muslim	-0.162	-.0019	-0.211	-.002
	(0.202)	(0.002)	(0.160)	(0.002)

WEALTH AND RESIDENCE

Poorest rural	0.106	0.509	-0.258*	-.003**

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Variable	Wealth in quintiles		Wealth index values	
	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
	(0.161)		(0.144)	0.000
Richest rural	0.106	0.002	-0.022	-.0002
	(0.161)		(0.164)	(0.001)
Poorest urban			-0.824	-.007**
			(0.581)	(0.001)
Richest urban			-0.186	-.002
			(0.147)	(0.001)
No of observations	21388		21388	
Prob >chi2	0.0000		0.0000	
Pseudo R2	0.2785		0.2785	

Table 5.11e The Logit Model for Skilled Delivery Utilisation for NDHS 1990

	NDHS 1990			
	Wealth in quintiles		Wealth index values	
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect

WEALTH VARIABLES

Wealth			0.105***	.0014***
			(0.021)	(0.0003)
Poorest	-0.853***	-.021***		
	(0.104)	(0.002)		
Poorer	-1.129***	-.026***		
	(0.114)	(0.002)		
Middle	-0.665***	-.017***		
	(0.092)	(0.002)		
Richer	-0.134**	-.004**		
	(0.063)	(0.0018)		
EMPLOYMENT	-0.033	-.0009	-0.191**	-.002**
	(0.060)	(#)	(0.090)	(0.0012)
not employed				

EDUCATION VARIABLES

RESPONDENT'S EDUCATION (REF: HIGHIER)

no education	-1.289***	-.051***	-1.857***	-.031***
	(0.155)	(0.008)	(0.193)	(0.0043)
Primary	-1.044***	-.025***	-0.915***	
	(0.143)	(0.003)	(0.154)	-.010***
				(0.0015)
Secondary	-0.366**	-.0097***	-0.277**	-.003**
	(0.138)	(0.003)	(0.139)	(0.0015)

PARTNER'S EDUCATION

no education	-.628***	-.021***	-0.463***	-.0061***
	(0.115)	(.004)	(0.154)	(0.0021)
Primary	-0.113	-.003	-0.016	-.0002
	(0.096)	(.003)	(0.118)	(0.0016)
Secondary	-0.071	-.002	0.001	.00002
	(0.093)	(0.003)	(0.108)	(0.0015)

AGE OF THE RESPONDENTS

age	-0.216***	-.007***	-0.227***	-.003***
	(0.005)	(0.0002)	(0.007)	(0.0002)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	0.474***	.014***	0.465***	.0062***
	(0.013)	(0.0005)	(0.018)	(0.0004)

MARITAL STATUS (REF: MARIED)

Single	-0.271**	-.007**		
	(0.121)	(0.003)	-0.467**	-.005***
			(0.198)	(0.0018)

REGION (REF :SOUTH WEST)

North East	-1.516***	-.035***	0.689***	.011***
	(0.106)	(0.002)	(0.100)	(0.002)
North West	-1.361***	-.031***	0.135	.001
	(0.109)	(0.002)	(0.108)	(0.002)
South East	-0.228***	-.007***		
	(0.066)	(0.002)	-0.544***	-.006***
			(0.132)	(0.001)

RESIDENCE

Urban	0.238***	.008***	0.215**	.0030**
	(0.0710)	(0.0023)	(0.086)	(0.0013)

RELIGION (REF :CHRISTIANITY)

Islam	-0.296***	-.009***	-0.283***	-.0035***
	(0.073)	(0.0023)	(0.084)	(0.0010)
Traditionalist	-0.8392***	-.018***		
	(0.214)	(0.003)	-0.575***	-.0078***
			(0.107)	(0.0015)
_cons	5.279***		3.927***	
	(0.208)		(0.257)	

INTERRACTION VARIABLES

EDUCATION AND REGION

	Model 1		Model 2	
Northeast with no education	-0.663***	-.016***		
	(0.184)	(0.004)	-0.626***	-.015***
			(0.181)	(0.004)
Northeast with higher education	#	#		
			#	#
Northwest no education	-1.156***	-.024***	-1.116***	-.024***
	(0.181)	(0.003)	(0.180)	(0.003)
Northwest higher education	0.565	.0209	0.431	.015
	(0.555)	(0.026)	(0.568)	(0.024)
Southwest no education	0.628***	.023***	0.721***	.027***
	(0.121)	(0.006)	(0.120)	(0.006)
Southwest higher education	-0.489	-.012*		
	(0.334)	(0.006)	-0.590*	-.013**
			(0.343)	(0.006)

RELIGION AND REGION

Muslim North West	12.911	0.997	13.035***	.996***
	(#)	(#)	(0.792)	(0.001)
Christian North West	14.8694	.9758***	14.915***	.975
	( )	(0.0017)	(0.803)	(#)
Muslim North East	-1.070*	-.023*	-0.978	-.021
	(0.827)	(0.0139)	(0.822)	(0.014)
Christian North East	0.212	.0065	0.204	.006
	(0.783)	(0.0264)	(0.780)	(0.027)
Muslim South West	-0.373	-.009	-0.333	-.008
	(0.428)	(0.009)	(0.424)	(0.009)
Christian South West	-0.524	-.0126***	-0.602**	-.014**
	(0.320)	(0.007)	(0.319)	(0.006)

WEALTH AND REGION

Poorest North East	-0.577***	-.020**	0.657***	.024***
	(0.201)	(0.009)	(0.172)	(0.008)
Richest North East	0.874***	.0358***	0.845***	.034***
	(0.203)	(0.0119)	(0.189)	(0.011)

Poorest North West	-2.149***	-.027***	-2.102***	-.027***
	(0.600)	(0.0027)	(0.590)	(0.003)
Richest North West	1.0355***	.0456***	0.956***	.041***
	(0.182)	(0.01)	(0.166)	(0.010)
Poorest South West	-0.095	-0.0025	-0.109	-.002
	(0.221)	(0.006)	(0.197)	(0.005)
Richest South West	-0.283**	-.007**	-0.462***	-.010***
	(0.127)	(0.003)	(0.087)	(0.002)
Poorest North Central	#	#		
Richest North Central	#	#		
WEALTH AND RELIGION				
Poorest Christian	-0.355	-.009		
	(0.333)	(0.008)	0.142	.004
			(0.106)	(0.004)
Richest Christian	-0.737**	-.017**	-0.579***	-.014***
	(0.431)	(0.0076)	(0.104)	(0.002)
Poorest Muslim	-0.743**	-.017**	-0.227	-.006
	(0.361)	(0.006)	(0.171)	(0.004)
Richest Muslim	-0.051	-.0015	0.160	.005
	(0.434)	(0.012)	(0.122)	(0.004)
WEALTH AND RESIDENCE				
Poorest rural	-0.333	-.009	0.103	.003
	(0.272)	(0.007)	(0.092)	(0.003)
Richest rural	0.361**	.013**	0.199	.006
	(0.147)	(0.0061)	(0.157)	(0.006)
Poorest urban			0.342	.012
			(0.269)	(0.011)
Richest urban			-0.372***	-.010***
			(0.100)	(0.003)
No of observations	27413		27413	

Prob >chi2	0.0000	0.0000
Pseudo R2	0.3197	0.3197

The regressions in each table are also similar; the only difference lies with the inclusion of wealth index and wealth in each of the regression models. The results show that the coefficients and marginal effect for each of the wealth index categories were negative and significant at 1% for most of the years. The negative coefficients implies that women from the lower category of wealth index had lower probability of being assisted by skilled delivery personnel during delivery compared to women from the higher wealth index. This was more pronounced in 1990, 2003 and 2013 when about 20% of women from the poorest wealth index had lower probability of being assisted by skilled delivery assistants. Wealth in each of the tables is statistically

significant at 1% and positively related to skilled delivery utilisation for all the results. This implies that skilled delivery utilisation increased with wealth as stated a priori in the methodology. Distance to health facility and transport to health facility which represents the price of accessing skilled delivery care in the utilisation model were found to be statistically significant. Women that viewed "distance to health facility" and "transport to health facility" as big problems had lower probability of giving birth through the help of the skilled birth attendants, this is more pronounced in 2003 when $\beta = -0.373$. "Transport to health facility" was also negatively related to skilled delivery utilisation with greater impact in 2003.

Insurance and employment statuses which stood for enabling and predisposing factors as well as the maternal characteristics in the theoretical and empirical model were also found to be statistically significant at 1% and 5% respectively. Employment status was significant for 2008 and 2013 results. The result implies that the enabling and predisposing factors were major determinants of skilled delivery utilisation. The negative sign on the marginal effect and coefficient for "no insurance" implies that women with "no insurance" had lower probability of receiving skilled delivery assistance compared to women with insurance. The positive marginal effect of "no employment implies that women with "no employment" had higher probability of being attended to by skilled birth attendants compared to employed women. This however did not meet the a priori expectation. The reason why it is positive may be that employed women give birth to fewer children than unemployed women; as such unemployed women have higher probability of utilising skilled birth attendant compared to the employed women. The variable "no female provider" which represents the availability of health personnel or part of the enabling factor in the theoretical model was statistically significant at 1% in 2003 while "no provider" was not significant in the utilisation model. Women who viewed "no female provider" as a big problem had lower probability of giving birth through the help of the skilled birth attendants

Respondent's education and partner's education have statistically significant relationship at 1% with signs based on the a priori expectation of the skilled delivery utilisation, this cuts across all the years. The negative sign for education category shows that women with "no education" have lower probability of delivery with the assistance of skilled delivery personnel. This was worse in 1990 with marginal effect for women and their husbands with "no education" given as -0.051 and -0.02,

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respectively. In line with partner's education, marital status also was found to be statistically significant as single women had lower probability of being assisted by skilled birth attendants during delivery compared to married women. This means the probability of skilled delivery utilisation is increased in women that are married; whose husband's have higher educational qualification.

Age of the respondent in the regression was found to be negative but statistically significant for all the years at 1%. This means that the probability of skilled delivery utilisation decreased with a rise in age of the respondents. Young women were more likely to utilise skilled delivery than those who are old. Also skilled delivery assistance is increased with number of children; which was statistically significant at 1%, the positive sign implies that the greater the number of children born by a woman, the higher the probability of skilled delivery utilisation, because; the more the number of children a woman has with age, the riskier it becomes for her to give birth. Therefore women that have many children may develop complications; this may prompt their visiting skilled birth attendants during delivery.

Among the variables that represents maternal characteristics in the empirical model is ethnicity, which in the model was found to be statistically significant at 1% with Hausa ethnic group as the reference category. The results show that the Igbo and Yoruba women were more likely to utilise skilled delivery assistance compared to other ethnic groups like the Ijaw/Izon, the Kanuri/Beriberi and the Tiv ethnic groups. This was more pronounced in 2008 when the marginal effect for Igbo and Yoruba was given as 0-029 and 0.023, respectively. Similarly, region and residence were also significant in the empirical model at 1%. Given the South West was the reference category, women from other regions of the country had less probability of being assisted by skilled delivery personnel compared to women from the region. This is more pronounced in the North West and North East in 1990 with marginal effect for both regions given as -0.035 and -0.031, respectively. The results for residence, shows that urban women had higher probability of being assisted by skilled birth attendants compared to women from the rural areas this is evident by the positive sign for the "urban" areas.

Religion is also a statistically significant variable at 1% and 5% levels in the skilled delivery utilization model. Given christianity as the reference category, muslim women and traditionalists had lower probability of delivering with the assistance of skilled delivery personnel compared to other christian women.

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The interactive terms for education and regions show that education and region jointly affected skilled delivery utilisation. Women from the North East with no education had less probability of giving birth with the assistance of skilled delivery personnel, while those with higher education from the North East had higher probability of skilled delivery utilization. This largely depends on the year because results for some years are not significant. Wealth and residences show a positive and significant sign for the richest rural women for some years. This confirms that for those years, wealth has a major impact on utilisation of skilled delivery because women from the rural areas in the richest wealth index were more likely to utilise skilled delivery compared to rural women in the poorest wealth index.

The interactive terms for education and region were intended to establish their joint effect on skilled delivery utilisation. Although some of the marginal effects were not significant. The results show that women from the North East with no education had less probability of giving birth with the assistance of skilled delivery personnel. In contrast, the North East women with higher education show a positive marginal effect. This means that women from the North East with higher education had higher probability of giving birth with the assistance of skilled health professionals. A similar result was recorded for the North West region. The North Central region however has different signs for the interaction terms and most of the marginal effect was not significant.

The interaction for South West women with no education was significant for all the survey data with positive marginal effect. This implies that there was a positive correlation between South West women with no education and skilled delivery utilisation. However, there was no significant relationship between skilled delivery utilisation and South West women with higher education.

Religion and region were interacted to establish if there was a link between skilled delivery utilisation and religion as well as region. The results show that for some marginal effects, the relationship was positive while for others it was negative. Although some of the marginal effects are not significant, there is no difference in signs between the two religions in the same region for most of the survey results. This implies that there was no difference in both religions within the same region when the variables were interacted. The interaction between wealth and region seeks to establish the relationship between them and skilled delivery utilisation. The results show that, women from the poorest wealth index in the North East were less likely to

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have skilled delivery while those from richest wealth in the region had higher probability for delivery in the health facilities through the help of a skilled birth professional. A similar result was obtained in the North West for the poorest and richest wealth indexes. The interactive terms between wealth and region therefore means that poverty in North East and North West region influences skilled delivery utilisation. The interactive terms for the South West and North Central were not significant for most of the survey results though with negative signs for some marginal effect and positive for the others. The results for the interactive terms for the South West and North Central show that poverty and wealth do not make much difference in skilled delivery utilisation.

The interactive terms between wealth and religion were to establish a relationship between skilled delivery utilisation wealth status and religion of the respondents. The results show a positive sign and negative sign for christianity and islam poorest and richest wealth indexes depending on the survey. The 2008 results for the poorest christian and the 2003 and 1990 results for the richest Christians were significant with positive and negative signs, respectively. The results suggest that wealth and religion had a positive and negative impact on skilled delivery utilisation for the poorest and richest christians. The marginal effect for the poorest muslim was significant and positive for the 2013 results but negative for 2003 and 1990 results. While that of the richest Muslim was significant and positive in 2003. This suggests that wealth influences the muslim women in the utilisation of skilled delivery.

Wealth and residence were interacted to establish a link between skilled delivery utilization among the rural women. The focus was to test if rural women were less assisted by skilled delivery assistants due to poverty. The poorest women from the rural areas were less likely to be assisted by skilled birth attendants. The results of the richest rural women show a positive sign for the 2013, 2008 and 1990. This confirms that wealth has a major impact on utilisation of skilled delivery assistance because; women from the rural areas in the richest wealth index were more likely to utilise skilled delivery.

Regional analysis of the determinants of skilled delivery utilisation in Nigeria

Regional analysis for the skilled delivery utilisation was to establish the major determinants of skilled delivery utilisation on regional basis. Appendix II presents the

results on skilled delivery utilisation for the North Central, North East, North West, South East, South South and South West, based on each NDHS in Tables A27 to A37.

North Central

The regression results for the North Central indicate that wealth was significant for most of the years with the expected negative sign. Age was also found to be significant with the negative sign. Residence was significant for the 2013, 2008, and 2003 survey results. Religion was found to be significant for Muslims given the 2008, 2013 and 2003 results. Muslims and christian religions had the expected negative signs which indicate that the North Central christian women were more likely to be assisted by skilled delivery personnel compared to other religions. Education was also found to be significant for most of the results. Education had the expected negative sign as women with higher education were more likely to receive skilled delivery assistance compared to those with primary, secondary or no education. Marital status and insurance status were only significant for 2013 and 2008. The results for marital and insurance status in the North Central shows the expected signs as married women and those with no insurance were less likely to receive assistance from skilled delivery personnel compared to those married and have insurance coverage. Partner's education was significant only for the women with "no education" and "primary" education. The sign was negative indicating that in the North Central, women whose husbands have only primary or no education were less likely to give birth in health facilities with the skilled birth attendants. Employment status was also significant for the 2013 and 2008 results with the expected signs. Birth order was significant for all the years. Also, "distance to health facility" was significant for 2013 and 2008 with the expected negative sign. While "transport to health facility", "no provider" and were "no female provider" are not significant at all.

North East

The regression results for the North East region show that wealth and age of respondents were significant with a negative sign. The negative sign of wealth and age implies that poorer women were less likely to deliver with skilled delivery assistants. Also, skilled delivery decreased with age although the relationship was quadratic in nature. Residence was significant for 2013, 2008 and 1999 with expected positive signs. This implies in the North East urban women were more likely to receive assistance from skilled birth attendants compared to the rural women. Islam was

significant for all the years with negative sign, indicating that christian women were more likely to deliver with skilled assistance compared to muslim women in the North East. Education was significant for all the years; partner's education is also significant for most of the years while marital status is not significant for the region. Employment status was significant and positive for only 2013. This implies that for the region, employed women had lower probability of receiving skilled delivery assistance during childbirth than the unemployed women. This depicts the situation in most parts of the northern region where most women were caregivers and full housewives with no formal employment. The results also show that skilled delivery care is increased with respects to birth order for the region. "Distance to health facility" was significant and negative for all the years, while "transport to health facility" is significant for just 2008. This implies that "transport to health facility" was a hindrance to utilising skilled delivery care by women for the year that it is significant. No provider and no female provider was not significant for the region.

North West

The results for the North West region show that wealth index and age were significant with negative signs for all the years. Residence was positive and significant except for 1999 and 1990. Religion was also significant. Education and "partner's education' were also found to be significant for some years; while employment is significant for only 2003, 2008 and 1990. Marital status or "single" was not significant because, many women from the region were married. Birth order was positive and significant for all years, while "distance to health facility" is significant for only 2013 and 2003. "Transport to health facility" and "no provider" were not significant for all the years. "No female provider" was significant for 2008 and 2003.

South East

The region shows that all variables were significant except residence, "no female provider" and "no provider". Wealth index, age of respondents, religion, respondent's education, partner's education and marital status had negative signs based on the a priori expectation. Marital status was significant for 2013, 2008, 1999 and 1990. Employment status was significant and positive for 2013 and 2008. It was positive because most women in Nigeria generally do not work in the formal sector. "Distance to health facility" and "transport to health facility" were negative and significant for

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only 2013. This shows that for this period, transportation and distance constitute problems in the region.

South South

The regression results for the region shows similar pattern with that of other regions. Wealth index, age and residence were all significant for all the years. Religion was also significant but had conflicting signs compared to other results. Respondent's education and partner's education were significant with the expected negative signs. Marital status was also significant and in line with the results obtained from other regression. Employment was only significant for the 2008 results at 10%, while insurance status is not significant for any of the years. In addition, birth order, was significant and has similar signs like the regression results for other regions. "Distance to health facility" was significant for 2013 and 2008 with the expected negative sign, while the marginal effect for "transport to health facility" was also significant and negative for 2008 and 2003. "No provider" and "no female provider" were significant they both recorded negative sign based on the a priori expectation.

South West

The regression results for the region shows that wealth index was significant but negative for all the years as such, skilled delivery utilisation increased with wealth. Women from the richest wealth index were more likely to deliver with skilled delivery assistance compared to those from the lower wealth index in the South West. Age also had negative and significant marginal effect similar to regressions from other regions. This means that in the South West, older women had lower probability of utilisation of skilled delivery. This age relationship is also quadratic. "Residence" was positive and significant for 2013, 2008 and 1990. This is in conjunction with the results obtained from other regressions. Religion was not a strong factor in skilled delivery utilisation in the region because only 2008 results were significant with a positive sign for Islam. Respondent's education and partners education were also found to have negative but significant marginal effect. However, partner's education for the 1999 survey results is not significant. Marital status was significant for 2013, 2008 and 1999 with a negative sign for the region. Indicating that single women were less likely to be assisted by skilled health professionals compared to married women, insurance for the South west region is only significant for the 2013 results. Employment status was also significant for the 2013 and 1990 results. Birth order was found to be significant and positive for

all the survey data. This is in line with the results obtained from other regional regressions. Distance to health facility, "no provider" and "no female provider" had negative signs as expected but significant only for 2013 and 2008.

Regional results compared

 The regional regression analysis for the skilled delivery was similar to the national regression. There were few exceptions; the South East regional results show that all variables were significant except residence, "no female provider" and "no provider". The results for the South West region shows that religion is not a strong factor in skilled delivery utilisation because only the 2008 results were significant with positive sign for Islam.

5.3.2.2 Determinants of child health care utilization

(A) Determinants of immunisation utilization in Nigeria

Child immuniation in the data as described in the methodology was measured by examining children that have ever received vaccination five years prior to the survey for each of the NDHS. Vaccination in this regard includes all category of immunisation like the polio, measles, DPT and other type of vaccination as captured by the data. The utilisation model for immunization is estimated by logit regression as stated in the methodology. Tables 5.13a to 5.13e presents the logit regression results for immunisation utilisation.

Table 5.12a: The Logit Model for Child Immunisation Utilisation 2013

	NDHS 2013			
	Wealth in quintiles/index		Wealth index values/scores	
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect

WEALTH VARIABLES OF

MOTHER(REF:RICHEST)

Wealth			0.009	.0016
			(0.009)	(0.002)
Poorest	-0.6760***	-.1376***		
	(0.1062)	(0.0227)		
Poorer	-0.5506***	-.1113***		
	(0.1023)	(0.0217)		
Middle	-0.5853***	-.1206***		
	(0.0949)	(0.0208)		
Richer	-0.4769***	-.0978***		
	(0.0889)	(0.0193)		

MOTHER'S EMPLOYMENT STATUS (REF:EMPLOYED)

not employed	-0.4316***	-.0852***	-0.428***	-.085***
	(0.0370)	(0.0075)	(0.037)	(0.008)

PRICE VARIABLES

DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)

big problem	-0.1184***	-.0227***	-0.136***	-.026***
	(0.0375)	(0.0073)	(0.037)	(0.007)

MOTHER'S INSURANCE STATUS (REF: INSURED)

no insurance	-0.3435	-.0606	#	#
	(0.2314)	(0.0367)		

EDUCATION VARIABLES

MOTHER'S EDUCATION (REF: HIGHER)

no education	-1.0220***	-.1876***	-1.241***	-.226***
	(0.1581)	(0.0276)	(0.155)	(0.027)
Primary	-0.7865***	-.1656***	-0.995***	-.213***
	(0.1529)	(0.0346)	(0.150)	(0.035)
Secondary	-0.5771***	-.1187***	-0.705***	-.147***
	(0.1462)	(0.0319)	(0.145)	(0.032)

FATHER'S EDUCATION (REF:

HIGHER)

no education	-0.5845***	-.1126***	-0.686***	-.133***
	(0.0836)	(0.0162)	(0.082)	(0.016)
Primary	-0.3051***	-.0608***	-0.392***	-.079***
	(0.0850)	(0.0177)	(0.084)	(0.018)
Secondary	-0.1043	-.0201	-0.163**	-.0318**
	(0.0798)	(0.0156)	(0.079)	(0.016)

MOTHER'S AGE

age	0.0062	.0012	0.008*	.0015*
	(0.0042)	(0.0008)	(0.004)	(0.001)

CHILD AGE

Child age	0.1981***	.0378***	0.199***	.038***
	(0.0131)	(0.0025)	(0.013)	(0.003)

CHILD SEX(REF. MALE)

Female	-0.008	-.0015	-0.009	-.002
	(0.0343)	(0.0065)	(0.034)	(0.007)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	0.0025	.0005	-0.002	-.0003
	(0.0112)	(0.0021)	(0.011)	(0.002)

MARITAL STATUS (REF: MARIED)

Single	0.3709***	.0646***	0.353***	.0620***
	(0.1209)	(0.0190)	(0.121)	90.019)

ETHNICITY OF MOTHER (REF: HAUSA)

Igbo	0.7264***	.1170***	0.806***	.127***
	(0.2147)	(0.0283)	(0.208)	(0.026)
ijaw/izon	-0.6672***	-.1443***		
	(0.1246)	(0.0295)	-0.662***	-.143***
			(0.124)	(0.029)
kanuri/beriberi	-0.7776***	-.1716***	-0.735***	-.161***
	(0.1208)	(0.0294)	(0.120)	(0.029)

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Tiv	-0.5165***	-.1095***	-0.523***	-.111***
	(0.1497)	(0.0345)	(0.150)	(0.035)
Yoruba	0.6206***	.1032***	0.660***	.109***
	(0.1228)	(0.0174)	(0.122)	(0.017)
Others	0.0289**	.0055**	0.033	.006
	(0.0617)	(0.0117)	(0.061)	(0.012)

REGION (REF SOUTH WEST)

North Central	0.1647	.0305	0.114	.021
	(0.1050)	(0.0188)	(0.104)	(0.019)
North East	-0.3599***	-.0719***	-0.435***	-.087***
	(0.1046)	(0.0218)	(0.103)	(0.022)
North West	1.0306***	.1850***	0.967***	.174***
	(0.1089)	(0.0182)	(0.107)	(0.018)
South East	-0.7092***	-.1536***	-0.835***	-.184***
	(0.2147)	(0.0509)	(0.207)	(0.050)
South South	0.0745	.0139	0.065	.012
	(0.1134)	(0.0210)	(0.113)	(0.021)

RESIDENCE

Urban	-0.2624***	-.0515***	-0.162***	-.032***
	0.0526)	(0.0106)	(0.048)	(0.009)

RELIGION (REF :CHRISTIANITY)

Islam	-0.4314***	-.0791***	-0.417***	-.076***
	(0.0700)	(0.0123)	(0.070)	(0.012)
Traditionalist	-0.6829***	-.1489***	-0.681***	-.149***
	(0.1530)	(0.0367)	(0.153)	(0.037)
_cons	2.6907***		2.457***	
	(0.2974)		(0.291)	

INTERACTION VARIABLES

EDUCATION AND REGION

Muslim North West	.5190***	.0892***		
	(0.1626)	(0.0252)	#	#
Christian North west	-3.163***	-.6376***	0.532***	.091***

	(0.7445)	(0.0755)	(0.162)	(0.025)
Muslim North East	1.3098***	.2170***	-3.198***	-.640***
	(0.1606)	(0.0232)	(0.748)	(0.074)
Christian North East	-3.9050***	-.6931***	-3.874***	-.690***
	(0.7665)	(0.0425)	(0.770)	(0.044)
Muslim southwest	1.0815***	.1555***	1.092***	.156***
	0.1705	(0.0175)	(0.170)	(0.017)
Christian South West	-2.2672***	-.5129***	-2.303***	-.519***
	(0.7609)	(0.1385)	(0.764)	(0.136)
Muslim North Central	.4385**	.0738**	0.403**	.068**
	(0.2121)	(0.0314)	(0.211)	(0.032)
Christian North Central	-1.4732*	-.3422*	-1.515*	-.352
	(0.8370)	(0.2016)	(0.841)	(0.201)
WEALTH AND REGION				
Poorest North East	0.1955	.0357	-.442	-.091**
	(0.2474)	(0.0433)	(0.069)	(0.015)
Richest North East	-1.0126***	-.2296***	0.075	.014
	(0.2490)	(0.0619)	(0.194)	(0.036)
Poorest North West	0.7610***	.1257***	0.115**	.021**
	(0.2451)	(0.0346)	(0.059)	(0.011)
Richest North West	-1.7467***	-.4065***	-0.639***	-.138***
	(0.2269)	(0.0509)	(0.159)	(0.038)
Poorest South West	-0.2171	-.0433	-0.873***	-.195***
	(0.3652)	(0.0764)	(0.278)	(0.069)
Richest southwest	-0.2261	-.0450	0.871***	.133***
	(0.2389)	(0.0499)	(0.175)	(0.020)
Poorest North Central	0.7967***	.1223***	0.163	.029
	(0.2726)	(0.0322)	(0.138)	(0.024)
Richest North Central	-0.8200***	-.1815***	0.268	.047
	(0.2511)	(0.0614)	(0.194)	(0.032)
WEALTH AND RELIGION				
Poorest Christian	-0.5280	-.1117	0.075	.014
	(0.3320)	(0.07660	(0.130)	(0.024)

Richest Christian	-0.0110	-.0020	0.930***	.141***
	(1.0774)	(0.2056)	(0.124)	(0.014)
Poorest Muslim	-0.7708***	-.1586**	-0.166***	.032***
	(0.3100)	(0.0680)	(0.045)	(0.009)
Richest Muslim	-0.8022	-.1759	0.139	.025
	(1.0742)	(0.2597)	(0.113)	(0.020)
WEALTH AND RESIDENCE				
Poorest rural	0.2736*	.0505*	-0.098**	-.018**
	(0.1594)	(0.0285)	(0.044)	(0.009)
Richest rural	0.0118	.0022	0.524***	.087***
	(0.1978)	(0.0375)	(0.179)	(0.025)
Poorest urban	#	#	-0.385**	-.079**
			(0.153)	(0.034)
Richest urban	#	#	0.500***	.085***
			(0.095)	(0.014)
RELIGION AND REGION				
Muslim North West	-1.7046***	-.3463***	-1.829***	-.372***
	(0.5773)	(0.1183)	(0.576)	(0.117)
Christian North West	-1.6950***	-.3955***	-1.770***	-.412***
	(0.4711)	(0.1071)	(0.470)	(0.104)
Muslim North East	-1.8084***	-.4025***	-1.898***	-.422***
	(0.6286)	(0.1412)	(0.630)	(0.139)
Christian North East	-0.0908	-.0177	-0.196	-.039
	(0.5177)	(0.1029)	(0.518)	(0.108)
Muslim South West	-2.4769**	-.5499***	-2.698**	-.584***
	(1.2034)	(0.2007)	(1.173)	(0.172)
Christian South West	-1.9367*	-.4455*	-2.143**	-.488**
	(1.1430)	(0.2459)	(1.111)	(0.221)
Muslim North Central	-1.1599**	-.2624**	-0.756*	-.164
	(0.5674)	(0.1392)	(0.425)	(0.102)
Christian North Central	-0.6621	-.1422	-.442	-.091**
	(0.4268)	(0.1003)	(0.069)	(0.015)

		19521		19521
No of observations		19521		19521
Prob >chi2		0.0000		0.0000
Pseudo R2		0.1262		0.1262

Table 5.12b: The Logit Model for Child Immunisation Utilisation 2008

	NDHS 2008			
	Wealth in quintiles/index		**Wealth index values/scores**	
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
WEALTH VARIABLES OF MOTHER(REF:RICHEST)				
Wealth			0.038***	.0086***
			(0.010)	(0.002)
Poorest	-0.8096***	-.1885***		
	(0.1047)	(0.0247)		
Poorer	-0.6531***	-.1529***		
	(0.1019)	(0.0244)		
Middle	-0.4255***	-.0994***		
	(0.0979)	(0.0235)		
Richer	-0.3875***	-.0907***		
	(0.0933)	(0.0225)		
MOTHER'S EMPLOYMENT (REF:EMPLOYED)				
not employed	-0.3832***	-.0876***	-0.384***	-.087***
	(0.0365)	(0.0084)	(0.036)	(0.008)
PRICE VARIABLES				
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)				

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big problem	-0.1197**	-.0271**	-0.152**	-.034***
	(0.0538)	(0.0122)	(0.054)	(0.012)
TRANSPORT TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)				
Big problem	0.0271	.0061	0.012	.002
	(0.0546)	(0.0123)	(0.055)	(0.012)

NO PROVIDER (REF NOT A BIG PROBLEM)

Big problem	0.1062**	.0238**	0.103**	.023**
	(0.0551)	(0.0124)	(0.055)	(0.012)

MOTHER'S INSURANCE STATUS (REF: INSURED)

no insurance	-0.4256	-.0890		
	(0.2946)	(0.0562)		

NO IMMUNISATION DRUGS

Big problem	0.0765	.0172	0.078	.017
	(0.0545)	(0.0123)	(0.054)	(0.012)

EDUCATION VARIABLES

MOTHER'S EDUCATION (REF: HIGHER)

no education	-1.2299***	-.2632***	-1.389***	-.295***
	(0.1806)	(0.0357)	(0.176)	(0.034)
Primary	-0.8582***	-.2035***	-0.994***	-.236***
	(0.1780)	(0.0430)	(0.173)	(0.042)
Secondary	-0.4013**	-.0938**	-0.477***	-.112***
	(0.1736)	0.0417	(0.171)	(0.041)

FATHER'S EDUCATION (REF: HIGHER)

no education	-0.3549***	-.0802***	-0.506***	-.114***
	(0.0851)	(0.0192)	(0.082)	(0.018)
Primary	-0.0213	-.0048	-0.133	-.030
	(0.0870)	(0.0197)	(0.085)	(0.020)
Secondary	-0.0219	-.0049	-0.088	-.019
	(0.0830)	(0.0188)	(0.082)	(0.019)

MOTHER'S AGE

age	0.0131***	0.0029***	0.013***	.003***

	(0.0040)	(0.0009)	(0.004)	(0.001)

CHILD AGE

Child age	0.2505***	.0566***	0.252***	.056***
	(0.0127)	(0.0029)	(0.013)	(0.003)

CHILD SEX(REF. MALE)

Female	0.0240	.0054	0.027	.006
	(0.0341)	(0.0077)	(0.034)	(0.008)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	0.0128	.0028	0.013	.003
	(0.0108)	(0.0025)	(0.011)	(0.002)

MARITAL STATUS (REF: MARIED)

Single	0.3086***	.0662***	0.310***	.066***
	(0.1141)	(0.0231)	(0.113)	(0.023)

ETHNICITY OF MOTHER (REF: HAUSA)

Igbo	0.4668**	.0980**	0.524***	.109***
	(0.2027)	(0.0390)	(0.197)	(0.037)
ijaw/izon	-1.1791***	-.2860***	-1.184***	-.287***
	(0.1416)	(0.0332)	(0.141)	(0.033)
kanuri/beriberi	-0.7542***	-.1825***	-0.756***	-.183***
	(0.0895)	(0.0223)	(0.090)	(0.022)
Tiv	-0.1220	-.0280	-0.195	-.045
	(0.1220)	(0.0285)	(0.122)	(0.029)
Yoruba	0.5232***	.1091***	0.573***	.118***
	(0.1159)	(0.0220)	(0.114)	(0.021)
Others	0.0553	.0124	0.061	.013
	(0.0592)	(0.0133)	(0.059)	(0.013)

REGION (REF SOUTH WEST)

North Central	0.1619	.0359	0.133	.029
	(0.1034)	(0.0225)	(0.102)	(0.022)
North East	0.5583***	.1200***	0.453***	.098***
	(0.1109)	(0.0225)	(0.109)	(0.023)
North West	0.0215	.0048	-0.051	-.011

	90.1127)	(0.0254)	(0.111)	(0.025)
South East	-0.6852***	-.1649**	-0.719***	-.173***
	(0.2046)	(0.0508)	(0.199)	(0.049)
South South	0.4375***	.0925***	0.453***	.095***
	(0.1258)	(0.0246)	(0.125)	(0.024)
RESIDENCE				
Urban	-0.0420	-.0095	0.132***	.029***
	(0.0527)	(0.0120)	(0.047)	(0.010)
RELIGION (REF :CHRISTIANITY)				
Islam	-0.3201***	-.0712***	-0.291***	-.065***
	(0.0647)	(0.0141)	(0.064)	(0.014)
Traditionalist	-0.9151***	-.2227***	-0.962***	-.234***
	(0.1221)	(0.0300)	(0.122)	(0.030)
_cons	1.9058***		1.628***	
	(0.3690)		(0.373)	

INTERACTION VARIABLES

EDUCATION AND REGION

Muslim North West	-0.1483	-.0339	13.991***	.369***
	(0.1681)	(0.0390)	(1.149)	(0.020)
Christian North West	#	-.0279	-0.062	-.014
		(0.0379)	(0.168)	(0.038)
Muslim North East	-0.1225**	-.2310**		-.019
	(0.1651)	(0.1097)	#	(0.038)
Christian North East	-0.9475**	.0184**	-0.950**	.036
	(0.4494)	(0.0370)	(0.448)	(0.036)
Muslim South west	0.0824	-.0622	0.163	-.065
	(0.1676)	(0.1010)	(0.167)	(0.101)
Christian South West	-0.2656	.0452	-0.279	.054
	(0.4186)	(0.0439)	(0.418)	(0.043)
Muslim North Central	0.2071*	.1454*	0.251	.136
	(0.2086)	(0.0842)	(0.207)	(0.088)
Christian North Central	0.7451	(#)	0.690	
	(0.5222)		(0.525)	

WEALTH AND REGION

Poorest North East	-0.0220	-.0049	-0.320***	-.074***
	(0.1780)	(0.0403)	(0.068)	(0.016)
Richest North East	-0.6067*	-.1461*	0.222	.048
	(0.3264)	(0.0815)	(0.282)	(0.059)
Poorest North West	0.1181	.0262	-0.180***	-.041***
	(0.1752)	(0.0383)	(0.060)	(0.014)
Richest North West	-0.9938***	-.2419***	-0.184	-.042
	(0.2328)	(0.0565)	(0.166)	(0.039)
Poorest South West	0.1777	.0389	-0.150	-.034
	(0.2799)	(0.0593)	(0.228)	(0.054)
Richest South West	-0.4505**	-.1070*	0.344**	.073**
	(0.2353)	(0.0579)	(0.169)	(0.034)
Poorest North Central	0.3237*	.0692*	-0.002	-.0004
	(0.1908)	(0.0385)	(0.099)	(0.022)
Richest North Central	-0.2788	-.0652	0.507**	.104***
	(0.2589)	(0.0624)	(0.201)	(0.037)

WEALTH AND RELIGION

Poorest Christian	#	.1727***	0.097	
		(0.0406)	(0.096)	#
Richest Christian	0.6845**	1.3106***	0.0001***	
	(0.2509)	( )	(0.0001)	#
Poorest Muslim	#	.1440***	-0.116**	
		(0.0486)	(0.055)	#
Richest Muslim	1.1683**	7.5707***	0.0001***	
	(0.4223)	(#)	(0.0001)	#

WEALTH AND RESIDENCE

Poorest rural	0.3462**	.0763**	-0.202***	-.046***
	(0.1639)	(0.0352)	(0.042)	(0.010)
Richest rural	-0.0738	-.0168	0.387**	.081**
	(0.1810)	(0.0417)	(0.156)	(0.030)
Poorest urban	#	#	-0.631***	-.152***
			(0.159)	(0.040)
Richest urban	#	#	0.388***	.082***

			(0.104)	(0.021)

RELIGION AND REGION

Muslim North West	#	-.1588	-0.694	-.161
		(0.1617)	(0.682)	(0.161)
Christian North West	2.0278***	.2830***	1.970***	.279***
	(0.3857)	(0.0246)	(0.387)	(0.026)
Muslim North East	-1.2066*	-.2868*	-1.244*	-.295*
	(0.6860)	(0.1619)	(0.681)	(0.160)
Christian North East	0.8215**	.1591***	0.663**	.133**
	(0.3440)	(0.0546)	(0.341)	(0.059)
Muslim South West	-0.4402	-.1044	-0.495	-.118
	(0.8286)	(0.2039)	(0.817)	(0.202)
Christian South West	0.7978*	.1562*	0.676	.135
	(0.5665)	(0.0924)	(0.555)	(0.098)
Muslim North Central	-0.8405	-.2030	0.525	.109
	(0.7004)	(0.1729)	(0.356)	(0.068)
Christian North Central	0.6061*	.1244**	-0.320***	-.074***
	(0.3576)	(0.0654)	(0.068)	(0.016)

RELIGION AND EDUCATION

Christian no education	0.5901**	.1211**	0.581**	.119***
	(0.2726)	(0.0492)	(0.270)	(0.050)
Christian higher education	14.0732***	.4222	14.110***	.423***
	(1.1180)	( )	(1.118)	(0.022)
Muslims no education	0.4990*	.1123*	0.465*	.104*
	(0.2689)	(0.0598)	(0.266)	(0.060)
Muslims higher education	13.9745***	.3684	13.991***	.369***
	(1.1550)	(#)	(1.149)	(0.020)
No of observations	17567		17567	
Prob >chi2	0.0000		0.0000	
Pseudo R2	0.1302		0.1302	

Table 5.12c: The Logit Model for Child Immunisation Utilisation 2003

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	NDHS 2003			
	Wealth in quintiles/index		**Wealth index values/scores**	
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
WEALTH VARIABLES OF MOTHER(REF:RICHEST)				
Wealth			0.013	.0024
			(0.013)	(0.002)
Poorest	-0.7920***	-.1662***		
	(0.2073)	(0.0458)		
Poorer	-0.7300***	-.1535***		
	(0.1979)	(0.0440)		
Middle	-0.5644***	-.1174**		
	(0.1942)	(0.0426)		
Richer	-0.5575***	-.1165***		
	(0.1830)	(0.0404)		
MOTHER'S EMPLOYMENT (REF:EMPLOYED)				
not employed	-0.4568***	-.0909***	-0.672***	-.133***
	(0.0804)	(0.0163)	(0.179)	(0.036)
PRICE VARIABLES				
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)				
big problem	-0.2666*	-.0518*	0.321**	.063**
	(0.1446)	(-0.0282)	(0.145)	(0.028)
Small problem	0.0237	.0045		
	(0.1342)	(0.0259)		
TRANSPORT TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)				
Big problem	0.1029	.01999	0.142	.027
	(0.1442)	(0.0280)	(0.145)	(0.028)
Small problem	0.0560	.0107	0.052	.009
	(0.1339)	(0.0256)	(0.135)	(0.026)

EDUCATION VARIABLES

MOTHER'S EDUCATION (REF: HIGHER)

no education	-0.1327	-.0256	-0.374	-.072
	(0.3353)	(0.0646)	(0.328)	(0.062)
Primary	0.2066	.0390	-0.010	-.002
	(0.3309)	(0.0607)	(0.324)	(0.063)
Secondary	0.2570	.0479	0.141	.026
	(0.3246)	(0.0580)	(0.318)	(0.059)

FATHER'S EDUCATION (REF: HIGHER)

no education	-0.5477***	-.1078***	-0.489**	-.1005**
	(0.1799)	(0.0358)	(0.185)	(0.040)
Primary	-0.3921*	-.0796***	-0.188	-.037
	(0.1837)	(0.0388)	(0.178)	(0.036)
Secondary	-0.1303	-.0257		
	(0.1771)	(0.0355)		

MOTHER'S AGE

age	-0.0004	-.0001	0.001	.0002
	(0.0095)	(0.0019)	(0.010)	(0.002)

CHILD AGE

Child age	0.3765***	.0730***		
			0.374***	.0728***
	(0.0291)	(0.0056)		
			(0.029)	(0.006)

CHILD SEX(REF. MALE)

Female	0.0154	.0029	0.023	.0045
	(0.0750)	(0.0146)	(0.075)	(0.015)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	0.0453*	.0087*	0.040	.008
	(0.0243)	(0.0047)	(0.024)	(0.005)

MARITAL STATUS (REF: MARIED)

Single	0.0676	.0129	0.044	.008
	(0.2139)	(0.0403)	(0.218)	(0.042)

MOTHER'S REGION (REF SOUTH WEST)

North Central	-0.7810***	-.1683***	-0.83***	-.180***

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	(0.2295)	(0.0528)	(0.227)	(0.053)
North East	-1.0572***	-.2252***	-1.148***	-.246***
	(0.2252)	(0.0503)	(0.222)	(0.050)
North West	-1.0711***	-.2212***	-1.101***	-.228***
	(0.2222)	(0.0471)	(0.219)	(0.046)
South East	-1.1207***	-.2550***	-1.15***	-.263***
	(0.2713)	(0.0664)	(0.270)	(0.066)
South South	-1.1900***	-.2714***	-1.22***	-.278***
	(0.2647)	(0.0643)	(0.262)	(0.064)
MOTHER'S RESIDENCE				
Urban	0.0001	9.5606	0.109	.0209
	(0.1001)	(0.0194)	(0.091)	(0.017)

MOTHER'S RELIGION (REF :CHRISTIANITY)

Islam	-0.4668***	-.0875***	-0.421***	-.079***
	(0.1362)	(0.0245)	(0.135)	(0.025)
Traditionalist	-0.5087*	-.1092*	-0.552**	-.119*
	(0.2765)	(0.0643)	(0.278)	(0.065)
_cons	2.2134***		1.801***	
	(0.4883)		(0.468)	

INTERACTION VARIABLES

EDUCATION AND REGION

Muslim North West	0.0142	.0028		
	(0.3538)	(0.0688)	#	#
Christian north West	#	0.0729	0.018	0.004
		(#)	(0.356)	(0.069)
Muslim North East	-0.3468	-.0702		
	(0.3481)	(0.1683)	#	#
Christian North East	-0.3166**	-.0661**	-0.232	-.047
	(0.7596)	(0.0919)	(0.761)	(0.164)
Muslim South West	-1.0259**	-.2324**	-1.008**	-.227**
	(0.3750)	(0.2499)	(0.374)	(0.092)
Christian south West	-0.3517	-.0739	-0.221	-.045
	(1.1139)	(0.1152)	(1.113)	(0.238)

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Muslim North Central	-0.3060	-.0636	-0.326	-.068
	(0.5237)	(#)	(0.523)	(0.116)
Christian North Central	#	#	#	#
WEALTH AND REGION				
Poorest North East	-0.0073	-.0014	0.016	.003
	(0.3114)	(0.0605)	(0.150)	(0.029)
Richest North East	-0.1042	-.0207	0.551	.092
	(0.5618)	(0.1139)	(0.469)	(0.067)
Poorest North West	-0.2350	-.0476	-0.206	-.041
	(0.3095)	(0.0654)	(0.150)	(0.031)
Richest north west	-0.2633	-.0539	0.392	.068
	(0.4206)	(0.0904)	(0.283)	(0.045)
Poorest South West	-0.7458	-.1653	-0.703	-.154
	(0.5581)	(0.1356)	(0.494)	(0.119)
Richest South West	-0.5747	-.1239	0.127	.023
	(0.6207)	(0.1455)	(0.533)	(0.097)
Poorest North Central	-0.3737	-.0779	-0.318	-.065
	(0.3430)	(0.0763)	(0.220)	(0.048)
Richest North Central	0.1138	.0214	0.781	.122**
	(0.5748)	(0.1054)	(0.479)	(0.059)
WEALTH AND RELIGION				
Poorest Christian	-0.1316	-.0261	-0.623***	-.133***
	(0.5532)	(0.1124)	(0.173)	(0.040)
Richest Christian	-0.2861	-.0584	0.372	.066
	(0.3279)	(0.0705)	(0.257)	(0.041)
Poorest Muslim	0.5145	.0909	0.022	.004
	(0.5385)	(0.08615)	(0.108)	(0.020)
Richest Muslim	#	#	0.667***	.109***
			(0.227)	(0.031)
WEALTH AND RESIDENCE				
Poorest rural	-0.4374	-.0892	-0.195**	-.038**
	(0.2867)	(0.0612)	(0.099)	(0.020)
Richest rural	-0.3641	-.0761	0.349	.061

	Col1	Col2	Col3	Col4
	(0.3626)	(0.0807)	(0.312)	(0.050)
Poorest urban			0.194	.035
			(0.269)	(0.047)
Richest urban			0.681***	.114***
			(0.203)	(0.029)

RELIGION AND REGION

	Col1	Col2	Col3	Col4
Muslim North West	-12.95***	-.9943***	-12.40***	-.993***
	(1.4151)	(.0029)	(1.196)	(0.003)
Christian North West	1.5682	.1939***	1.487	.188**
	(1.0377)	(.06931)	(1.053)	(0.076)
Muslim North East	-12.77***	-.980***	-12.27***	-.977***
	(1.3313)	(.00627)	(1.047)	(0.006)
Christian North East	1.0660	.1545*	0.869	.134
	(0.8333)	(.0847)	(0.832)	(0.097)
Muslim South West	-12.83***	-.8153***	-12.16***	-.811***
	(1.6462)	(.01827)	(1.438)	(0.023)
Christian South West	-0.0046	-.0008	-0.007	-.001
	(1.2223)	(.23446)	(1.231)	(0.237)
Muslim North Central	-12.97***	-.868***	1.877**	.232***
	(1.2721)	(.01396)	(0.723)	(0.052)
Christian North Central	1.9427**	.2367***	0.016	.003
	(0.7160)	(.04804)	(0.150)	(0.029)

RELIGION AND EDUCATION

	Col1	Col2	Col3	Col4
Christian no education	0.0840	.01601	0.039	.007
	(0.6397)	(0.1199)	(0.645)	(0.124)
Christian higher education	0.3539	.0630	0.237	.043
	(0.6868)	(0.1112)	(0.676)	(0.117)
Muslims no education	0.0264	.0051	-0.039	-.007
	(0.6250)	(0.1212)	(0.630)	(0.123)
Muslims higher education	#	#		
			#	#
No of observations	4009		4009	
Prob >chi2	0.0000		0.0000	

| | Pseudo R2 | 0.1394 | | 0.1394 | |

Table 5.12d: The Logit Model for Child Immunisation Utilisation 1999

	NDHS 1999			
	Wealth in quintiles/index		Wealth index values/scores	
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
WEALTH VARIABLES OF MOTHER(REF:RICHEST)				
Wealth			0.237***	.058***
			(0.043)	(0.011)
Poorest	-1.5568***	-.3681***		
	(0.2530)	(0.0526)		
Poorer	-0.9189***	-.2256***		
	(0.2450)	(0.0577)		
Middle	-0.8494***	-.2091***		
	(0.2335)	(0.0556)		
Richer	-0.9321***	-.2285***		
	(0.2302)	(0.0538)		
MOTHER'S EMPLOYMENT (REF:EMPLOYED)				
not employed	-0.5599***	-.1371***	-0.527***	-.129
	(0.1246)	(0.0301)	(0.125)	(0.030)

EDUCATION VARIABLES

MOTHER'S EDUCATION (REF: HIGHER)

no education	-1.8048**	-.4133***	-1.622**	-.376
	(0.6570)	(0.1300)	(0.641)	(0.132)
Primary	-1.2030*	-.2908**	-1.121*	-.272***
	(0.6522)	(0.1456)	(0.634)	(0.144)
Secondary	-0.6187	-.1535	-0.583	-.144**
	(0.6478)	(0.1584)	(0.632)	(0.155)

FATHER'S EDUCATION (REF: HIGHER)

no education	-0.1328	-.0328	-0.145	-.035***
	(0.2511)	(0.0621)	(0.246)	(0.061)
Primary	0.1642	.0403	0.141	.034
	(0.2522)	(0.0616)	(0.244)	(0.060)
Secondary	0.3655	.0889	0.366	.089
	(0.2491)	(0.0594)	(0.244)	(0.058)

MOTHER'S AGE

age	0.0054	.0013	0.007	.0018
	(0.0122)	(0.0030)	(0.012)	(0.003)

CHILD AGE

Child age	0.5654***	.1398***	0.559***	.138***
	(0.0692)	(0.0171)	(0.069)	(0.017)

CHILD SEX(REF. MALE)

Female	0.1280	.0316	0.145	.035
	(0.1080)	(0.0267)	(0.107)	(0.026)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	0.0596*	.0147*	0.052	.012
	(0.0331)	(0.0082)	(0.033)	(0.008)

MARITAL STATUS (REF: MARIED)

Single	0.1187	.0291	0.081	.019
	(0.3804)	(0.0926)	(0.393)	(0.096)

MOTHER'S REGION (REF SOUTH WEST)

North Central	0.0459	.0113	0.033	.008
	(.2045)	(.0504)	(0.202)	(0.050)
North East	-0.5701***	-.1413***	-0.524**	-.130**
	(0.1747)	(0.0430)	(0.213)	(0.053)
North West	-0.4409**	-.1095**	-0.377*	-.093*
	(0.1784)	(0.0442)	(0.217)	(0.054)
South East	-0.4195**	-.1043**	-0.367	-.091
	(0.2210)	(0.0548)	(0.223)	(0.056)
South South	#	#		
MOTHER'S RESIDENCE				
Urban	0.7359***	.1751***	0.661***	.158***
	(0.1586)	(0.0356)	(0.158)	(0.036)
MOTHER'S RELIGION (REF :CHRISTIANITY)				
Islam	0.2303	.0563	0.136	.033
	(0.2033)	(0.0490)	(0.201)	(0.049)
Traditionalist	-0.3101*	-.0762*	-0.304*	-.075*
	(0.1736)	(0.0423)	(0.172)	(0.042)
_cons	1.9670**		0.832	
	(0.7358)		(0.723)	

INTERACTION VARIABLES

EDUCATION AND REGION

Muslim North West	-0.1777	-0.8738	-11.37***	-.587***
	(0.3552)	(0.5185)	(1.176)	(0.011)
Christian North West	0	(#)	-0.218	-.054
			(0.360)	(0.090)
Muslim North East	-0.6132	-1.3965		
	(0.3996)	(0.1700)	#	
Christian North East	0.00000		#	
Muslim South West	-0.6634*	-0.0886*		
	(0.3837)	(1.4154)	#	#
Christian South West	0.0000		#	#
Muslim North Central			0.618	.146*

			(0.383)	(0.084)
Christian North Central			#	
WEALTH AND REGION				
Poorest North East	-0.5399	#	-0.419*	-.104
	(0.3439)		(0.245)	(0.061)
Richest North East	-0.7770	-.1906	-0.157	-.039
	(0.5127)	(0.1192)	(0.403)	(0.101)
Poorest North West	-1.2217***	-.2898***	-1.134***	-.271***
	(0.3757)	(0.0776)	(0.281)	0.060
Richest North West	-0.4804	-.1194	0.157	.038
	(0.6224)	(0.1528)	(0.528)	(0.128)
Poorest South West	-0.2494	-.0621	-0.072	-.017
	(0.4813)	(0.1203)	(0.416)	(0.104)
Richest South West	0.0660	.0162	0.813*	.186**
	(0.5690)	(0.1398)	(0.462)	(0.093)
Poorest North Central	#	#	#	#
Richest North Central	#	#	#	#
WEALTH AND RELIGION				
Poorest Christian	0.8984	.1049	0.456	.108
	(0.3363)	(0.1159)	(0.312)	(0.070)
Richest Christian	0.4380	.0416	0.551	.129
	(0.5075)	(0.1265)	(0.464)	(0.102)
Poorest Muslim	0.1702	-.0208	-0.253	-.063
	(0.5232)	(0.1289)	(0.502)	(0.125)
Richest Muslim	-0.0836	#	0.004	.001
	(0.5176)		(0.475)	(0.117)
WEALTH AND RESIDENCE				
Poorest rural	0.6001**	.1477**	-0.606***	-.150***
	(0.3270)	(0.0781)	(0.180)	(0.044)
Richest rural	-0.0044	-.0011	0.816**	.186**
	(0.2824)	(0.0706)	(0.401)	(0.081)
Poorest urban	#	#	0.382	.091

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		(0.549)	(0.126)	
Richest urban	#	#	0.691**	.161**
			(0.340)	(0.073)

RELIGION AND REGION

Muslim North West	0.9978	(0.0838)	1.039	.225
	(0.8973)		(0.899)	(0.157)
Christian North West	1.4941*	.2961*	1.513**	.298***
	(0.6254)	(0.1641)	(0.635)	(0.084)
Muslim North East	0.6247***	.1453***	0.604	.140
	(0.7733)	(0.0766)	(0.775)	(0.166)
Christian North East	1.1521*	.2462*	1.125**	.241***
	(0.4569)	(0.1233)	(0.459)	(0.078)
Muslim South West	-0.4818	-.1199	-0.462	-.114
	(0.5009)	(0.1042)	(0.501)	(0.124)
Christian South West	-0.6574	-.1625	-0.674	-.166
	(0.4348)		(0.433)	(0.103)
Muslim North Central	#	#		
Christian North Central	#	#	-0.419*	-.104
			(0.245)	(0.061)

RELIGION AND EDUCATION

Christian no education	0.4342	(.01953)	0.360	.086
	(0.3100)		(0.327)	(0.076)
Christian higher education	-10.905***	-.5963***	-11.554***	-.598***
	(0.9781)	(.10015)	(0.979)	(0.012)
Muslims no education	0.4848***	.1144***	0.625	.144
	(0.4521)	(.01956)	(0.455)	(0.096)
Muslims higher education	-10.729***	-.5857	-11.37***	-.587***
	(1.1834)	(0.0000)	(1.176)	(0.011)
No of observations	2069		2069	
Prob >chi2	0.0000		0.0000	
Pseudo R2	0.2581		0.2581	

Table 5.12e: The Logit Model for Child Immunisation Utilisation 1990

	NDHS 1990			
	Wealth in quintiles/index		Wealth index values/scores	
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
WEALTH VARIABLES OF MOTHER(REF:RICHEST)				
Wealth			0.237***	.058***
			(0.043)	(0.011)
Poorest	-1.1975***	-.2841***		
	(0.1473)	(0.0316)		
Poorer	-1.1904***	-.2807***		
	(0.1501)	(0.0316)		
Middle	-1.1698***	-.2758***		
	(0.1433)	(0.0302)		

Richer	-0.5433***	-.1342**		
	(0.1223)	(0.0295)		

MOTHER'S EMPLOYMENT (REF:EMPLOYED)

not employed	-0.1909**	-.0476	-0.52***	-.129***
	(0.0788)	(0.0196)	(0.125)	(0.030)

MOTHER'S EDUCATION (REF: HIGHER)

no education	-0.1739	-.0434	-1.622**	-.376***
	(0.3818)	(0.0952)	(0.641)	(0.132)
Primary	0.1670	.0416	-1.121*	-.272**
	(0.3755)	(0.0935)	(0.634)	(0.144)
Secondary	0.7809	.1884	-0.583	-.144
	(0.3812)	(0.0858)	(0.632)	(0.155)

FATHER'S EDUCATION (REF: HIGHER)

no education	-0.9152***	-.2248	-0.145	-.036***
	(0.2385)	(0.0566)	(0.246)	(0.061)
Primary	-0.4732**	-.1174	0.141	.034
	(0.2355)	(0.0576)	(0.244)	(0.060)
Secondary	-0.3735	-.0928	0.366	.089
	(0.2383)	(0.0584)	(0.244)	(0.058)

MOTHER'S AGE

age	0.0189**	.0047**	0.007	.001
	(0.0072)	(0.0018)	(0.012)	(0.003)

CHILLD AGE

Child age	0.2787***	.0696***	0.559***	.138***
	(0.0245)	(0.0061)	(0.069)	(0.017)

CHILD SEX(REF. MALE)

Female	0.0330	.0082	0.145	.035
	(0.0682)	(0.0171)	(0.107)	(0.026)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	-0.0154	-.0038	0.052	.013
	(0.0199)	(0.0050)	(0.033)	(0.008)

MARITAL STATUS (REF: MARIED)				
Single	0.1548	.0386	0.081	.0199
	(0.1942)	(0.0483)	(0.393)	(0.096)
REGION (REF SOUTH WEST)				
North Central				
North East	-0.4648***	-.1154***	0.126	.031
	(0.1256)	(0.0308)	(0.179)	(0.044)
North West	-0.5642***	-.1394***	-0.335**	-.083**
	(0.1304)	(0.0314)	(0.173)	(0.043)
South East	0.0601	.0152	-0.480***	-.119***
	(0.1165)	(0.0291)	(0.169)	(0.042)
South South	#	#		
RESIDENCE				
Urban	0.3865***	.0961	0.661***	.158***
	(0.1032)	(0.0255)	(0.158)	(0.036)
RELIGION (REF :CHRISTIANITY)				
Islam	-0.0823	-.0205	0.136	.033
	(0.1082)	(0.0270)	(0.201)	(0.049)
Traditionalist	-0.1126	-.0281	-0.304*	-.074*
	(0.2244)	(0.0560)	(0.172)	(0.042)
_cons	0.6010		0.832	
	(0.4133)		(0.723)	

INTERRACTION VARIABLES

EDUCATION AND REGION

Muslim North West	-0.6992***	-.0024		
	(0.2283)	(0.0050)	#	
Christian North West	(#)	-.172***	-0.74***	-.182***
		(0.0544)	(0.229)	(0.054)
Muslim North East	-0.1933	-.0483		
	(0.2619)	(0.0653)	#	
Christian North East	-15.734***	-.5126***	-15.5***	-.512
	(1.0963)	(0.0463)	(1.232)	(#)

	(1)	(2)	(3)	(4)
Muslim South West	0.6039***	.1468***		
	(0.2066)	(0.0478)		
Christian South West	-13.684***	-.5467***		
	(0.4696)	(0.0456)		
Muslim North Central	#	#	0.602***	0.146***
			(0.205)	(0.047)
Christian North Central	#	#	-13.3***	-0.546
			(0.522)	(#)
WEALTH AND REGION				
Poorest North East	0.0671	.0168	0.325**	0.080**
	(0.2039)	(0.05090)	(0.151)	(0.037)
Richest North East	-0.2614	-.0650	0.320	.079
	(0.4312)	(0.1063)	(0.278)	(0.068)
Poorest North West	-0.0695	-.0174	0.225	.056
	(0.2344)	(0.0586)	(0.194)	(0.048)
Richest North West	-0.8312**	-.1980**	-0.125	-.031
	(0.4091)	(0.0884)	(0.239)	(0.059)
Poorest South West	-0.3637	-.0900	-0.028	-.006
	(0.2954)	(0.0718)	(0.265)	(0.066)
Richest South West	-0.9689**	-.2307**	-0.310*	-.077*
	(0.3875)	(0.0835)	(0.184)	(0.045)
Poorest North Central				
Richest North Central				
WEALTH AND RELIGION				
Poorest Christian	0.4994	.1227	0.457***	.113***
	(0.3427)	(0.0813)	(0.147)	(0.035)
Richest Christian	-13.828	-.8059	-0.54***	-.132***
	(0.9890)	(#)	(0.199)	(0.047)
Poorest Muslim	0.2565	.0638	0.178	.044
	(0.3422)	(0.0844)	(0.139)	(0.035)
Richest Muslim	-13.219	-.7811	0.107	.026
	(0.8998)		(0.193)	(0.048)
WEALTH AND RESIDENCE				

Poorest rural	0.6001*	.1477**	0.298**	.074
	(0.3270)	(0.0781)	(0.109)	(0.027)
Richest rural	-0.0044	-.0011	-0.084	-.021
	(0.2824)	(0.0706)	(0.296)	(0.074)
Poorest urban	#	#	-0.221	-.055
			(0.338)	(0.084)
Richest urban	#	#	-0.099	-.024
			(0.178)	(0.044)

RELIGION AND REGION

Muslim North West	11.4039***	.9214***	11.19***	.917***
	(0.8149)	(0.0130)	(0.819)	(0.014)
Christian North West	12.5565***	.5419***	12.21***	.539***
	(0.8337)	(0.0099)	(0.837)	(0.009)
Muslim North East	-1.4010**	-.3257***	-1.344**	-.314**
	(0.5826)	(0.1172)	(0.577)	(0.118)
Christian North East	0.5759	.1406	0.619	.1504
	(0.5189)	(0.1209)	(0.514)	(0.118)
Muslim South West	-0.1255	-.0313	-0.019	-.004
	(0.4685)	(0.1168)	(0.468)	(0.117)
Christian South West	0.1517	.0378	0.178	.044
	(0.3623)	(0.0903)	(0.361)	(0.090)
Muslim North Central	#	#		
Christian North Central	#	#		

RELIGION AND EDUCATION

Christian no education	1.3701***	.3122	1.321***	.302***
	(0.3901)	(0.0739)	(0.390)	(0.075)
Christian higher education	0.1039	.0259	0.043	.0106
	(0.8652)	(0.2157)	(0.904)	(0.226)
Muslims no education	0.4195	.1044	0.361	.090
	(0.3947)	(0.0976)	(0.394)	(0.098)
Muslims higher education	#			
			#	
No of observations	4714		4714	

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Prob >chi2	0.0000	0.0000
Pseudo R2	0.2118	0.2118

Most of the variables in child health care regression model were related to the characteristics of the child's mother and father or maternal characteristics. The socioeconomic status of a child was measured by those of the child's parents. The results show that just like other maternal health care variables in this study, child health care utilisation was also determined by wealth, education, ethnicity and other variables identified in maternal health care. Each of the tables shows that wealth had the expected positive sign and was significant in 2008, 2003, 1999 and 1990. This connotes that the probability of being immunised is increased with wealth. Also, wealth index was significant at 1% for all the wealth index categories. The wealth index categories had negative coefficients and marginal effect. This implies that

children with poorest mothers had lower probability of being immunised compared to those with wealthy mothers. This was more evident in 1999 when about 37% of children from poorest mothers had lower probability of being immunised compared to those from well off mothers. Therefore, wealth and wealth index were important factors in considering the utilisation of immunisation in Nigeria.

"Distance to health facility" the price of accessing immunisation was statistically significant at 1%, 5% and 10% for 2013, 2008 and 2003, respectively. The negative sign implies that mothers who viewed "distance to health facility" as a big problem were less likely to immunise their children. "Transport to health facility" was not statistically significant in the model for immunisation utilisation. Also "no immunisation drug" was not statistically significant, but "no provider" was significant at 5%.

Mothers' and fathers' education were important determinants of child immunisation children whose parents had no education recorded lower probability of being immunised compared to those whose parents were educated; this was more evident in 1990 and 1999 when 41% of children whose mothers were not no educated had lower probability of being immunised and about 22% of children whose fathers were no education also recorded lower probability of being immunised. Child age in the results was significant and positive; as such the probability of a child being immunised increased with the age of a child. Child sex was not a significant factor, this means that male and female children were not discriminated against in immunisation. Birth order was significant at 10% in 2003 and 1999; this shows that birth order was not a strong factor that affects child immunisation.

Ethnicity was significant for all the years, it was an important factor in child immunisation in Nigeria. Children whose mothers are from the Igbo and Yoruba ethnic groups had higher probability of being immunised than those from Hausa and other ethnic groups. In line with ethnicity, region in the utilisation model was also significant most of the years. Children from the southern part of the country were more likely to be immunised compared to their northern counterparts. Residence had negative signs in 2013 and 2008 while the 1999 and 1990 survey results have positive signs. Meanwhile, only the 2013, 1999 and 1990 survey results were significant. The 1999 and 1990 surveys indicates that children from the urban regions were more likely to be immunized while the 2013 results reveal that the probability of a child being

immunised was higher for the children from the rural areas. This may be so due to massive immunisation campaigns as well as mobile immunisation which increased utilisation in the rural areas. Also, religion was significant for the 2013, 2008 and 2003 results. The results shows that children whose parents are muslim had lower probability of being immunised compared to children from christian parents. Mother's age was significant for 2008 and 1990s survey only. The coefficient for mother's age had a positive sign. This shows that immunisation is increased in the age of the mother. Young women had less probability of getting their children being immunised compared to old women.

Variable interaction for immunisation follows the same pattern as other health care variables discussed in the earlier sections. In adding the interactive terms in the regression model, the 2003 results were not significance between the interactive terms and immunisation. The 2008 survey results shows a positive relationship between immunisation and the interaction between religion and education, while the 1999 and 1990 surveys' results shows a negative relationship between immunisation and interaction as well as between children of christian and muslim women with higher education.

In interacting religion and region, the 2013 results shows a negative relationship between immunisation and the interaction between religion and region although the interaction for the chiristianity and North East as well as North Central were not significant. The 2008 survey results for christianity and the North West shows a significant and positive relationship with immunization, while the interaction between islam and the North East shows a negative and significant relationship at 10%. The interaction between the christianity and the South East, the South West and North central shows a positive relationship with immunisation. The results for the 2003 survey also shows a negative but significant relationship between islam and the North West, North East, North Central and South West. Most of the results for the interaction between the christianity and the region show a positive relationship though not significant for most of the survey. The 1999 results show positive relationship between religion in the North East and North West. while the relationship between christians and muslims in the North West shows a positive and significant relationship for the 1990 survey. In the same vein; the Islam from the North East shows a positive and significant relationship.

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The interaction between wealth and religion in the immunisation regression model is intended to observe if immunisation utilisation is influenced by wealth and religion. The results show that the 2013 survey result was significant but negative only for the poorest muslim category which had a negative relationship. This implies that poverty and being a muslim was associated with the low probability of being immunised. The 2008 results show positive signs for all the religions and wealth categories although the 2003, 1999 and 1990 results were not significant.

The interaction between education and region for the 2013 results shows that the interaction between all regions with "no education" shows significant and positive relationship while all regions and "higher education" show a negative relationship with immunisation utilisation. The contrasting signs may suggest that more children with uneducation in all the regions received immunisation compared to children whose mothers with higher education. The reason for this outcome may be the differences in the ratio between children whose mothers are not educated and children of mothers with higher education. The results obtained in 2013 survey were similar to most of the surveys. Wealth and region were interacted to establish if regional immunisation utilisation was influenced by wealth. The results show that there was no significant relationship between the poorest in the North East and immunisation utilisation. Negative relationship existed between the richest in the North East and immunisation utilisation. This is significant for only the 2008 and 2013 survey results. For the North East, there exists a significant relationship between wealth and the North West region. The relationship was positive for the poorest North West and negative for the richest North West with the exception in 1999 survey results. The results for the South West and North Central were significant for some of the surveys with the richest having negative signs. The results for the interaction between wealth and residence shows that the richest rural was not significant. The poorest rural was significant for 2013, 2008, 1999 and 1990 surveys' results.

Regional analysis of the determinants of immunisation in Nigeria.

The regional analysis for the immunisation regression model is presented based on each NDHS in Appendix III for the North Central, North East, North West , South East, South South and South West regions in tables A38 to A48.

North Central

The results for the region show that wealth index was significant for all the years with the lower wealth index recording a lower probability of utilising immunisation compared to the highest wealth index. Child age was significant for the region, but child sex was not. Mother's age was significant in 2013 only while residence was significant for all the results. Mother's religion is also significant as children from christian mothers are more likely to be immunized compared to other religions. Mother's education is significant for 2013 and 2008. Also, father's education was significant in 2013 and 2008. Marital status was significant for 2003 and 1999 results with a positive sign. Insurance status of mother is positive and significant for only 2013. Birth order was significant for all the years, with a positive sign. "Distance to health facility" and "no provider" were significant in 2008 at 5%.

North East

The results for the region show that wealth was significant except in 2003 and 1999. Age was significant for all the years but child sex was not. Mother's age was significant for in 2013 and 2008 survey. Residence was significant with a negative sign indicating that for the region, children in the urban region were less likely to be immunised. This result is in contrast with that obtained in other regional regressions. Mother's religion was found to be significant for all the results. Education was significant for all the years except in 2013, while father's education was significant with negative signs for all the years except in1999. Marital status is significant with positive signs in 2013, 2008 and 2003. Employment status had a negative sign and was significant for all the years except in 1990. Birth order is only significant in 1990, while 'distance to health facility" was significant only in 2008. "Transport to health facility" was significant in 2003 only. "No provider" and "no immunisation" drugs was also significant for the North East in 2008.

North West

Wealth index in the region was not significant in 2013 and 2008. The 2003, 1999 and 1990 results were significant with the lower wealth index recording lower probability of being immunised. Child age was significant for all the years and child sex was significant with positive signs in the 2008 and 1990 surveys. This implies that female children in the region were more likely to be immunised compared to male children. Mother's age was not significant for the region except in 1990. Residence was significant in 2013 and 2003 with negative sign for the urban region. Mother's and

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father's education were significant, employment and insurance status were significant in the region. Birth order, "distance to health facility", "transport to health facility", "no provider" and "no immunisation drugs" were significant for some of the years.

South East

The results for the region show that, wealth, child age, religion and education were significant, but child sex, mother's age, and residence were not significant. Education of father was significant only in 2013 with negative sign while marital status was only significant at 10% level in 2013. Birth order was also significant at 10% only in the 2008 survey results. "Distance to health facility" and "transport to health facility" were significant in 2013 and 2008 only.

South South

The regression results for the region shows a similar pattern with other results as wealth index, child age mother's age and mother's religion; given they were all significant. In this regression, child sex was significant only in 2008 with negative signs showing that the male child was more likely to be immunised than the female child. Marital status is also significant with positive sign in 2013. Also, employment status, "distance and transport to health facility" were significant in 2013 and 2008.

South West

The regression results for the region were similar to other regional regression results. Wealth, child age and education were statistically significant; child sex is also significant with positive signs in 2013 which shows that the female children are more likely to be immunized than the male children for this period. Mother's age was significant in 2008, 1999 and 1990. Residence was significant in 2013, 1999 and 1990 with positive signs indicating that urban children were more immunised than the rural children. This is in contrast with the results obtained in the North West and the South East regions. Muslim religion was significant with a positive sign for some of the years; this implies that in the region, the Muslim children had higher probability of being immunised than other religions. Marital status and employment were significant in 2013 with negative sign for employment and positive sign for marital status. Father's education was not significant for the region. This implies that education of father's do not have any influence on children's immunisation. Birth order was significant in 2008, 1999 and 1990 with negative signs which shows that child immunisation decreased in

the number of children that a woman had. "Transport to health facility", was not significant but "distance to health facility", "no provider" and "no immunisation drugs" were significant.

Regional results compared

The regional regression results were similar to that of the national regression with few exceptions. In the North West, sex was significant. Female children were more likely to be immunised compared to male children. The results for the South East region show that child sex, mother's age and residence were not significant. Education of father was significant in 2013 only with negative sign. The results for the South South region show that child sex was significant in 2008 with negative signs suggesting that the male children were more likely to be immunised than the female children. The South West regression results shows that "transport to health facility" is not significant but "distance to health facility", "no provider" and "no immunisation drugs" were significant.

(B) Determinants of bed nets utilisation in Nigeria

As discussed in the methodology, bed nets in this study were categorised into two; the treated and untreated bed nets with "no bed nets" as the base outcome. The categorisation of the type of bed nets is in line with Oresanya et al (2008). Also as discussed in chapter four, multinomial logit regression was used for the multivariate analysis of the determinants of bed nets utilisation. The multinomial logit regression results are presented in Tables 5.13a to 5.13c for 2003 to 2013.

Table 5.13a Multinomial Logit Regression Results for Bed Nets Utilisation 2013

	NDHS 2013					
	Wealth in quintiles/index			**Wealth index values/scores**		
No bed net (base outcome)	Only treated nets	Only untreated nets		Only treated nets	Only untreated nets	
Variable	Coef. / Std. Err.	Coef. / Std. Err.	Marginal effect	Coef. / Std. Err.	Coef. / Std. Err.	Marginal effect
WEALTH VARIABLES OF MOTHER (REF:RICHEST)						

Wealth				-.047*** (.0101)	-.037 (.028)	.007*** (0.0015)
Poorest	.3031*** (.0873)	-.2630 (.2447)	-.0422*** (0.0139)			
Poorer	.580*** (.0789)	.5641*** (.1984)	-.0952*** (0.0136)			
Middle	.5709*** (.0682)	.6067*** (.1685)	-.0951*** (0.0119)			
Richer	.1923*** (.0616)	.2309 (.1589)	-.0302*** (0.0096)			
MOTHER'S EMPLOYMENT (REF:EMPLOYED)						
not employed	-.059 (.0392)	.1601 (.1106)	.0064 (0.0055)	-.064 (.039)	.157 (.110)	.007 (0.0056)
PRICE VARIABLES						
INSURANCE STATUS OF MOTHER (REF: INSURED)						
no insurance	-0.0896 (0.1263)	-.086 (.3106)	.0137 (0.0192)	-.040 (.125)	-.024 (.307)	.006 (0.0187)
MOTHER'S EDUCATION (REF: HIGHER)						
no education	-0.337*** (0.0969)	-.1393 (.2405)	.0480*** (0.0137)	-.180 (.094)	.016 (.240)	.024* (0.0136)
Primary	-0.183** (0.0881)	-.0690 (.2121)	.0254** (0.01182)	-.016 (.085)	.126 (.207)	.0008 (0.0122)
Secondary	-.2159** (0.0779)	-.3325* (.1959)	.0322*** (0.011)	-.139* (.076)	-.228 (.192)	.021** (0.0106)
FATHER'S EDUCATION (REF: HIGHER)						
no education	-0.431*** (0.0724)	-.5270*** .1828	.0631*** (0.0097)	-.410*** (.070)	-.594*** (.182)	.061*** (0.0095)
Primary	-0.241*** (0 .0674)	-.6373*** .1726	.0376*** (0.0088)	-.183** (.066)	-.608*** (.169)	.030*** (0.0089)
Secondary	-0.204*** (0.0583)	-.4405*** (0.1459)	.0318*** (0.0079)	-.176*** .058	-.423*** (.145)	.0283*** (0.008)
MOTHER'S AGE						

age	-.0033 (.0040)	-.0048 (.0104)	.0005 (0.0005)	-.005 (.004)	-.007 (.010)	.0008 (0.0006)

CHILD AGE

Child age	-.0893*** (.0122)	-.0548 (.0339)	.0129*** (0.0018)	-.092*** (.012)	-.057* .033	.013*** (0.0018)

CHILD SEX(REF. MALE)

Female	.0418 (.0335)	.0444 (.0927)	-.0062 (0.0048)	.045 (.033)	.049 .092	-.007 (0.0049)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	(-.0055) (.0110)	.0439 (.0300)	.0003 0.0016	-.0016 (.011)	.047 (.030)	-.0003 (0.0016)

MARITAL STATUS OF MOTHER (REF: MARIED)

Single	-.1425 (.1100)	-.684 (.3867)	.0243* (0.01447)	-.080 (.109)	-.606 (.387)	.015 (0.0151)

REGION (REF SOUTH WEST)

North Central	-.1390* (.0834)	1.2301*** (.2202)	-.0019 (0.0122)	-.076 (.083)	1.276*** (.219)	-.012 (0.012)
North East	-.5690*** (.0970)	-.0856 (.3144)	.0718*** (0.0113)	-.509*** (.095)	-.129 (.313)	.065*** (0.012)
North West	-.4035*** (.0979)	.9246*** (.2777)	.0415*** (0.0133)	-.326*** (.096)	.943*** (.276)	.031** (0.013)
South East	-.255** (.1130)	.3840 (.3495)	.0282** (0.0148)	-.137 (.110)	.495 (.346)	.012 (0.016)
South South	-.1595* (.0904)	.7126** (.2629)	.0112 (0.0126)	-.156 (.091)	.721*** (.264)	.0104 (0.013)

ETHNICITY OF MOTHER (REF. HAUSA

Igbo	-.0728 (.1156)	1.1479*** (.3255)	-.0093 (0.0175)	-.116 (.114)	1.149*** (.319)	-.004 (0.017)
ijaw/izon	-.191 (.1181)	.9107*** (.3247)	.0098 (0.0167)	-.157 (.118)	1.013*** (.322)	.003 (0.017)
kanuri/beriberi	-.1340	-13.02*** (.1874)	.0309	-.129	-12.971***	.030

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	(.162)		(0.0213)	(.162)	(.188)	(0.021)
Tiv	-.397***	-1.190*	.0567***	-.334**	-1.084*	.049***
	(.1446)	(.6340)		(.143)	(.630)	(.016)
			(0.0159)			
Yoruba	-.4890	1.306***	.0343**	-.499***	1.345***	.033**
		(.2580)		(.102)	(.256)	(0.013)
	(.1032)		(0.0136)			
Others	-.388 ***	.2265	.0487***	-.344***	.347*	.042***
	(.0694)	(.1983)	(0.0091)	(.069)	(.195)	(0.009)
RESIDENCE						
Urban	.1181**	-.0016	-.0166**	.014	-.069	-.001
	(.0455)	(.1148)				
			(0.0067)	(.042)	(.112)	(0.0062)
RELIGION (REF :CHRISTIANITY)						
Islam	-.3337***	-.1842	.0493***	-.352***	-.187	.052***
	(.0619)			(.061)	(.142)	(0.0092)
		(.1441)	(0.0092)			
Traditionalist	-.1273	-.3848	.0204	-.141	-.468	.023
		(.5211)				
	(.1746)		(0.0231)	(.173)	(.521)	(0.0228)
_cons	-.3961**	-4.341***		-.169	-4.198***	
	(.2003)	(.5359)				
				(.193)	(.517)	
No of observations	25181			25181		
Prob >chi2	0.0000			0.0000		
Pseudo R2	0.0294			0.0294		

Table 5.13b Multinomial Logit Regression Results for Bed Nets Utilisation 2008

	NDHS 2008					
	Wealth in quintiles/index			**Wealth index values/scores**		
No bed net (base outcome)	Only treated nets	Only untreated nets		Only treated nets	Only untreated nets	
Variable	Coef. / Std. Err.	Coef. / Std. Err.	Marginal effect	Coef. / Std. Err.	Coef. / Std. Err.	Marginal effect
WEALTH VARIABLES OF MOTHER (REF:RICHEST)						
Wealth				-.025**	.002	.0009
				(.013)	(.014)	(0.001)
Poorest	-.3433**	.5366***	-.0228*			
	(.1597)	(.1612)	(0.0134)			
Poorer	.2366*	.6478***	-.0537***			
	(.1351)	(.1549)	(0.0137)			
Middle	.3205**	.5877***	-.0538***			
	(.1189)	(.1442)	(0.0129)			
Richer	.2427**	.3150**	-.0304***			
	(.1025)	(.1368)	(0.0108)			
MOTHER'S EMPLOYMENT (REF:EMPLOYED)						
not employed	-.0022	-.3081*** .0611***	.0174***	-.012	-.315***	.0183***
	(.0683)		(0.0045)	(.068)	(.061)	(0.00449)
PRICE VARIABLES						
INSURANCE STATUS OF MOTHER (REF: INSURED)						
no insurance	-.3180	.8023	-.0180	-.271	.897**	-.023
	(.1954)	(.4346)	(0.0169)	(.195)	(.433)	(0.016)
MOTHER'S EDUCATION (REF: HIGHER)						
no education	-.7435***	-.2290	.0438***	-.703***	.019	.028**
	(.1647)	(.1918)	(0.0137)	(.163)	(.184)	(0.01341)
Primary	-.426***	-.2882	.0315***	-.334**	-.057	.016
	(.1444)	(.1833)	(0.0111)	(.141)	(.176)	(0.01182)

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	(1)	(2)	(3)	(4)	(5)	(6)
Secondary	-.1571 (.1270)	-.4325** (.1743)	.0290*** (0.0100)	-.082 (.123)	-.291* (.170)	.019* (0.0104)
FATHER'S EDUCATION (REF: HIGHER)						
no education	-1.006** (.1256)	-.6791*** (.1135)	.0766*** (0.0080)	-1.144*** (.124)	-.583*** (.111)	.0777*** (0.00798)
Primary	-.712*** (.1092)	-.5083*** (.1146)	.0511*** (0.0065)	-.744*** (.108)	-.414*** (.112)	.048*** (0.00667)
Secondary	-.7497*** (.0957)	-.4694*** (.1085)	.0516*** (0.0064)	-.7639208 (.095)	-.412*** (.107)	.049*** (0.0065)
MOTHER'S AGE						
age	.0035 (.0071)	-.0094 (.0066)	.0004 (0.0005)	.002 (.007)	-.011* (.006)	.0005 (0.0005)
CHILLD AGE						
Child age	-.1116*** (.0225)	-.0842*** (.0195)	.0094*** (0.0015)	-.109*** (.022)	-.083*** (.019)	.009*** (0.0015)
CHILD SEX(REF. MALE)						
Female	.0906 (.0612)	.0565 (.0536)	-.0069* (0.0041)	.085 (.061)	.053 (.053)	-.006 (0.00415)
OTHER VARIABLES						
NUMBER OF CHILDREN OR BIRTH ORDER						
birth order	-.0003 (.0194)	.0002 (.0174)	-1.5306 (0.0013)	.004 (.019)	(.005) .0175017	-.0004 (0.0013)
MARITAL STATUS OF MOTHER (REF: MARIED)						
Single	-.7488** (.2779)	.0184 (.1776)	.0208 (0.0126)	-.721*** (.276)	.044 (.178)	.019 (0.0130)
REGION (REF SOUTH WEST)						
North Central	.0290 (.1746)	.3012* (.1765)	-.0204 (0.0143)	.046 (.172)	.351** .174	-.024* (0.015)
North East	.2601 (.1916)	.6207*** (.1852)	-.0526*** (0.0168)	.174 (.188)	.688*** (.182)	-.054*** (0.017)
North West	.1013 (.2092)	.8149*** (.1893)	-.0604*** (0.01782)	.075 (.208)	.878*** (.187)	-.065*** (0.018)

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	(1)	(2)	(3)	(4)	(5)	(6)
South East	.5979*** (.1933)	.0396 (.2691)	-.0325 (0.0201)	.669*** (.189)	.098 (.263)	-.041** (0.020)
South South	.5621*** (.1820)	.6656*** (.2120)	-.0744*** (0.0213)	.596 (.179)	.644*** (.210)	-.075*** (0.021)
ETHNICITY OF MOTHER (REF. HAUSA						
Igbo	-.1599 (.2064)	.4135* (.2370)	-.0223 (0.0203)	-.202 (.207)	.349 (.234)	-.015 (0.019)
ijaw/izon	-.2946 (.2140)	.6468*** (.1962)	-.0401** (0.0208)	-.291 (.212)	.714*** (.196)	-.047** (0.021)
kanuri/beriberi	-.0059 (.2309)	.9560*** (.1214)	-.0825*** (0.0169)	-.038 (.232)	.944*** (.121)	-.080*** (0.016)
Tiv	-1.699*** (.4093)	.5120** (.1851)	-.0041 (0.0178)	-1.85*** (.410)	.521*** (.184)	-.003 (0.018)
Yoruba	-.3810* (.2079)	.1198 (.1992)	.0059 (0.0147)	-.404** .207	.067 (.197)	.010 (0.014)
Others	-.4192 (.1395)	-.1740* (.1007)	.0257*** (0.0076)	-.417*** (.140)	-.166* (.100)	.025*** (0.007)
RESIDENCE						
Urban	-.1624** (.0821)	-.3905*** (.0828)	.0276*** (0.0054)	-.141** (.075)	-.529*** (.078)	.034*** (0.0049)
RELIGION (REF :CHRISTIANITY)						
Islam	-.2071** (.1074)	.0990 (.1026)	.0026 (0.0076)	-.169 (.106)	.061 (.102)	.003 (0.008)
Traditionalist	-.3487 (.2813)	.2817 (.1886)	-.0070 (0.0165)	-.422 (.281)	.275 (.190)	-.004 (0.016)
_cons	-1.243*** (.3666)	-3.134*** (.5149)		-1.16*** (.361)	-2.970*** (.515)	
No of observations	21062			21062		
Prob >chi2	0.0000			0.0000		
Pseudo R2	0.0501			0.0501		

Table 5.13c: Multinomial Logit Regression Results for Bed Nets Utilisation 2003

	NDHS 2003		
	Wealth in quintiles/index		
No bed net (base outcome)	Only treated nets	Only untreated nets	
Variable	Coef. / Std. Err.	Coef. / Std. Err.	Marginal effect
WEALTH VARIABLES OF MOTHER (REF:RICHEST)			
Poorest	1.0990 (.5917)	-1.6212*** (.3852)	-.0184*** (.0064)
Poorer	-.2262 (.6532)	1.4750*** (.3695)	-.0154** (.00585)
Middle	.7642 (.5336)	.7523** (.3778)	-.0066*. (0038)
Richer	.1562 (.5245)	.2478 (.3685)	-.0017 (.0027)
MOTHER'S EMPLOYMENT (REF:EMPLOYED)			
not employed		-.1467 (.1607)	.0009 (.0009)

PRICE VARIABLES

INSURANCE STATUS OF MOTHER (REF: INSURED)

no insurance

MOTHER'S EDUCATION (REF: HIGHER)

no education	-1.0786** (.5287)	-.4331 (.4863)	.0030 (.0032)
Primary	-1.1304** (.5213)	-.8028* (.4831)	.0046** (.00215)
Secondary	.0898 (.0987)	-1.0167** (.4528)	.0054*** (.0018)

FATHER'S EDUCATION (REF: HIGHER)

no education	#	-.9987*** (.2613)	.0065*** (.00156)
Primary	#	-.6221** (.2649)	.0039*** (.0013)
Secondary	#	-.6162** (.2657)	.0039*** (0013)

MOTHER'S AGE

age	-.5254 (.3837)	-.0129 (.01792)	.0001 (.00012)

CHILD AGE

Child age	-.1116 (.1109)	-.0535 (.0531)	.0004 (.0003)

CHILD SEX(REF. MALE)

Female	.2910 (.2909)	-.2890** (.1433)	.0017* (.0013)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	#	.0099 (.0433)	-.0001 (.0003)

MARITAL STATUS OF MOTHER (REF: MARIED)

Single	-19.227*** (1.6658)	-.2024 (.4226)	.0020 (.0023)
REGION (REF SOUTH WEST)			
North Central	1.1775** (.523)	16.2037*** (.2538)	-.9993*** (.0001)
North East	-16.1477*** (.4641)	15.7260*** (.2157)	-.9988*** 0003)
North West	-.5239 (.8513)	15.0157*** (.2260)	-.9959*** (.0009)
South East	-.7886 (.7978)	17.0190*** (.3463)	-.9983*** (.0004)
South South	-.6864 (.7630)	17.531*** (.3184)	-.99835*** (.0004)
RESIDENCE			
Urban	-15.9209*** (.2341)	-.1747 (.1831)	.0013 (.0011)
RELIGION (REF :CHRISTIANITY)			
Islam	-.0328 (.3176)	1.3301*** (.3024)	-.0085*** (.00174)
Traditionalist	-1.2729* (.5433)	.4915 (.4582)	-.0032 (.0047)
_cons		-18.5155*** (.6921)	
No of observations	4726		
Prob >chi2			
Pseudo R2	0.1051		

The results show that wealth was negatively related to treated bed nets utilisation in 2013 but positively related to them in 2008. This result did not conform to the a priori expectation, as poorest mothers had more access to treated bed nets for their children compared to other women in 2013. The reason for this may be because, prior to the 2013 survey, there was free distribution of treated bed nets as well as public campaign on treated bed nets utilisation to improve access and utilisation. In terms of wealth index results, children with mothers from the poorest wealth index had lower probability of utilising any type of bed net compared to other categories of wealth index, this was more pronounced in 2013 with marginal effect given as -0.042. The signs of the coefficients for both nets show that the poorest were more likely to use treated bed nets but less likely to use untreated bed nets in 2013. In 2008, the poorest were less likely to use treated nets but more likely to use untreated nets, this means that the use of treated nets in 2008 was directly related to affordability. Treated nets were more expensive compared to untreated nets. These results also indicate that bed nets utilisation was generally low for all children within the categories of all wealth indexes with respect to mothers. But the poorest had access to treated bed nets than the untreated ones in 2013. This may be due to free bed nets distribution policy within this period. Employment status was only significant in 2003. This implies that children whose mothers are unemployed mothers were less likely to utilise bed net during this period. Education in 2013 shows that children whose mothers are not educated and secondary education were less likely to utilise treated bed nets than children of mothers with higher education. Results for other years also indicate the same findings. Father's education is found to be significant for all years. Marital status was also found to be significant in 2008 and 2003 results. Child age was significant with negative sign for

treated and untreated bed nets in 2008 and 2013. This shows that younger children were more likely to use treated and untreated bed nets than older children. Mother's age, birth order and insurance status were not significant in bed nets utilisation model for most of the years.

Region was found to be significant for treated and untreated bed nets for most of the years. Most children in the north were found to utilise less of the treated bed nets than the untreated. In terms of residence, children from the urban areas were more likely to utilise treated bed nets than untreated bed nets; this was not so in 2008. Both bed nets were less utilised in the urban areas in 2008. The 2003 results also show that the urban children had lower probability of using treated bed nets than untreated ones. In terms of religion of mother, Muslims were less likely to use treated bed nets and more likely to use untreated bed nets given 2003 results. Ethnicity was found to be significant for treated and untreated bed nets.

Regional analysis of the determinants of bed nets utilisation in Nigeria.

In this section, the results on the analysis of the determinant of bed nets utilisation for each of the regions are discussed. The results are presented in Appendix iv in tables A49 to A58 for 2003 to 2013 NDHS

North Central

The 2013 results for the North Central region in table A58 shows that children from the poorest households were less likely to utilise untreated bed nets, while the 2008 results show that the poorest were more likely to utilise untreated bed nets than those from the richest wealth index. Child age was negative but significant in 2013. Residence was significant with negative and positive signs in 2003, 2008 and 2013, showing that urban children have lower and higher probability of utilising bed nets. Islam was significant for the treated bed nets given in 2013 and 2003. Also, marital status was significant in 2003 this mean, children belonging to single mothers were less likely to use treated bed nets. Employment in 2013 and 2003 results show that children born to unemployed women were less more likely to use untreated bed nets than the treated ones. Education of mother and father also shows that children whose parents were less educated utilise less of bed nets in general. Birth order, mother's age and insurance status were not significant in the region.

North East

For the region, wealth was found to be significant for some categories of wealth index in 2013 showing that the poorer and the middle wealth index utilised more treated bed nets. The opposite was the case for the 2008 results. Child age was negative but significant in 2013 showing that young children have higher probability of utilising bed nets in the region. Residence was significant with a positive sign for treated and untreated bed nets. Religion in the region was also significant with negative sign for both nets in 2013 and positive in 2008. Mother's and father's education were not significant in 2013 but significant in 2008. Marital status was significant in 2008 for the untreated bed nets with a negative sign, while insurance status and birth order were also not significant for the North Central region.

North West

In the region, wealth was significant with a negative sign only for middle wealth index in 2013 and for the poorest as well as middle wealth index in 2008 results. Wealth was not significant for the 2003 survey results. Child age was significant for 2013 and 2008 results with a negative sign. Religion, mother's age and residence were significant in in 2013 and 2008 while mother's education was significant in 2008 and 2003; father's education was also significant for all the results. Birth order and child sex were not significant for the region.

South East, South South and South West

In the South East, all other variables were significant except child sex and mother's age. Marital status and insurance were significant for some years. The South South regions follow the same pattern with the results from the South East as wealth, child age, mother's age residence, religion, father's education, mother's education, marital status and employment status of mother were all found to be significant. Birth order was significant with negative sign for untreated bed nets in 2003. In the South West region, all variables were significant depending on the year. Child sex was significant but negative for the untreated bed nets in 2013, showing that female children had lower probability of utilising untreated bed nets in the South West region.

5.4 Discussion

5.4.1: Inequity in maternal and child health care utilisation
Antenatal care

The profile of inequity constructed for antenatal care for the four periods shows that inequity exist in antenatal care utilisation because the concentration curves lies below the line of equality/diagonal with positive horizontal inequity index. Wealth and education had the highest contribution to inequity and they are the major drivers of inequity in antenatal care utilisation. This corroborates the findings of Houweling et al (2007), Zere *et al* (2010) and Bonfruer *et al* (2012). The study also shows that standardisation for the differences in need and non-need variables are important and appropriate because it clearly reveals the factors driving inequity in antenatal care utilisation in Nigeria. Wealth related pro-rich inequity in antenatal care utilisation may be attributed to the fact that most health facilities were antenatal care is administered are located in the urban areas where most women in the richer and richest wealth quintile live. Second, very poor women from rural areas may not have access to the information on were free antenatal care is administered in any health facility even if it is available. Third, there are more private providers of health care in Nigeria compared to public providers. In private facilities, out of pocket payment is the only way to access any type of health care services.

The concentration index also shows that "region" contributes to horizontal inequity to a large extent in Nigeria although it is not the major driver of inequity. This finding is in contrast with that by Zere et al (2010) who found out that region was not a significant factor in considering inequity in antenatal care utilisation. The results on the concentration curve and the horizontal inequity index also shows that the highest incidence of inequity in antenatal care was recorded in 2008 and 2013. This shows that wealth-related inequity had increased over time in spite of policy of free antenatal care.

Skilled delivery care

The profile of inequity in skilled delivery estimated for the 2013, 2008, 2003, and 1999 NDHS shows that, the concentration curves for skilled delivery care utilisation lies below the line of equality/diagonal with positive horizontal inequity index for all the surveys which indicates that there is pro-rich inequity in skilled delivery utilisation in Nigeria. The results on the concentration index and the horizontal inequity index show that the need variable had little contribution to inequity in skilled delivery utilisation than the non-need variable with wealth and education as the major drivers. The conclusions on inequity in skilled delivery in this study are related to the socioeconomic inequity observed by Zere et al (2010). The study also reveals that

inequity is higher in skilled delivery care than antenatal care. Women from poor families especially from rural areas may go for antenatal care but are found to deliver at home with the assistance of friends, relatives and traditional midwives/birth attendants because of the problem of easy accessibility to skilled delivery care that is involved. This poses great danger to women as they are exposed to infectious diseases, prolonged labour, haemorrhage and death due to delivery complications. Higher inequity in skilled delivery utilisation may be attributed to distance to health facilities especially in rural areas, cost associated to caesarean section in some public and private facilities as well as cultural beliefs.

Immunisation and bed nets utilisation

The results of the concentration curve and horizontal inequity index for immunisation and bed nets use show that there is pro-rich inequity in immunisation among children while the bed nets utilisation is mostly pro-poor. Notably, inequity varies between different surveys. Immunisation shows equity for the concentration curve in 2013. The results for bed nets shows that utilization is predominantly among the poor although the horizontal inequity index for 2013 shows that the rich utilise more bed nets compared to the poor. The results on the standardisation for differences in need and non-need variables for maternal and child health care show that the standardisation is appropriate as the concentration index is zero or near zero for the need variable but higher for non-need variables. This shows that though the need variable is homogenous across the population there is no need related inequity in antenatal care and skilled delivery utilisation. What contributed majorly to inequity are the non-need variables. Religion was identified in the model as a contributor to inequity stands for the role of responsibility which had minimal contribution to inequity because wealth and education were found to be the major drivers of inequity in maternal and child health care services.

5.4.2 Determinants of maternal and child health care utilisation in Nigeria
Determinants of antenatal care utilisation

Results obtained on the determinants of antenatal care utilisation show that wealth, region, age of respondents, birth order, respondents' education were significant in line with the findings of Nwosu et al (2012); Goland et al (2012); Nketiah-Amponsah et al; 2011, and Babalola and Fatusi (2007). Although these studies used the logit and poison

or descriptive statistics, in estimating antenatal care utilisation, the findings on this for the two- part model show that these variables were significant for logit and negative binomial model depending on the year. The difference lies in the fact that a variable may influence the decision to go for antenatal care but may not influence the frequency of antenatal visits therefore, in considering which variable is important at each stage of decision, the two-part model is appropriate. For instance, the 2013 results show that in some regions; the North Central, South East and South South were not significant in the logit model but significant in the negative binomial model. This implies that the decision to go for antenatal care or not is not a major issue in 2013,

although the decision to attend antenatal care had improved in 2013 more should be done to improve the frequency of visits especially among women to meet up with the WHO minimum standard for number of visits before delivery. Another example is if wealth is assumed as the variable of interest, and wealth in the logit model is significant while in the negative binomial it is not significant, it means the decision to go for antenatal care is determined by wealth. But once the contact is made with the health care provider, the health care provider or other factors then will determine the frequency of visits and not wealth any more. This is typical of the findings by Ortiz (2007) and Nunez and Chi (2013), where the patient first determines and takes the decision to use health care, but subsequently, the health care provider now determines the frequency of visits. In terms of the variable interaction, wealth and residence follows the a priori expectation for the antenatal care. Poorer women from the rural areas had lower probability of utilising antenatal care compared with rural women from the higher wealth index. This results cut across all the surveys. This is however not the case for the interactions between region and education, region and religion, education and wealth, education and religion as well as wealth and religion. Depending on the survey, the signs and the level of significance differ.

Determinants of Skilled delivery utilisation

The national and regional regression results for skilled delivery show that most variables were significant although some were not significant for some years. Wealth status proved a high level of significance as women from the two highest wealth quintiles are more likely to be delivered by skilled birth attendance compared to women from the three poorest wealth quintile. Ethnicity and education were found to

be statistically significant as Igbo and Yoruba women were much more likely to deliver with the assistance of skilled birth attendants than women from other tribes. Also, women with higher level of education were much more likely to deliver with the assistance of skilled birth attendants compared to women with no formal education. This result is consistent with the findings of Babalola and Fatusi (2009), Goland et al (2011), as well as Bonfrer et al (2012). Other variables like marital status, religion, age of a woman were also significant in explaining utilisation of skilled delivery by women in Nigeria. Employment status, "distance to health facility" and "transport to health facility" also had significant relationship in the utilisation of skilled delivery care in Nigeria. Based on the results, problems relating to lack of providers or female provider did not show any level of significance in the 2013 national regression results as well as some other years in each of the regional regressions. Given these results, it is obvious that majority of births were still handled at home by unskilled health professionals with wealth as a major barrier to utilisation.

The regression results for national and the regions had similar determinants of skilled delivery utilisation as most variables were significant in both regressions depending on the year. The negative sign for the marital status indicate lower utilisation of skilled delivery for the unmarried women. This may be an indication of teenage pregnancies likely to be delivered at home especially in rural areas. Unlike the antenatal care, skilled delivery utilisation decreased with age. This may be due to the fact that older women have given birth several times with more experience in child bearing, so, they are less likely to think of going to health facilities for skilled deliveries even though they have more tendencies of developing complications during pregnancy and child birth. Therefore they have lower probability of utilising skilled delivery but higher probability of of utilising antenatal care compared to younger pregnant women. It is however important to note that the relationship between age as well as antenatal and skilled delivery utilisation is quadratic in nature. This is because younger women have lower utilisation level and utilisation increases up to a certain level after which it decreases with age.

The interactive terms for skilled delivery regression model had positive or negative signs depending on the year. This implies that the effects of the interactive terms depend on the year and the term interacted although the level of significance of each interactive term depended on the respondents in each of the years. Interactive

terms for skilled delivery was useful as it demonstrated the relevance of each of the variable interacted.

Determinants of immunisation utilisation

The regression results for regional and national show that children from poor parents and with less education were less likely to be immunised compared to children from wealthy homes and from educated parents. Religion was also a significant variable in children immunisation. Christians were more likely to immunise their children compared to the muslims and traditionalists. The regression results show a significant relationship between immunizations and many of the variables except child sex, residence, insurance status, "no immunization drugs", "transport to health facility" and birth order. Interestingly, in contrast to findings like that of Antai (2011), residence had an opposite sign and is not significant in explaining child immunisation in Nigeria. Most importantly, wealth, education, region, religion, ethnicity and partner's educations as well as child age were significant in explaining child immunisation in Nigeria. The fact that in 2013 wealth was not significant implies that there was an improvement in immunisation which has appeared to reduce the wealth-related barriers. Mass or mobile vaccination of children may have been effective in 2013. The fact that wealth index is significant in 2013 still show that a significant relationship exists between wealth and immunisation.

Immunisation for the national regression in 2013 was in favour of children from the rural areas. This is in line with the results obtained from the concentration curve in the previous section which signifies a relatively equitable utilisation rate for immunisation. Differences in signs in some regions on immunisation show that immunisation utilization varied between regions. The regions with negative signs shows less utilisation compared to the regions with positive signs. Residence in 2013 show that rural children utilised immunisation more than the urban children, this may be due to massive immunisation outreaches and campaigns in the rural areas.

Bed nets utilisation

The regression results for bed nets utilisation show that the poor had higher probability of utilisation, as wealth decreased with bed nets utilisation because the results have positive sign for wealth index and negative for wealth in the national and regional regression models of some years. It may be that the rich were using other preventive

measures other than bed nets to prevent exposure to mosquito. Notably, insecticide treated bed nets were wealth related with less probability of utilisation for the poor respondents. This is evident for other years apart from 2013 which shows a positive sign for wealth. Immunisation and bed nets utilisation show that child sex was not significant for most years; child sex had differentials in terms of significance along regional line.

Further discussion on the independent variables

The statistical relationship of wealth and wealth index with the utilisation of all maternal and child health care shows that they represent income in the utilization model a major determinant of utilisation because; they reflect individual or household ability to pay for health services. In this case, higher wealth and thereby higher budget by individual households and government will influence women to seek more health care. "Distance to health facility" and "transport to health facility" which represents access costs or the price of health care in the utilisation model for maternal and child health care were significant and had negative impact on utilisation because even if a woman or her child needs health care, she might not seek health care if the marginal cost of access or the price of the health care is too high. Therefore, as long as the marginal cost of "transport to health facility" and "distance to health facility" is too high, women may see it as a big obstacle/problem to seek maternal and child health care. In addition, travel time is also a cost associated with "distance to health facility" and "transport to health facility". These variables are significant because, majority of the population lives in rural areas and health care facilities as well as good road infrastructure are concentrated in cities. This reasoning also explains why residence was significant for all the years and regions in the utilisation model. Based on the interactive terms, utilisation of maternal and child health care may be very low in rural areas because most people in rural settlements were poor and therefore cannot be able to afford to pay for maternal and child health care services.

Employment status was associated with wealth status, as a woman gets employed; she is able to earn income which in turn is used to purchase health care. The utilisation of antenatal care, immunisation and bed nets by employed women over the unemployed women is due to the purchasing power of health care obtained through income earned from employment. Meanwhile, for skilled delivery, unemployed women had greater probability of utilisation because an employed woman would have

a high probability of giving birth to fewer children will have lower probability of skilled delivery utilisation. The importance of region, religion, ethnicity and employment were linked to wealth and education. This reasoning explains why wealth and education are the major drivers of inequity as discussed in the first objective. The findings in this study are related to those of Nwosu et al (2012), Goland et al (2012), Nketiah-Amponsah et al (2011), Goland et al (2011), Bonfrer et al (2012). As well as Babalola and Fatusi (2007). The findings on "transport" and "distance to health facility' on maternal health care is at variance with the study by Nketiah-Amponsah et al (2012). "No provider" and "no female provider" may be associated with the attitude of the doctors/health workers over absenteeism at the health facilities. This may also be an indication of insufficient workforce in the health facilities especially in the rural areas.

Educational status of a woman was an important determinant of maternal and child health care utilization because as the education level of a woman increases, she becomes more aware of the need to access antenatal care. The education variable in the utilisation model not only applies to women but also their husbands. If a woman's spouse is educated, the likelihood for her to utilise antenatal care also increases. Unlike other studies, this study includes the partners' education because an educated spouse who is aware of the value of antenatal care will encourage his wife to attend antenatal clinic. Partner's education is therefore a proxy for the role of the husband in decision making. Thus, women education and partner's education were significant and strong determinants of maternal and child health care utilisation in this study because, education was an important correlate with good health. Better educated persons tend to have healthier lifestyles and are expected to be more efficient producers of health (Grossman 1972). Also, they have knowledge of the effects of different health care measures and with the ability to use this information more effectively, they are expected to be able to determine which health care measures should be undertaken at different situations. Therefore, educated women know the importance of maternal and child health care to their overall health and the health of their children. This also explains why maternal and child health care was underutilised by women with no education. Education was also associated with higher income and affordability of services.

The effect of insurance was significant but not so pronounced because some of the years show significance while others did not. This may be that there are only very

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few respondents in the country that were insured as at the period of the survey. The effect of insurance can be felt by extending insurance coverage to majority of the citizens through community health insurance policies.

Age of respondents was statistically significant and positive in the utilisation model especially for skilled delivery and antenatal care because, according to Grossman model, the stock of health depreciates with time, which also affects the marginal effect of health care on health, implying that more health care was needed to sustain the same amount of health (Grossman 1972). Old women were also likely to appreciate the importance of maternal and child health care and thereby increase their consumption.

Some variables in the utilisation model may work in connection with other variables to explain why they were significant. Such variables include; region, religion, ethnicity, and employment status. The statistical significance of region cuts across all health care discussed in this study which may be associated with other factors. Based on the variables interactions and regional regression, underutilisation of maternal and child health care in the north may be associated with other reasons like education and wealth. Majority of women in the northern part of the country especially in the North East and North West were not educated and are poor. As such they cannot appreciate the importance of maternal and child health care utilisation. Ethnicity and religion were also in line with this thinking. The Hausa ethnic groups with low probability of utilisation are from the northern part of the country where low level of utilisation was expressed. Therefore, regional and ethnic differences may also be due to wealth and education of the respondents. In terms of religion, the study shows that muslim women were less likely to utilise any of the heath care. This is so in the northern part of the country which may also be associated with wealth and education. Looking at the results for the South West, muslims were more likely to utilise antenatal care, this may be because in this region, education is not a major problem.

5.5 Contributions to knowledge

The findings of this study contributes to knowledge in the following ways; the estimation of inequity using the horizontal inequity index and concentration curves show that non-need variables have the greatest contribution to inequity as indicated by the concentration index. Second, estimation of inequity using four sets of surveys shows that inequity in antenatal care and skilled delivery has increased over time with

the greatest incidence in 2008 and 2013, while inequity in immunisation has reduced over time with near equity being achieved in immunisation in 2013. Thirdly, in contrast to the study by Ortiz (2007) in Columbia, the two part model estimation of the determinants of antenatal care utilisation in Nigeria shows that, age and region of the respondents is significant for the logit model and the negative binomial model. This implies that age and region were important in determining use and non-use of antenatal care and the frequency of use. Fourthly, access variables like distance to health facility, transport to health facility, "no provider", and "no female provider" were significant in the maternal and child health care utilisation model for Nigeria. Although most of the variables interacted between education, region, wealth, residence and religion were significant, region and wealth has the greatest influence in the variable interaction. Regional analysis shows that both the regional and national regression analysis of variables had the same level of significance with few exceptions.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND POLICY RECOMMENDATTIONS

Introduction

This chapter contains three sections; the summary, conclusion and the policy recommendations. The summary gives a short synopsis of the entire study. The conclusions were derived from the results and discussions while the policy recommendations were also derived from the results, discussions and conclusions

6.1 Summary

This study has constructed the profile of horizontal inequity in utilisation of basic maternal and child health care in Nigeria and has also estimated the determinants of maternal and child health care utilisation in Nigeria. The first objective is achieved by constructing the concentration curves, the concentration index and the horizontal inequity index for maternal and child health care utilisation for 1999 to 2013. The results for the concentration curve and concentration index through standardisation for the differences in need and non-need variables show that there is pro-rich inequity in antenatal and skilled delivery care utilisation in Nigeria given by the values of the horizontaal inequity index and the shape of the conecentration curves. Inequity in antenatal and skilled delivery increased over time from 1999 to 2013 with a slight reduction in antenatal care in 2013. This was driven by education and wealth as the major non-need variables which are the components of the standardised concentration index.

Results from analysis for child health care shows that immunisation utilisation is inequitable in favour of the rich in 2008, 2003 and 1999 while near equity is achieved in immunisation in 2013. The results for 1999 to 2008 shows that although inequity exists in immunisation, it is not so severe compared to maternal health care as concentration curves were very close to the line of equality with near zero horizontal inequity index. The components of the concentration index show that wealth and education as well as region were also the major drivers of inequity in immunisation utilisation in Nigeria. Analysis of inequity in bed nets utilisation shows that there is

inequity in favour of the poor for the bed nets utilisation for the period between 2003 to 2008 but in favour of the rich in 2013. Wealth, eduaction and region were also the main drivers of inequity . Inequity in bed nets is greater than that of immunisation.

The resuslts on the determinants of antenatal care shows that price variables, wealth variables, education variables, and other variables such as region, residence, age of rspondents, ethnicity, and religion were significant in antenatal and skilled delivery utilisation model. The two-part model for antenatal care utilisation was important because it explained two important decisions in antenatal care utilisation; the decision to go for antenatal care and the decision to obtain the required number of visits. Access variables which represents the price of health care in the model were significant. These include; "distance to health facility","transport to health facility", "no female provider" and "no provider" they were very important in explaining antenatal care and skilled delivery utilisation. Utilisation of skilled delivery and antenatal care by years shows that all respondents were affected by these variables in the utilisation of antenatal care and skilled delivery. Analysis of antenatal and skilled delivery by region also shows that national regression has similar results with few exceptions which are peculier to the region. For instance, in the south west, the Muslims utilise more antenatal care compared to the christians which was not so in the national regression. Variable interaction also shows that all variables have impact on utilisation but wealth and region had the greatest impact.

Results on immunisation and bed nets utilisation shows that even though immunisation and bed nets is free, utilisation is still determine by wealth with the exception of 2013 where children from poorer parents were more likely to be immunised. This may be an indication of improvement in routine immunisation in 2013. Other variables such as education, distance, transport, ethnicity, region, residence, and religion were all significant in the utilisation model. Regional analysis shows that child sex was significant in South East as female children were more likely to be immunised than male children.

6.2 Conclusions

Following the results obtained from the study, the following conclusions are drawn; there is pro-rich inequity in antenatal care, skilled delivery and immunisation utilisation and pro-poor inequity in bed nets utilization in 2003 and 2008.

Socioeconomic factors such as wealth, education and region are the main drivers of inequity in maternal and child health care utilisation in Nigeria. Inequity in utilisation is greater in maternal health care than child health care. Bed nets utilisation may be low within the regions with inequity in favour of the poor but the use of treated bed nets is related to wealth. There is an improvement in the utilization of child health care especially in immunisation over time but inequity in utilisation of maternal health care especially on skilled delivery worsened over time. Wealth, education of mother, partner's education, region, ethnicity, employment status, religion, transport to health facilities, distance to health facilities, availability of health care providers, child age and child sex are important determinants of maternal and child health care utilization. Given inequity in maternal and child health care services, resource allocation decisions based on the national average figures may not lead to appropriate targeting of the efficient and effective use of scarce maternal and child health care resources.

6.3 Recommendations

Antenatal care and skilled delivery care

The study shows that wealth and education were the major drivers of inequity of both antenatal and skilled delivery utilisation of which both constitutes the non-need variables. Inequity in antenatal care and skilled delivery utilization can therefore be reduced by reducing poverty among women so that the percentage number of women among the poorest group will reduce. This can be achieved by ensuring that women are economically empowered by providing employment opportunities either formal or informal (skills acquisition) for women who are not employed. Women and their partners should be encouraged to attain formal education especially at the secondary and higher educational level, this will go a long way to reduce inequity and increase antenatal and skilled delivery care utilisation. The problem of "distance to health facility", "transport to health facility", "no provider" and "no female provider" which affects antenatal care and skilled delivery utilisation should be addressed. More public health facilities especially in rural areas should be established to solve the problem of "distance to health facilities" and "transport to health facilities". Health insurance which is also one of the determinants should be encouraged at all levels to cater for any deficiency in the provision of antenatal care and skilled delivery in the informal sector and rural areas. This can be achieved through community health insurance.

Regional, ethnic and religious differences in the utilisation of antenatal care and skilled delivery should tackled be by looking at the causes of the differences within each region, religion, and ethnic group that are disadvantaged. Given that over 60% of respondents attend antenatal care in 2013 with an average of 5 visits, but only about 10% had skilled delivery, this study recommends that to improve skilled delivery utilisation, women who attend antenatal care should be encouraged by any means at the point of antenatal visits to deliver in health facilities.

Immunization and Bed nets utilization

The results on the two objectives for immunisation shows that although inequity in the utilization of immunisation is minimal among children, immunisation utilization is still influenced by their mother's wealth, mother and father's education, region and "distance to health facility". Improving the economic and social status of the child's parents in terms of wealth and education will improve the level of immunisation utilisation of a child. Based on the findings on bed nets utilization, equity in bed nets utilization should be enhanced by also improving the economic and social status of the parents. More access to treated bed nets should be provided on regional basis to enhance utilization. In conclusion, the study recommends that inequity in utilisation of maternal and child health care should be taken seriously by policy makers if the problem of maternal and child mortality will be reduced.

6.4 limitations of the study and further research

There were several limitations of this study which were majorly based on the Nigerian demographic and health survey (NDHS) data. The limitations however do not affect the authenticity of the results obtained from the analysis. The variable "ethnicity" and "insurance status" is not available in 2003, 1999, and 1990 NDHS data. Insurance status is not available in these surveys because there was little or no availability of health insurance during these years. In addition given the current six geopolitical zones of the country, the NDHS 1999 do not have observations for the South South region, while NDHS 1990 do not have observations for the South South, and the North Central region. This may be so because these regions were not in existence as of the time these surveys were carried out. Also, variables like "distance to health facility", "no provider", "transport to health facilities", "no female provider" are not available for 1999 and 1990 NDHS data. The 2013 NDHS had missing observations for "no

provider", "transport to health facilities", and "no female provider". Due to some deficiencies found with the 1990 NDHS data; the ADEPT soft ware used for the analysis of inequity could not compute the concentration index for all the health care services under consideration due to missing observations and internal errors in NDHS 1990 data. The data for bed nets for the 1999 and 1990 NDHS data was not available. Analysis for bed nets was limited to 2013, 2008 and 2003. Also the South Western region had very few observations for the 2003 NDHS which were not sufficient for the regression analysis. Variables were not interacted for the NDHS survey data on bed nets due to some deficiencies inherent in the data.

There is variation on how wealth index was used in the data. This is because; the data on wealth index was only found for 2013, 2008, and 2003 NDHS data. The 1999 and 1990 NDHS data was not available. Given the data on assets for 1999 and 1990 NDHS, the wealth index was computed using the principal component analysis (CPA).

This study has not covered all aspects of inequity; inequity in finance as well as inequity in access. Further research is therefore suggested. In addition, there is need for further research on other maternal and child health care services utilisation especially on family planning related issues due to high prevalence of fertility rate in Nigeria. There is also need for further research on the effect of house hold decision making on maternal and child health care utilisation. Further research will be appropriate on how cultural practices in other regions of the country affect maternal and child health care utilisation. This will help to explain other reasons why there is low utilisation despite the availability of free maternal and child health care services in the country. This will however require primary survey as the NDHS data may not provide sufficient information on these studies. Qualitative research is also very important and urgent in skilled delivery utilisation given the very low level of utilisation in the country. The need to find out from the perspective of women why they prefer to give birth at home with unskilled delivery attendants is very important as a further research. Since we have so many private health care providers, there is need for research on out of pocket expenditures on maternal and child health care services. Equity issues relating to health care financing in all health care should be examined.

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Appendix 1: Regional regression results for antenatal care utilisation

Table A1: Antenatal care utilisation in North Central 2013

	NDHS 2013		
	First Logit model		Second NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-2.332***	-.461***	-0.971***
	(0.396)	(0.089)	(0.113)
Poorer	-1.7066***	-.2839***	-0.4802***
	(0.3750)	(0.0748)	(0.0664)
Middle	-1.0230***	-.1414**	-0.1207**
	(0.3635)	(0.0553)	(0.0499)
Richer	-0.7337**	-.1029*	-0.0621
	(0.3597)	(0.0565)	(0.0409)
EMPLOYMENT			
not employed	-0.0820	-.0100	-0.0742**
	(0.1243)	(0.0154)	0.0371)
PRICE VARIABLES			
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	-0.5307***	-.0698**	-0.3275***
	(0.1136)	(0.0165)	(0.0433)
INSURANCE STATUS			
No insurance	.8318	.0750	-0.0523
	(.6797)	(.0444)	(0.0661)
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	-1.3076**	-.1843**	-0.3340***
	(0.5186)	(0.0817)	(0.0622)
Primary	-0.9392*	-.1322*	-0.1483**
	(0.5142)	(0.0813)	(0.0571)
Secondary	-0.5158	-.0672	-0.0685
	(0.5042)	(0.0699)	(0.0457)
PARTNER'S EDUCATION (REF: HIGHIER)			
No education	-0.5749**	-.0777**	-0.1435**
	(0.2229)	(0.0333)	(0.0613)
Primary	-0.4069*	-.0536*	0.0470
	(0.2211)	(0.0316)	(0.0519)
Secondary	-0.5751***	-.0738**	-0.0551
	(0.1994)	(0.0269)	(0.0387)
AGE OF THE RESPONDENTS			
Age			
	0.0389***	.0046***	0.0171***

OTHER VARIABLES	(0.0117)	(0.0014)	
NUMBER OF CHILDREN OR BIRTH ORDER			
Birth order	-0.0739**	-.0089**	-0.0346***
	(0.0363)	(0.0043)	(0.0113)
MARITAL STATUS (REF: MARIED)			
Single	-0.7155***	-.1084***	-0.2912**
	(0.2752)	(0.0508)	(0.1107)
RESIDENCE			
Urban			
RELIGION (REF. CHRISTIANITY)	0.5422***	.0608***	0.2242***
	(0.1883)	(0.0192)	(0.0390)
Islam	0.1290	.0155	0.1774***
	(0.1242)	(0.0150)	(0.0339)
Traditionalist	-1.4233***	-.2604***	-0.9397***
	(0.3571)	(0.0853)	(0.2458)
_cons	3.1950***		1.6883***
	(0.5835)		(0.1150)
No of observations	2810		
Prob >chi2	0.0000		
Pseudo R2	0.2070		

*significance at 10%   **significance at 5%   ***significance at 1%   # missing values

Table A2: Antenatal care utilisation in North central 2008

	NDHS 2008		
	First		Second
	Logit model		NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-1.9816***	-0.3986***	-0.7041***
	(.3281)	(0.0700)	(0.0788)
Poorer	-1.4761***	-0.2849***	-0.4090***
	(-.3253)	(0.0690)	(0.0656)
Middle	-1.0854***	-0.1998***	-0.1815***
	(.3173)	(0.0639)	(0.0571)
Richer	-0.8206**	-0.1525**	-0.0443
	(.3173)	(0.0659)	(0.0549)
EMPLOYMENT			
not employed	0.0150	0.0024	-0.1290***
	(.1060)	(0.0168)	(0.0377)
PRICE VARIABLES			
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	-0.2655*	-0.0429*	-0.2815***
	(.1473)	(0.0243)	(0.0546)
TRANSPORT TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			

big problem	-.209***	-0.046***	-0.1943**
	(.0709)	(0.0243)	(0.0597)
NO PROVIDER (REF: NOT A BIG PROBLEM)			
big problem	-0.1722	-0.0282	-0.0681
	(.1403)	(0.0236)	(0.0523)
NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)			
big problem	-0.1253***	-0.0205***	-0.0545
	(.1708)	(0.0288)	(0.0723)
INSURANCE STATUS			
No insurance			
EDUCATION VARIABLES			-0.0323
			(0.0655)
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	-1.7606***	-0.3044***	-0.4480***
	(0.6039)	(0.1064)	(0.0720)
Primary	-0.9499	-0.1679	-0.1286**
	(.6017)	(0.1138)	(0.0661)
Secondary	-0.7637	-0.1368	-0.0461
	(.5978)	0.1165	(0.0554)
PARTNER'S EDUCATION (REF: HIGHIER)			
No education	-0.8661***	-0.1515***	-0.2978***
	(.2387)	(0.0451)	(0.0640)
Primary	-0.4135*	-0.0703*	-0.0882
	(.2363)	(0.0426)	(0.0541)
Secondary	-0.4334**	-0.0725*	-0.1218**
	(.2255)	(0.0394)	(0.0449)
AGE OF THE RESPONDENTS			
Age	0.0202**	0.0032**	0.0139***
	(0.3186)	(0.0016)	(0.0039)
OTHER VARIABLES			
NUMBER OF CHILDREN OR BIRTH ORDER			
Birth order	-0.0285	-0.0045	-0.0323**
	(.0313)	(0.0050)	(0.0118)
MARITAL STATUS (REF: MARIED)			
Single	-0.7238***	-0.1379**	-0.1493
	(.2339)	(0.0513)	(0.1057)
RESIDENCE			
Urban	0.2658*	0.0407*	0.0959**
	(0.0102)	(0.0234)	(0.0398)
RELIGION (REF. CHRISTIANITY)			
Islam	-0.4323***	-0.0707***	0.0578
	(0.1595)	(0.0194)	(0.0419)
Traditionalist	-0.3923	-0.0696	-0.0545
	(0.1162)	(0.0561)	(0.1670)
_cons	4.0679***		1.8413***
	(.7126)		(0.1309)
No of observations	2851		
	0.0000		
Prob >chi2			

| | Pseudo R2 | | 0.1911 | |

Table A3: Antenatal care utilisation in North Central 2003

	NDHS 2003		
	First		Second
	Logit model		NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-2.2037***	-.436***	-0.739***
	(0.5983)	(0.121)	(0.202)
Poorer	-2.0521***	-.422***	-0.4376**
	(0.5769)	(0.123)	(0.188)
Middle	-1.4192**	-.274**	-0.254
	(0.5741)	(0.123)	(0.170)
Richer	-0.5655	-.096	-0.016
	(0.5678)	(0.102)	(0.149)
EMPLOYMENT			
not employed	-0.6002**	-.1006**	-0.129
	(0.2640)	(0.0472)	(0.106)
PRICE VARIABLES			
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	-1.3818**	-.2147)**	-0.449*
	(0.5300)	(.0819)	(0.2552)
Small problem	1.0116*	.1344**	0.193
	(0.5533)	(0.063)	(0.2478)
TRANSPORT TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	-1.4051**	-.2147**	-0.1189
	(0.5478)	(0.0822)	(0.2548)
Small problem	-1.1242**	-.2049*	0.1192
	(0.5640)	(0.1161)	(0.2530)
NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)			
big problem	. 5180**	.08807*	0.0060
	(0.2661)	(0.0489)	(0.1284)
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	0.0025	.001	-0.349
	(1.1845)	(0.183)	(0.3006)

Primary	0.7760	.110	-0.012
	(1.1796)	(0.151)	(0.2954)
Secondary	0.7115	.098	-0.1268
	(1.1702)	(0.142)	(0.282)
PARTNER'S EDUCATION (REF: HIGHIER)			
No education	-0.9127**	-.1616*	-0.154
	(0.4727)	(0.0936)	(0.1676)
Primary	-0.5150	-.0849	-0.146
	(0.4636)	(0.0808)	(0.152)
Secondary	-0.2182	-.0345	0.037
	(0.4587)	(0.0743)	(0.1421)
AGE OF THE RESPONDENTS			
Age	0.0230	.004	0.033
	(0.0245)	(0.004)	(0.010)
OTHER VARIABLES			
NUMBER OF CHILDREN OR BIRTH ORDER			
Birth order	-0.0924	-.0142	-0.101***
	(0.0659)	(0.0101)	(0.0288)
MARITAL STATUS (REF: MARIED)			
Single	-0.7901	-.1487	-0.357
	(0.5147)	(0.1128)	(0.217)
RESIDENCE			
Urban	-0.0698	-.011	0.018
	(0.2700)	(0.042)	(0.115)
RELIGION (REF. CHRISTIANITY)			
Islam	-0.4988	-.079	0.099
	(0.3376)	(0.055)	(0.1154)
Traditionalist	-1.6818*	-.3654**	-0.723**
	(0.7196)	(0.177)	(0.377)
_cons	2.5408*		
	(1.5096)		
No of observations			
Prob >chi2	601		
Pseudo R2	0.0000		
	0.0388		

Table A4: Antenatal care utilization in North Central 1999

	NDHS 1999		
	First		Second
	Logit model		NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err
INCOME VARIABLES			
Poorest	-2.483***	-0.302**	-0.612***
	(0.7267)	(0.1260)	(0.152)
Poorer	-1.479**	-0.135	-0.148
	(0.734)	(0.087)	(0.129)
Middle	-1.239*	-0.101	-0.117
	(0.715)	(0.070)	(0.093)
Richer	-0.804	-0.055	-0.073
	(0.748)	(0.0568)	(0.077)
EMPLOYMENT STATUS			
not employed	-0.489*	-0.0297	-0.281***
	(0.275)	(0.019)	(0.077)
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	-13.95***	-0.990***	-0.508***
	(0.765)	(0.005)	(0.136)
Primary	-12.83***	-0.997***	-0.094
	(0.715)	0.001)	(0.122)
Secondary	-11.779***	-0.9929***	-0.1490
	(0.752)	(0.0010)	(0.111)
PARTNER'S EDUCATION (REF: HIGHIER)			
No education	-1.291	-0.094	-0.174
	(1.053)	(0.089)	(0.109)
Primary	-1.037	-0.0750	-0.043
	(1.0364)	(0.0867)	0.0927
Secondary	-1.231	-0.0955	-0.018
	(1.035)	(0.0986)	(0.078)
AGE OF THE RESPONDENTS			
Age	-0.002	-0.0001	0.001
	(0.029)	(0.0017)	(0.008)
OTHER VARIABLES			
NUMBER OF CHILDREN OR BIRTH ORDER			
Birth order	0.133*	0.008*	0.009
	(0.0783)	(0.0045)	(0.020)
MARITAL STATUS (REF: MARIED)			
Single	0.4807	0.0228	0.072
	(0.892)	(0.034)	(0.214)
RESIDENCE			

Urban	1.025***	0.0522***	0.074
	(0.317)	(0.0148)	(0.073)
RELIGION (REF. CHRISTIANITY)			
Islam	0.647	0.0302	0.325***
	(0.697)	(0.0261)	(0.099)
Traditionalist	-0.561**	-0.0327*	0.088
	(0.291)	(0.0176)	(0.079)
_cons	17.083***		1.8894***
	(1.024)		(0.2326)
Prob >chi2	582		
Pseudo R2	0.0000		
	0.2908		

Table A5: Antenatal care utilisation in North East 2013

	NDHS 2013		
	First		Second
	Logit model		NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-1.105**	-.239**	-0.526***
	(0.411)	(0.089)	(0.083)
Poorer	-0.779**	-.172*	-0.265***
	(0.406)	(0.092)	(0.073)
Middle	-0.439	-.097	-0.131**
	(0.398)	(0.092)	(0.066)
Richer	0.368	.073	-0.072
	(0.420)	(0.077)	(0.054)
EMPLOYMENT			
not employed	-0.548***	-.116***	-0.196***
	(0.084)	(0.018)	(0.038)
PRICE VARIABLES			
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	-0.924***	-.203***	-0.461***
	(0.087)	(0.0196)	(0.048)
INSURANCE STATUS			
No insurance	-0.548***	-.116***	-0.196***
	(0.084)	(0.018)	(0.038)
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	-0.8588	-.1682	-0.146**

	(0.637)	(0.114)	(0.071)
Primary	-0.094	-.020	0.10572
	(0.636)	(0.130)	
Secondary	0.362	.072	0.123**
	(0.6449)	(0.1201)	(0.058)
PARTNER'S EDUCATION (REF: HIGHIER)			
No education	-1.637***	-.320***	-0.501***
	(0.2720)	(0.0467)	(0.055)
Primary	-0.930***	-.215***	-0.142**
	(0.2854)	(0.069)	(0.059)
Secondary	-0.598**	-.134**	-0.099**
	(0.2894)	(0.0674)	(0.046)
AGE OF THE RESPONDENTS			
Age	-0.002	-.001	0.004
	(0.009)	(0.002)	(0.005)
OTHER VARIABLES			
NUMBER OF CHILDREN OR BIRTH ORDER			
Birth order	-0.018	-.004	-0.011
	(0.0256)	(0.0053)	(0.012)
MARITAL STATUS (REF: MARIED)			
Single	-0.1828	-.039	0.031
	(0.2750)	(0.062)	(0.085)
RESIDENCE			
Urban	0.2601*	.053**	-0.026
	(0.141)	(0.028)	(0.047)
RELIGION (REF. CHRISTIANITY)			
Islam	0.067	.0142	0.021
	(0.148)	(0.032)	(0.048)
Traditionalist	-0.008	-.002	-0.080
	(0.4532)	(0.0956)	(0.201)
_cons	3.870***		1.969**
	(0.7203)		(0.158)
No of observations			
Prob >chi2	3635		
Pseudo R2	0.0000		
	0.2369		

*significance at 10%   **significance at 5%   ***significance at 1%   # missing values

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Table A6: Antenatal care utilisation in North East 2008

	NDHS 2008		
	First		Second
	Logit model		NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-2.003***	-0.462***	-0.881***
	(0.49)	(0.096)	(0.1252)
Poorer	-1.285**	-0.303***	-0.3611***
	(0.4892)	(0.1028)	(0.1194)
Middle	-0.731	-0.178	-0.1360
	(0.486)	(0.112)	(0.1121)
Richer	-0.231	-0.058	-0.138
	(0.503)	(0.1245)	(0.1050)
EMPLOYMENT			
not employed	-0.233***	-0.268***	-0.1205**
	(0.084)	(0.053)	(0.0539)
PRICE VARIABLES			
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	-0.358***	-0.0857**	-0.319***
	(0.125)	(0.0314)	(0.078)
TRANSPORT TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	-0.344**	0.1130***	-0.133*
	(0.127)	(0.0225)	(0.0786)
NO PROVIDER (REF: NOT A BIG PROBLEM)			
big problem	0.454***	-0.0990***	0.303***
	(0.093)	(0.0265)	(0.0543)
NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)			
big problem	-0.399***	-0.3986***	-0.176**
	(0.1081)	(0.1080)	(0.0706)
INSURANCE STATUS			
No insurance		-0.058***	0.1101
		(0.0209)	(0.1802)
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	-1.817*	-0.411**	-0.137
	(1.052)	(0.194)	(0.109)
Primary	-1.2133	-0.283	0.138
	(1.0550)	(0.215)	(0.1086)
Secondary	-0.799	-0.192	0.211**
	(1.064)	(0.2366)	(0.101)
PARTNER'S EDUCATION (REF: HIGHIER)			
No education	-1.105***	-0.0853	-0.441***
	(0.226)	(0.0584)	(0.0773)
Primary	-0.344	-0.0986*	-0.023
	(0.2379)	(0.0587)	(0.0792)
Secondary	-0.398*	0.0054	-0.072
	(0.240)	(0.0059)	(0.0717)
AGE OF THE RESPONDENTS			
Age	0.002	0.001	-0.005
	(0.009)	(0.0022)	(0.0060)
OTHER VARIABLES			
NUMBER OF CHILDREN OR BIRTH ORDER			
Birth order	-0.022	-0.0891***	0.016

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	(0.0237)	(0.0310)	(0.0158)
MARITAL STATUS (REF: MARIED)			
Single	-0.076	-0.0190	-0.0003
	(0.254)	(0.0635)	(0.1207)
RESIDENCE			
Urban	0.377***	0.0937***	0.414***
	(0.119)	(0.029)	(0.0606)
RELIGION (REF. CHRISTIANITY)			
Islam	-0.415	-0.103***	-0.325***
	(0.131)	(0.032)	(0.0675)
Traditionalist	-1.802***	-0.360***	-1.125**
	(0.517)	(0.064)	(0.4375)
_cons	4.450***		1.882***
	(1.094)		(0.2854)
No of observations	2851		
Prob >chi2	0.0000		
Pseudo R2	0.1911		

Table A7: Antenatal care utilization in North East 2003

	NDHS 2003		
	First		Second
	Logit model		NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-3.149***	-0.645***	-0.859***
	(1.080)	(0.162)	(0.221)
Poorer	-2.9890**	-0.633***	-0.548**
	(1.0790)	(0.163)	(0.210)
Middle	-2.3931**	-0.5345**	-0.284
	(1.0732)	(0.197)	(0.206)
Richer	-0.9789	-0.2253	0.006
	(1.0990)	(0.262)	(0.194)
EMPLOYMENT			
not employed	-0.271	-0.057	-0.1927**
	(0.178)	(.038)	(0.0897)
PRICE VARIABLES			
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	0.332	0.070	0.1531
	(0.294)	(0.062)	(0.1481)
Small problem	0.356	0.072	0.235
	(0.287)	(0.055)	(0.152)
TRANSPORT TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	-0.595**	-0.126**	-0.3326**
	(0.295)	(0.062)	(0.150)
Small problem	-0.256	-0.052	-0.192
	(0.2906)	(0.058)	(0.153)
NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)			
big problem	-0.199	-0.042	-0.241**
	(0.189)	(0.041)	(0.105)
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	-14.257***	-0.973***	-0.206
	(0.5724)	0.004)	(0.299)

X

Primary	-13.669***	-0.962***	0.089
	(0.565)	(0.003)	(0.298)
Secondary	-12.857***	-0.904	0.079
	(0.728)	(#)	(0.278)
PARTNER'S EDUCATION (REF: HIGHIER)			
No education	0.026	0.0055	-0.493***
	(0.464)	(0.098)	(0.176)
Primary	0.403	0.080	-0.0225
	(0.479)	(0.089)	
Secondary	1.0854**	0.190***	0.1294
	(0.4988)	(0.069)	(0.1687)

AGE OF THE RESPONDENTS

Age	0.042**	0.0087**	0.022**
	(0.022)	(0.005)	(0.0111)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

Birth order	-0.0768	-0.0161	-0.020
	(0.0529)	(0.0111)	(0.022)

MARITAL STATUS (REF: MARIED)

Single	-0.156	-0.034	-0.008*
	(0.441)	(0.098)	(0.2043)

RESIDENCE

Urban	0.1914	0.039	0.096
	(0.219)	(0.045)	(0.108)
RELIGION (REF. CHRISTIANITY)			
Islam	-0.660**	-0.125**	-0.168
	(0.308)	(0.052)	(0.1301)
Traditionalist	-0.867	-0.205	-0.6601
	(0.789)	(0.197)	(0.6287)
_cons	15.651***		0.666*
	(1.077)		(0.397)
No of observations	655		
Prob >chi2	0.0000		
Pseudo R2	0.2114		

Table A8: Antenatal care utilisation in North East 1999

Variable	NDHS 1999		
	First Logit model		Second NB model
	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-1.196***	-0.282**	-0.812***
	(0.5876)	(0.1283)	(0.226)
Poorer	-1.021*	-0.238*	-0.482**
	(0.5953)	(0.126)	(0.245)
Middle	-0.887	-0.207	-0.264
	(0.5772)	(0.1239)	(0.201)
Richer	0.315	0.0785	0.338*
	(0.614)	(0.1530)	(0.1882)
EMPLOYMENT STATUS			
not employed	-0.195**	-0.049	-0.049
	(0.262)	(0.0655)	(0.1568)
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	-11.029***	-0.917***	0.125
	(1.0021)	(0.0228)	(0.293)
Primary	-9.937***	-0.704***	0.638**
	(1.0515)	(0.0351)	(0.311)
Secondary	-9.127***	-0.639***	0.342*
	(1.286)	(0.033)	(0.192)
PARTNER'S EDUCATION (REF: HIGHIER)			
No education	-2.438***	-0.541***	-1.0238***
	(0.749)	(0.127)	(0.196)
Primary	-1.464*	-0.3098**	-0.217
	(0.788)	(0.1334)	(0.2494)
Secondary	-1.178	-0.2639*	-0.118
	(0.797)	(0.1555)	(0.169)
AGE OF THE RESPONDENTS			
Age	-0.008	-0.0020	-0.011
	(0.0229)	(0.006)	(0.017)
OTHER VARIABLES			
NUMBER OF CHILDREN OR BIRTH ORDER			
Birth order	0.009***	0.0022	-0.021
	(0.064)	(0.0158)	(0.045)
MARITAL STATUS (REF: MARIED)			
Single	1.275*	0.296**	0.444
	(0.774)	(0.1484)	(0.375)
RESIDENCE			
Urban	1.567***	0.370***	0.794***
	(0.274)	(0.0569)	(0.155)
RELIGION (REF. CHRISTIANITY)			
Islam	0.164**	0.041	-0.396

	(0.9139)	(0.228)	(0.303)
Traditionalist	-1.807***	-0.401***	-0.673***
	(0.519)	(0.0886)	(0.2202)
_cons	14.698***		2.033***
	(0.835)		(0.460)
No of observations	1815		
Prob >chi2	0.0000		
Pseudo R2	0.0740		

Table A9: Antenatal care utilisation in North East 1990

	NDHS 1990		
	First		Second
	Logit model		NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-1.441***	-0.319***	-0.744***
	(0.295)	(0.056)	(0.144)
Poorer	-1.712***	-0.371***	-1.077***
	(0.2888)	(0.052)	(0.1515)
Middle	-1.279***	-0.2803***	-0.589***
	(0.2806)	(0.0521)	(0.126)
Richer	-0.3372	-0.081	-0.052
	(0.2720)	(0.0636)	(0.104)
EMPLOYMENT STATUS			
not employed	-0.103	-0.025	-0.027
	(0.1136)	(0.0279)	(0.076)
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	-1.4224**	-0.338**	0.2403
	(0.5896)	(0.123)	(0.3187)
Primary	-0.6118	-0.143	-0.330**
	(0.5946)	(0.130)	(0.153)
Secondary			0.161
			(0.1508)
PARTNER'S EDUCATION (REF: HIGHIER)			
No education	-2.732**	-0.578***	-0.745***
	(1.0167)	(0.144)	(0.1725)
Primary	-2.3835**	-0.4240***	-0.455**
	(1.0262)	(0.1100)	(0.183)
Secondary	-1.8752*	-0.3537**	-0.228
	(1.0569)	(0.1304)	(0.1798)
AGE OF THE RESPONDENTS			
Age	-0.0261**	-0.0064**	-0.014*
	(0.0105)	(0.0026)	(0.008)
OTHER VARIABLES			
NUMBER OF CHILDREN OR BIRTH ORDER			
Birth order	0.081**	0.0199**	0.069***
	(0.0306)	(0.0075)	(0.022)
MARITAL STATUS (REF: MARIED)			
Single	.2176	.0539	0.363
	(.5149)	(.1286)	(0.2425)
RESIDENCE			
Urban	0.9181***	0.226***	0.783***

	(0.1974)	(0.047)	(0.107)
RELIGION (REF. CHRISTIANITY)			
Islam	-1.387***	-0.332***	-0.714***
	(0.1641)	(0.035)	(0.090)
Traditionalist	-0.1368	-0.033	-0.095
	(0.3904)	(0.0934)	(0.2568)
_cons	6.131		2.4915***
	(1.346)		(0.2880)
No of observations	1815		
Prob >chi2	0.0000		
Pseudo R2	0.1279		

Table A10: Antenatal care utilisation in North West 2013

Variable	NDHS 2013		Second
	First Logit model		NB model
	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-2.431***	-.5090***	-0.779***
	(0.2837)	(0.0468)	(0.087)
Poorer	-1.878***	-.400***	-0.425***
	(0.2812)	(0.0496)	(0.079)
Middle	-1.432***	-.2948***	-0.179**
	(0.274)	(0.045)	(0.068)
Richer	-0.628**	-.1432**	0.0015
	(0.2809)	(0.0590)	(0.0517)
EMPLOYMENT			
not employed	-0.262***	-.063***	-0.128**
	(0.0666)	(0.0159)	(0.0494)
PRICE VARIABLES			
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	-0.585***	-.1396***	-0.472***
	(0.065)	(0.015)	(0.052)
INSURANCE STATUS			
No insurance	1.633*	.369*	-0.209*
	(1.253)	(.21147)	(0.1164)
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	-2.372**	-.5198***	-0.391***
	(1.027)	(0.1623)	(0.087)
Primary	-1.496	-.299**	0.031
	(1.030)	(0.152)	(0.091)
Secondary	-1.486	-.2926**	-0.0171
	(1.025)	(0.1457)	(0.0762)
PARTNER'S EDUCATION (REF: HIGHIER)			
No education	-0.699***	-.171***	-0.404***
	(0.1600)	(0.0388)	(0.0643)
Primary	0.125	.0306	0.132*
	(0.173)	(0.0425)	(0.0729)
Secondary	0.044	.0106	0.0406
	(0.1716)	(0.0419)	(0.0568)
AGE OF THE RESPONDENTS			
Age	-0.002	-.0004	0.0008
	(0.0074)	(0.0018)	(0.006)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

Variable	Coef./Std Err	Mar. Effect	Coef./Std Err
Birth order	-0.014	-.003	-0.0009
	(0.0196)	(0.0048)	0.0152
MARITAL STATUS (REF: MARIED)			
Single	0.105	.0256	0.178
	(0.219)	(0.054)	(0.128)
RESIDENCE			
Urban	0.177*	.0434*	0.0326
	(0.1046)	(0.0258)	(0.0570)
RELIGION (REF. CHRISTIANITY)			
Islam	-0.386**	-.0955**	-0.206***
	(0.1904)	(0.0475)	(0.070)
Traditionalist	-0.810*	-.1762**	-0.8642**
	(0.4719)	(0.0869)	(0.3617)
_cons	4.858***		2.094***
	(1.0728)		(0.196)
No of observations	5835		
Prob >chi2	0.0000		
Pseudo R2	0.2159		

Table A11: Antenatal care utilization in North West 2008

	NDHS 2008		
	First Logit model		Second NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-1.768***	-.2493***	-1.085***
	(0.296)	(0.0375)	(0.166)
Poorer	-1.373***	-.1918***	-0.624***
	(0.2839)	(0.0352)	(0.148)
Middle	-0.668**	-.0928***	0.035
	(0.276)		(0.132)
Richer	-0.5198*	-.0727**	0.032
	(0.2763)	(0.0335)	(0.113)
EMPLOYMENT			
not employed	-0.0521	-.0083	0.236
	(0.0905)	(0.0144)	(0.2949)
PRICE VARIABLES			
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem		.0173	0.0114
	0.107	(0.0227)	(0.026)
	(0.139)		
TRANSPORT TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	-0.192	-.030	-0.095
	(0.176)	(0.022)	(0.169)
NO PROVIDER (REF: NOT A BIG PROBLEM)			
big problem	-0.012	-.0018	-0.090
	(0.110)	(0.0176)	(0.1703)
NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)			
big problem	-0.094	-.0149	-0.095
	(0.1145)	(0.0181)	(0.1138)

EDUCATION VARIABLES

RESPONDENT'S EDUCATION (REF: HIGHIER)

No education	-3.375***	-.6791***	-0.739***
	(1.027)	(0.1555)	(0.150)
Primary	-2.6851	-.230***	-0.125
		(0.045)	(0.154)
Secondary	-2.010**	-.1814***	-0.039
	(1.0260)	(0.0449)	(0.127)

PARTNER'S EDUCATION (REF: HIGHIER)

No education	-0.807***	-.1396***	-0.024
	(0.1861)	(0.0347)	(0.0906)
Primary	-0.15541	-.0240	-0.708***
	(0.1986)	(0.0296)	(0.1302)
Secondary	0.27533	.0468	0.006
	(0.1964)	(0.0354)	(0.1425)

AGE OF THE RESPONDENTS

Age	0.006	.0009	0.008
	(0.010)	(0.0017)	(0.0101)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

Birth order	0.0026	.0004	0.066
	(0.0286)	(0.0045)	(0.1163)

MARITAL STATUS (REF: MARIED)

Single	0.611*	.1146	0.649***
	(0.3306)	(0.0707)	(0.228)

RESIDENCE

Urban	1.126***	.2204***	0.675***
	(0.129)	(0.0296)	(0.086)

RELIGION (REF. CHRISTIANITY)

Islam	-0.915***	-.1797***	-0.388***
	(0.213)	(0.0489)	(0.138)
Traditionalist	-1.2148**	-.1325***	-1.103***
	(0.5089)	(0.0338)	(0.369)
_cons	4.216***		1.384***
	(1.013)		(0.407)

No of observations	4235
Prob >chi2	0.0000
Pseudo R2	0.2785

Table A12: Antenatal care utilization in North West 2003

Variable	NDHS 2003		
	First Logit model		Second NB model
	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-4.189***	-.677***	-1.791***
	(0.791)	(.0679)	(0.275)
Poorer	-3.613***	-.677***	-1.412***
	(0.769)	(.089)	(0.259)
Middle	-2.624***	-.544***	-0.497**
	(0.761)		(0.244)
Richer	-2.302***	-.483***	-0.242
	(0.755)	(.118)	(0.199)
EMPLOYMENT			
not employed	-0.087	-.022	0.0297
	(0.172)	(.0429)	(0.1043)
PRICE VARIABLES			
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	0.191	.048	0.1548
	(0.262)	(.0652)	(0.2087)
Small problem	-0.559*	-.139*	-0.420**
	(0.304)	(.0739)	(0.197)
TRANSPORT TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	-0.0116	-.0029	0.253
	(0.2682)	(.0669)	(0.207)
Small problem	-0.178	-.0445	0.033
	(0.301)	(.0752)	(0.189)
NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)			
big problem	0.447**	.1111**	0.273**
	(0.1757)	(.0433)	(0.124)
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	-13.94***	-.971***	-0.158
	(0.682)		(0.383)
Primary	-13.24***	-.871***	-0.019
	(0.699)	(.017)	(0.3841)
Secondary	-11.67***	-.791***	0.1025
	(0.868)	(.0221)	(0.3687)
PARTNER'S EDUCATION (REF: HIGHIER)			
No education	-0.8364**	-.205**	-0.446**
	(0.4187)	(.0986)	(0.1977)
Primary	-0.4487	-.117	-0.3479
	(0.4395)	(.1081)	(0.2178)
Secondary	-0.3461	-.0863	0.0634
	(0.4629)	(.1148)	(0.1995)
AGE OF THE RESPONDENTS			
Age	-0.002	-.0005	0.007

	(0.0200)	(.005)		(0.014)

OTHER VARIABLES
NUMBER OF CHILDREN OR BIRTH ORDER

Birth order	-0.01928	-.0048	-0.0222
	(0.0480)	(.0119)	(0.0356)

MARITAL STATUS (REF: MARIED)

Single	-0.202	-.051	0.210
	(0.5974)	(.149)	(0.2938)

RESIDENCE

Urban	0.129	.032	-0.078
	(0.235)	(.0583)	(0.159)

RELIGION (REF. CHRISTIANITY)

Islam	-1.749***	-.354***	-0.784***
	(0.406)	(058)	(0.215)
_cons	18.54***		2.131***
	(1.148)		(0.561)

No of observations	601
Prob >chi2	0.0000
Pseudo R2	0.2077

Table A13: Antenatal care utilisation in North West 1999

	NDHS 1999		
	First		Second
	Logit model		NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-1.559**	-.2809**	-1.091**
	(0.684)	(0.1027)	(0.395)
Poorer	-1.032	-.1919*	0.069
	(0.643)	(0.1058)	(0.3781)
Middle	-0.292	-.0586	0.497
	(0.618)	(0.119)	(0.346)
Richer	-0.639	-.1177	-0.070
	(0.556)	(0.0895)	(0.311)
EMPLOYMENT STATUS			
not employed	0.1325	.027	-0.125
	(0.2973)	(0.060)	(0.239)
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	-11.129***	-.933***	0.020
	(1.125)	(0.015)	(0.458)
Primary	-10.018***	-.495 ***	0.665
	(1.1679)	(0.05)	(0.442)
Secondary	-9.265***	-.435***	1.033**
	(1.2200)	(0.030)	(0.402)

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PARTNER'S EDUCATION (REF: HIGHIER)

No education	-2.1974**	-.481**	-0.854**
	(0.8771)	(0.178)	(0.327)
Primary	-1.8970**	-.270***	-0.320
	(0.9248)	(0.086)	(0.367)
Secondary	-1.2994	-.212**	0.048
	(0.8970)	(0.112)	(0.3383)

AGE OF THE RESPONDENTS

Age	0.019	.0039	0.012
	(0.0289	(0.006)	(0.027)

OTHER VARIABLES
NUMBER OF CHILDREN OR BIRTH ORDER

Birth order	0.0723	.0150	0.071
	(0.0693)	(0.014)	(0.065)

MARITAL STATUS (REF: MARIED)

Single	2.915**	.596***	1.153***
	(1.0672)	(0.114)	(0.359)

RESIDENCE

Urban	1.335***	.3096***	1.261***
	(0.462)	(0.1100)	(0.274)

RELIGION (REF. CHRISTIANITY)

Islam	-0.122	-.025	0.143
	(1.008)	(0.199)	(0.380)
Traditionalist	-1.609**	-.389***	-0.351
	(0.586)	(0.132)	(0.2745)
_cons	13.125***		0.354
	(1.205)		(0.795)
No of observations	1081		
Prob >chi2	0.0000		
Pseudo R2	0.0773		

Table A13: Antenatal care utilisation in North West 1990

	NDHS 1990		
	First Logit model		Second NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-1.278***	-.0896**	-0.313***
	(0.415)	(0.0437)	(0.087)
Poorer	-0.843**	-.0499**	-0.23**
	(0.4407)	(0.0349)	(0.091)
Middle	-0.7331*	-.0404*	-0.088
	(0.4252)	(0.0301)	(0.076)
Richer	-0.5899**	-.0276*	-0.138***
	(0.2947)	(0.0155)	(0.032)
EMPLOYMENT STATUS			
not employed	-0.425	-.0203	0.023
	(0.323)	(0.0178)	(0.0392)
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	0.276	.01087	-0.027
	(0.765)	(0.0286)	(0.081)
Primary	0.466	.0183	-0.029
	(0.7457)	(0.0279)	(0.0755)
Secondary	0.8254	.0301	0.0017
	(0.7088)	(0.0230)	(0.0696)
PARTNER'S EDUCATION (REF: HIGHIER)			
No education	-1.2019*	-.0732	-0.164**
	(0.7004)	(0.0593)	(0.062)
Primary	-0.664	-.0298	-0.081*
	(0.68)	(0.033)	(0.048)
Secondary	-0.937	-.0464	-0.045
	(0.6427)	(0.0376)	(0.043)
AGE OF THE RESPONDENTS			
Age	0.0073	.0003	-0.004
	(0.0227)	(0.0009)	(0.003)
OTHER VARIABLES			
NUMBER OF CHILDREN OR BIRTH ORDER			
Birth order	-0.078	-.0032	0.001
	(0.055)	(0.0024)	(0.009)
MARITAL STATUS (REF: MARIED)			
Single	-0.404		0.034
	(0.469)	-.0199	(0.079)
		(0.0273)	
RESIDENCE			
Urban	0.6152*	.0298	0.135**
	(0.3287)	(0.0188)	(0.059)
RELIGION (REF. CHRISTIANITY)			
Islam	0.1987	.0080	-0.027
	(0.2204)	(0.0088)	(0.029)
Traditionalist	-0.6809	-.0385	-0.239
	(0.5593)	(0.0415)	(0.166)
_cons	2.369***		2.369***
	(0.121)		(0.121)
No of observations	1957		
Prob >chi2	0.0000		
Pseudo R2	0.1279		

Table A14: Antenatal care utilisation in South East 2013

	NDHS 2013		
	First Logit model		Second NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-0.029	-.001	-0.227**
	(0.601)	(0.0165)	0.094
Poorer	-0.267	-.008	-0.194***
	(0.4944)	(0.0157)	(0.0648)
Middle	0.307	.0077	-0.0156
	(0.523)	(0.012)	(0.050)
Richer	1.002**	.0228*	0.031
	(0.5305)	(0.0106)	(0.0420)
EMPLOYMENT			
not employed	-0.274	-.008	-0.009
	(0.374)	(0.012)	(0.041)
PRICE VARIABLES			
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	-0.422	-.012	-0.121***
	(0.2682)	(0.008)	(0.034)
INSURANCE STATUS			
No insurance			0.222***
			(0.082)
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	-2.639**	-.231**	-0.449***
	(1.2118)	(0.2091)	(0.1101)
Primary	-1.898*	-.082*	-0.261***
	(1.1469)	(0.0730)	(0.0588)
Secondary	-1.026	-.0274	-0.092**
	(1.113)	(0.02)	(0.044)
PARTNER'S EDUCATION (REF: HIGHIER)			
No education	-0.986	-.041	0.0097
	(0.864)	(0.052)	(0.1016)
Primary	-0.418	-.0117	-0.0742
	(0.8136)	(0.0244)	(0.0534)
Secondary	-0.417	-.0115	-0.0235
	(0.8256)	(0.0236)	(0.0485)
AGE OF THE RESPONDENTS			
Age	0.069***	.001***	0.011***
	(0.026)	(0.001)	(0.0033)
OTHER VARIABLES			
NUMBER OF CHILDREN OR BIRTH ORDER			
Birth order	-0.118	-.0032	-0.028***
	(0.0724)	(0.0019)	(0.0095)
MARITAL STATUS (REF: MARIED)			
Single	-0.766**	-.028**	-0.084
	(0.373)	(0.019)	(0.074)

RESIDENCE

Urban	0.185	.005	-0.075***
	(0.3115)	(0.0088)	(0.036)

RELIGION (REF. CHRISTIANITY)
Islam	(#)	#	-0.119
			(0.2782)
Traditionalist	-0.999**	-.043**	-0.216
	(0.447)	(0.029)	(0.159)
_cons	3.395**		2.050***
	(1.276)		(0.1341)
No of observations	1447		
Prob >chi2	0.0000		
Pseudo R2	0.1506		

*significance at 10%   **significance at 5%   ***significance at 1%   # missing values

Table A15: Antenatal care utilisation in South East 2008

	NDHS 2008		
	First Logit model		Second NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-1.911**	-.196*	-0.401***
	(0.721)	(0.117)	(0.123)
Poorer	-2.151***	-.224**	-0.327
	(0.697)	(0.114)	(0.1110)
Middle	-1.7155**	-.138*	-0.162**
	(0.6579)	(0.074)	(0.080)
Richer	-1.153*	-.075	-0.021
	(0.656)	(0.053)	(0.071)
EMPLOYMENT			
not employed	-0.6369**	-.0384*	-0.096
	(0.2962)	(0.0213)	(0.0598)
PRICE VARIABLES			
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	0.028	.0014	0.0455
	(0.283)	(0.014)	(0.0574)
TRANSPORT TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	0.253	.013	-0.066
	(0.293)	(0.015)	(0.062)
NO PROVIDER (REF: NOT A BIG PROBLEM)			
big problem	-0.229	-.012	-0.0969*
	(0.2579)	(0.014)	(0.0584)
NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)			
big problem	-1.128***	-.0819***	-0.1881**
	(0.279)	(0.0279)	(0.0844)
INSURANCE STATUS			
No insurance			0.227*
			(0.1360)

EDUCATION VARIABLES

RESPONDENT'S EDUCATION (REF: HIGHIER)

No education	-1.982*	-.202*	-0.508***
	(1.145)	(0.185)	(0.151)
Primary	-1.705	-.115	-0.285**
	(1.106)	(0.096)	(0.109)
Secondary	-0.706	-.038	-0.145
	(1.101)	(0.063)	(0.0918)

PARTNER'S EDUCATION (REF: HIGHIER)

No education	-1.2483	-.1000	-0.1125
	(0.7991)	(0.0912)	(0.1237)
Primary	-0.7120	-.0379	-0.0909
	(0.779)	(0.0430)	(0.0857)
Secondary	-1.4449*	-.0932	-0.0100*
	(0.8180)	(0.0656)	(0.0880)

AGE OF THE RESPONDENTS

Age	-0.008	-.0004	0.0003
	(0.0217)	(0.001)	(0.0049)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

Birth order	-0.044	-.0022	-0.0060
	(0.060)	(0.0031)	(0.0151)

MARITAL STATUS (REF: MARIED)

Single	0.154	.007	-0.021
	(0.387)	(0.018)	(0.098)

RESIDENCE

Urban	0.3305	.016	-0.058
	(0.2697)	(0.013)	(0.0536)

RELIGION (REF. CHRISTIANITY)

Islam	-0.5825	-.039	-0.063
	(1.0855)	(0.090)	(0.347)
Traditionalist	-1.016***	-.077**	-0.365***
	(0.324)	(0.035)	(0.129)
_cons	6.877***		2.234***
	(1.321)		(0.210)

No of observations	1049
Prob >chi2	0.0000
Pseudo R2	0.2213

Table A16: Antenatal care utilisation in South East 2003

	NDHS 2003		
	First Logit model		Second NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-4.189***	-.6771***	0.077
	(0.7917)	(.0679)	(0.142)
Poorer	-3.613***	-.6770***	-0.166
	(0.7690)	(.0885)	(0.1319)
Middle	-2.624***	-.5443***	0.081
	(0.7612)	(.1147)	(0.1116)
Richer	-2.303***	-.4833***	0.0367
	(0.7548)	(.11756)	(0.1122)
EMPLOYMENT			
not employed	-0.087	-.0216	0.128
	(0.1722)	(.04294)	(0.0853)
PRICE VARIABLES			
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	0.191	.04764	0.397**
	(0.2621)	(.0653)	(0.1503)
Small problem	-0.560*	-.1388*	0.432***
	(0.304)	(.0738)	(0.139)
TRANSPORT TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	-0.012**	-.0028**	-0.153
	(0.2683)	(.0669)	(0.163)
Small problem	-0.178	-.0445	-0.194
	(0.301)	(.0752)	(0.152)
NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)			
big problem	0.4474**	.1112**	0.0363
	(0.1757)	(.0433)	(0.1285)
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	-13.94***	-.9713***	-0.169
	(0.6820)	(.0069)	(0.1957)
Primary	-13.24***	-.8712***	-0.325**
	(0.6991)	(.01683)	(0.145)
Secondary	-11.67***	-.791***	-0.139
	(0.868)	(.0221)	(0.1338)
PARTNER'S EDUCATION (REF: HIGHIER)			
No education	-0.836**	-.2047**	-0.4196**
	(0.419)	(.0985)	(0.182)
Primary	-0.449	-.1116	-0.3553**
	(0.4396)	(.1082)	(0.1542)
Secondary	-0.346	-.0863	-0.118
	(0.4629)	(.1147)	(0.1550)
AGE OF THE RESPONDENTS			
Age	-0.002	-.0005	-0.008
	(0.0200)	(.0050)	(0.0078)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

Birth order	-0.019	-.0048	0.0205
	(0.0480)	(.0119)	(0.0215)
MARITAL STATUS (REF: MARIED)			
Single	-0.2023	-.0505	-0.489***
	(0.597)	(.149)	(0.165)
RESIDENCE			
Urban	0.1299	reside~1*	-0.1411*
	(0.2347)	.0323173	(0.0766)
RELIGION (REF. CHRISTIANITY)			
Islam	-1.749***	-.3544***	
	(0.4067)	(.05768)	
_cons	18.546***		2.478***
	(1.148)		(0.308)
No of observations	1081		
Prob >chi2	0.0000		
Pseudo R2	0.3462		

Table A17: Antenatal care utilisation in South East 1999

	NDHS 1999		
	First		Second
	Logit model		NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-0.822	-.0351	-0.114
	(0.723)	(.04206)	(0.145)
Poorer			-0.134
	-0.402	-.0141	(0.0988)
	(0.591)	(.0235)	
Middle			-0.019
	-0.329	-.0110	(0.088)
	(0.564)	(.0205)	
Richer	0.282	.0081	-0.019
	(0.704)	(.01844)	(0.081)
EMPLOYMENT STATUS			
not employed	-0.449	-.0153	-0.147**
	(0.385)	(.0142)	(0.074)
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education		-.988***	-0.76***
	-14.48***	(.0026)	(0.196)
	(0.8099)		
Primary	-13.656***	-.980***	-0.503***
	(0.709)	(.0084)	(0.132)
Secondary		-.987***	-0.373***
	-13.104***	(.0059)	(0.115)
	(0.6456)		
PARTNER'S EDUCATION (REF: HIGHIER)			
No education	-0.0887		0.064
	(0.9190)	-.0028	(0.1584)
		(.0303)	
Primary	0.5541	.0171	0.1928*
	(0.8627)	(.0264)	(0.1059)

	(1)	(2)	(3)
Secondary	0.1942 (0.8680)	.0058 (.02511)	0.1328 (0.1031)

AGE OF THE RESPONDENTS

	(1)	(2)	(3)
Age	0.023 (0.048)	.0007 (.0015)	0.001 (0.0076)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

	(1)	(2)	(3)
Birth order	-0.203** (0.1074)	-.0062** (.00310	-0.0173 (0.0190)

MARITAL STATUS (REF: MARIED)

	(1)	(2)	(3)
Single	-0.7490 (0.6213)	-.0318 (.0347)	-0.085 (0.168)

RESIDENCE

	(1)	(2)	(3)
Urban	-0.292 (0.469)	-.0098 (.0168)	-0.186** (0.0714)

RELIGION (REF. CHRISTIANITY)

	(1)	(2)	(3)
Islam	-0.5206 (0.381)	-.0169 (.0133)	0.024 (0.065)
Traditionalist	-0.455** (0.1694)	#	#
_cons	16.539*** (1.367)		2.307*** (0.2281)
No of observations	262		
Prob >chi2	0.0000		
Pseudo R2	0.0645		

Table A18: Antenatal care utilisation in South East 1990

| | NDHS 1990 | | |
| | First Logit model | | Second NB model |
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-2.040***	-.296***	-0.506***
	(0.447)	(.0746)	(0.066)
Poorer	-1.688***	-.2657***	-0.361***
	(0.462)	(.0899)	(0.069)
Middle	-1.280***	-.1796*	-0.149**
	(0.455)	(.0758)	(0.058)
Richer	-1.004**	-0.136*	-0.067
	(0.4631)	(.074)	(0.0501)
EMPLOYMENT STATUS			
not employed	-0.083	-.0090	-0.021
	(0.1771)	(.0197)	(0.044)
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	-13.32***	-.997***	-0.257**
	(0.428)	(.001)	(0.107)
Primary	-12.952***	-.995***	-0.125
	(0.4223)	(.00122)	(0.0957)
Secondary	-12.344***	-.9796***	-0.094
	(0.425)	(.0004)	(0.0875)
PARTNER'S EDUCATION (REF: HIGHIER)			
No education	-0.347	-.0391	0.126
	(0.641)	(.0759)	(0.085)
Primary	-0.510	-.055	0.081
	(0.633)	(.0696)	(0.07)
Secondary	-0.619	-.076	0.119
	(0.640)	(.0907)	(0.075)
AGE OF THE RESPONDENTS			
Age	0.015	.002	0.008*
	(0.015)	(.0016)	(0.0042)
OTHER VARIABLES			
NUMBER OF CHILDREN OR BIRTH ORDER			
Birth order	-0.049	-.005	-0.021**
	(0.038)	(.0041)	(0.010)
MARITAL STATUS (REF: MARIED)			
Single	-0.5009**	-.0631**	-0.271***
	(0.224)	(.0324)	
RESIDENCE			
Urban	0.027	.003	0.012
	(.2005)	(.021)	(0.043)
RELIGION (REF. CHRISTIANITY)			
Islam	-0.324	-.039	-0.483***
	(0.3004)	(.0398)	(0.091)
Traditionalist	-0.347	-.0416	-0.155*
	(0.2517)	(.0335)	(0.084)
_cons	16.607***		2.084***
	(0.718)		(0.1393)
No of observations	1908		
Prob >chi2	0.0000		
Pseudo R2	0.1181		

Table A19: Antenatal care utilisation in South South region 2013

	NDHS 2013		
	First Logit model		Second NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-3.0732**	-.6357***	-2.6350**
	(1.1471)	(0.1334)	(0.9843)
Poorer	-0.6597**	-.1333**	-0.3173***
	(0.2386)	(0.0529)	(0.1081)
Middle	-0.5672***	-.1077***	-0.1304*
	(0.1911)	(0.0378)	(0.0742)
Richer	-0.5205***	-.0968***	-0.0255
	(0.1814)	(0.0345)	(0.0598)
EMPLOYMENT			
not employed	-0.4639***	-.0887***	-0.1559**
	(0.1418)	(0.0288)	(0.0611)
PRICE VARIABLES			
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	-0.8890***	-.1685***	-0.4607***
	(0.1127)	(0.0224)	(0.0539)
INSURANCE STATUS			
No insurance	1.2381**	.1556***	-0.1123
	(0.5549)	(0.0439)	(0.0913)
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	-3.1174	-.6510***	-0.7522***
	(0.5110)	(0.0694)	(0.1562)
Primary	-2.1321***	-.4286***	-0.3195***
	(0.4779)	(0.0928)	(0.0840)
Secondary	-1.5447***	-.2724***	-0.0202
	(0.4731)	(0.0775)	(0.0657)
PARTNER'S EDUCATION (REF: HIGHIER)			
No education	0.0807	.0141	-0.1040
	(0.3364)	(0.0578)	(0.1730)
Primary	0.1084	.0191	0.0297
	(0.2197)	(0.0382)	(0.0821)
Secondary	-0.0508	-.0090	0.0067
	(0.2011)	(0.0358)	(0.0646)
AGE OF THE RESPONDENTS			
Age	0.0672***	.01202***	0.0249***
	(0.0123)	(0.0022)	(0.0050)
OTHER VARIABLES			
NUMBER OF CHILDREN OR BIRTH ORDER			
Birth order	-0.1812***	-.0323***	-0.0548***
	(0.0349)	(0.0063)	(0.0157)

MARITAL STATUS (REF: MARIED)			
Single	0.0617	.0107	0.0111
	(0.2415)	(0.0419)	(0.1094)
RESIDENCE			
Urban	0.8555***	.1395***	0.3725***
	(0.1481)	(0.0214)	(0.0525)
RELIGION (REF. CHRISTIANITY)			
Islam	0.4552	.0719	0.4744***
	(0.3368)	(0.0465)	(0.1670)
Traditionalist	0.4440	.0701	0.5665**
	(0.5694)	(0.0782)	(0.2843)
_cons	2.1038***		1.5707***
	(0.6045)		(0.1789)
No of observations	1996		
Prob >chi2	0.0000		
Pseudo R2	0.1760		

Table A20: Antenatal care utilization in South south 2008

	NDHS 1999		
	First Logit model		Second NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-1.2143***	-.2229**	-0.5945***
	(0.3822)	(0.0848)	(0.1604)
Poorer	-1.2076***	-.2077***	-0.5104***
	(0.3238)	(0.0647)	(0.1083)
Middle	-0.9386***	-.1482**	-0.3730***
	(0.3129)	(0.0549)	(0.0794)
Richer	-0.6974**	-.1041**	-0.2381***
	(0.2999)	(0.0479)	(0.0649)
EMPLOYMENT			
not employed	-0.1654	-.0231	-0.1555*
	(0.1709)	(0.0246)	(0.0626)
PRICE VARIABLES			
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	0.1050	.0140	-0.1529**
	(0.2476)	(0.0329)	(0.0772)
TRANSPORT TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)	-0.6450**	-.09415**	-0.1302
big problem	(0.2419)	(0.0373)	(0.0824)
NO PROVIDER (REF: NOT A BIG PROBLEM)			
big problem	-0.5818***	-.0844***	-0.2158***
	(0.1486)	(0.0230)	(0.0636)
NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)			
big problem	-0.6818***	-.1097***	-0.1480
	(0.2046)	(0.0383)	(0.1116)

INSURANCE STATUS

No insurance	-1.4045**	.1185**	0.0252
	(1.0005)	(0.0462)	(0.0781)

EDUCATION VARIABLES

RESPONDENT'S EDUCATION (REF: HIGHIER)

No education	-1.5463**	-.2977**	-0.5333***
	(0.6074)	(0.1408)	(0.1418)
Primary	-1.1102**	-.1669*	-0.1870**
	(0.5834)	(0.0945)	(0.0945)
Secondary	-0.5891	-.0807	-0.0944
	(0.5720)	(0.0784)	(0.0783)

PARTNER'S EDUCATION (REF: HIGHIER)

No education	-0.8877**	-.1526	-0.1413
	(0.3419)	(0.0710)	(0.1457)
Primary	-0.5453**	-.0809	0.0248
	(0.2729)	(0.0442)	(0.0872)
Secondary	-0.3338	-.0449	-0.0629
	(0.2549)	(0.0342)	(0.0633)

AGE OF THE RESPONDENTS

Age	0.0485***	.0065***	0.0054
	(0.0164)	0.0022	(0.0062)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

Birth order	-0.1283***	-.0173***	-0.0135
	(0.0429)	(0.0059)	(0.0195)

MARITAL STATUS (REF: MARIED)

Single	-0.4606	-.0714	-0.3143
	(0.2900)	(0.0512)	(0.1363)

RESIDENCE

Urban	0.1694	.0222	0.0007
	(0.2151)	(0.0274)	(0.0596)

RELIGION (REF. CHRISTIANITY)

Islam	1.8542*	.1389***	0.2812**
	(0.7734)	(0.0253)	(0.1034)
Traditionalist	0.2619	.03249	0.1291**
	(0.4268)	(0.0484)	(0.1734)
_cons	2.9781***		2.3530***
	(0.7466)		(0.1921)

No of observations	1542
Prob >chi2	0.0000
Pseudo R2	0.1730

Table A21: Antenatal care utilisation in South South 2003

	NDHS 2003		
	First Logit model		Second NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-3.0851**	-.2522	-0.5108**
	(1.2853)	(.18176)	(0.2113)
Poorer	-3.1574**	-.2801	-0.5534**
	(1.2596)	(.1942)	(0.2013)
Middle	-2.8789**	-.1955*	-0.3597**
	(1.2534)	(0.1405)	(0.1709)
Richer	-2.3106**	-.1224	-0.1088
	(1.1960)	(0.0921)	(0.1560)
EMPLOYMENT			
not employed	-0.1736	-.0047	-0.1550
	(0.4223)	(0.0119)	(0.1374)
PRICE VARIABLES			
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	-0.6828	-.0191	-0.3450
	(0.7019)	(0.0195)	(0.2404)
Small problem	0.0580	.0014	0.0368
	(0.6976)	(0.0174)	(0.2084)
TRANSPORT TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	-1.1002	-.0318	-0.4815**
	(0.7480)	(0.0251)	(0.2494)
Small problem	0.2102	.0052	-0.1635
	(0.6674)	(0.0156)	(0.2016)
NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)	0.0571	.0015	0.2467*
	(0.4095)	(0.1106)	(0.1401)
big problem			
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	-15.4095***	-.9925***	-0.3132
	(0.7461)	(0.0023)	(0.2681)
Primary	-14.3039***	-.9958***	-0.1690
	(0.6198)	(0.0023)	(0.2240)
Secondary	-14.7977***	-.9876***	-0.0846
	(0.5232)	(0.0056)	(0.2022)
PARTNER'S EDUCATION (REF: HIGHIER)			
No education	0.6475	.0131026	0.2908
	(1.1792)		(0.2681)
Primary	-0.8458	-.0263	-0.0023
	(0.7379)	(0.0247)	(0.1805)
Secondary	-0.2377	-.0063	0.0195

	(0.7450)	(0.0193)	(0.1591)
AGE OF THE RESPONDENTS			
Age	0.1237**	.0032**	0.0291**
	(0.0616)	(0.0019)	(0.0131)
OTHER VARIABLES			
NUMBER OF CHILDREN OR BIRTH ORDER			
Birth order	-0.1102	-.0029	-0.0464
	(0.1331)	(0.0035)	(0.0301)
MARITAL STATUS (REF: MARIED)			
Single	-0.2501	-.0072	0.0596
	(0.6311)	(0.0202)	(0.2222)
RESIDENCE			
Urban	0.6624	.0153	0.1621
	(0.5636)	(0.0128)	(0.1301)
RELIGION (REF. CHRISTIANITY)			
Islam	(#)		0.3779
			(0.4135)
Traditionalist	(#)		0.4446
			(0.4045)
_cons	15.8854***		1.4793***
	(2.3936)		(0.4395)
No of observations	319		
Prob >chi2	0.0000		
Pseudo R2	0.0202		

Table A22: Antenatal care utilization in South West 2013

	NDHS 2013		
	First		Second
	Logit model		NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-3.335***	-.333**	-2.109***
	(0.683)	(0.1520)	(0.379)
Poorer	-1.768***	-.078**	
	(0.480)	(0.039)	-0.389***
			(0.088)
Middle	-0.353	-.008	
	(0.4528)	(0.0115)	-0.039
			(0.046)
Richer	-0.199	-.004	
	(0.4369)	(0.0094)	0.014
			(0.027)
EMPLOYMENT			
not employed	-0.824**	-.023**	-0.021
	(0.301)	(0.011)	(0.043)
PRICE VARIABLES			
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	-0.689***	-.018**	-0.266***
	(0.216)	(0.008)	(0.050)
INSURANCE STATUS			
No insurance			-0.046
			(0.057)
EDUCATION VARIABLES			

RESPONDENT'S EDUCATION (REF: HIGHIER)

No education	-1.4673*	-.054**	-0.128
	(0.7954)	(0.0474)	(0.079)
Primary	-0.798	-.0196	0.055
	(0.804)	(0.024)	(0.048)
Secondary	-0.281	-.006	
	(0.758)	(0.0152)	0.064*
			(0.037)

PARTNER'S EDUCATION (REF: HIGHIER)

No education	-0.3910	-.0091	-0.097
	(0.595)	(0.016)	(0.0803)
Primary	-0.307	-.007	
	(0.539)	(0.013)	-0.109*
			(0.046)
Secondary	-0.298	-.006	-0.041
	(0.5152)	(0.0105)	(0.033)

AGE OF THE RESPONDENTS

Age	0.066***	.001**	
	(0.0233)	(0.0005)	0.010***
			(0.003)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

Birth order	-0.240***	-.005***	
	(0.0668)	(0.002)	-0.037***
			(0.010)

MARITAL STATUS (REF: MARIED)

Single
RESIDENCE

Urban	0.809**	.019**	-0.022***
	(0.305)	(0.0086)	(0.032)

RELIGION (REF. CHRISTIANITY)

Islam	0.689**	.0126**	0.002
	(0.257)	(0.0047)	(0.027)
Traditionalist	(#)		0.368
			(0.1346)
_cons	3.026***		2.542***
	(0.8477)		(0.097)
No of observations	2350		
Prob >chi2	0.0000		
Pseudo R2	0.3999		

Table A23: Antenatal care utilization in South West 2008

	NDHS 2008		
	First Logit model		Second NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	-1.684***	-.0978*	-0.467***
	(0.527)	(0.054)	(0.1073)
Poorer	-1.198**	-.0516**	-0.344***
	(0.507)	(0.032)	(0.0665)
Middle	-0.573	-.0188	-0.123**
	(0.504)	(0.020)	(0.0527)
Richer	-0.465	-.0138	-0.069**
	(0.427)	(0.014)	(0.035)
EMPLOYMENT			
not employed			
PRICE VARIABLES			
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	-0.689**	-.0221**	-0.039***
	(0.272)	(0.0103)	(0.012)
TRANSPORT TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	0.197	.0050	-0.121**
	(0.273)	(0.0066)	(0.047)
NO PROVIDER (REF: NOT A BIG PROBLEM)			
big problem	-0.839	-.0306**	0.089*
	(0.347)	(0.0160)	(0.049)
NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)			
big problem	0.175	.0044	0.019
	(0.421)	(0.0099)	(0.053)
INSURANCE STATUS			
No insurance	0.104	.003	0.013
	(0.331)	(0.008)	(0.082)
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	-1.549	-.0743	-0.176**
	(0.954)	(0.0723)	(0.078)
Primary	-1.054	-.0364	-0.1026*
	(0.9178)	(0.0397)	0.0597)
Secondary	-0.409	-.0112	0.009*
	(0.845)	(0.0238)	(0.048)
PARTNER'S EDUCATION (REF: HIGHIER)			
No education	-1.250*	-.0543*	-0.030
	(0.727)	(0.0481)	(0.039)
Primary	-0.178	-.0050	-0.125
	(0.686)	(0.0203)	(0.078)
Secondary	-0.182	-.0049	0.124**
	(0.627)	(0.0171)	(0.052)
AGE OF THE RESPONDENTS			
Age	0.071***	.002**	0.009**
	(0.026)	(0.0007)	(0.0033)
OTHER VARIABLES			
NUMBER OF CHILDREN OR BIRTH ORDER			
Birth order	-0.213**	-.0057**	0.039

	(0.082)	(0.0024)	(0.041)
MARITAL STATUS (REF: MARIED)			
Single	-0.717	-.0268	0.009
	(0.608)	(0.0307)	(0.109)
RESIDENCE			
Urban	-0.197	-.0052	-0.082**
	(0.314)	(0.0084)	(0.034)
RELIGION (REF. CHRISTIANITY)			
Islam	0.553**	.0140**	0.043
	(0.226)	(0.0055)	(0.030)
Traditionalist	-0.892	-.0369	-0.093
	(0.719)	(0.0433)	(0.198)
_cons	3.619***		0.071
	(1.159)		(0.061)
No of observations	2405		
Prob >chi2	0.0000		
Pseudo R2	0.4029		

Table A24: Antenatal care utilisation in South West 2003

	NDHS2003		
	First Logit model		Second NB model
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err.
INCOME VARIABLES			
Poorest	0.5414	.0005	-0.1868
	(0.9472)	(0.001)	(0.133)
Poorer	0.7232	.0006	-0.0568
	(0.9213)	(0.0008)	(0.1284)
Middle	(#)	#	0.0918
			(0.1234)
Richer	-0.870	-.0014	0.0259
	(0.553)	(.0009)	(0.0847)
EMPLOYMENT			
not employed	-0.452	-.0006	-0.2619**
	(1.133)	(0.002)	(0.1016)
PRICE VARIABLES			
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	-0.206	-.0002	-0.080
	(0.951)	(0.0009)	(0.191)
Small problem	-0.162	-.00012	-0.2356
	(1.1390)	(0.0014)	(0.1962)
TRANSPORT TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)			
big problem	0.597	.0008	0.2625
	(0.855)	(0.0015)	(0.207)
Small problem	1.847	.001	0.296
	(1.409)	(0.001)	(0.209)
NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)			
big problem	1.438**	.003**	0.165
	(0.689)	(0.003)	(0.129)
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	0.392	.0004	-0.0049
	(1.610)	(0.001)	(0.1599)
Primary	2.497	.002	0.0705
	(1.857)	(0.002)	(0.1405)
Secondary	2.5775*	.004	0.146
	(1.5278)	(0.002)	(0.127)
PARTNER'S EDUCATION (REF: HIGHIER)			

No education	-14.92***	-.996***	-0.0213
	(1.2873)	(0042)	(0.1341)
Primary	-15.821***	-.994***	-0.1730
	(1.0290)	( )	(0.1136)
Secondary	-14.902***	-.8527***	-0.1332
	(1.144)	(0.1326)	(0.0929)

AGE OF THE RESPONDENTS

Age	-0.0649	-.0001	-0.0033
	(0.051)	(0.0001)	(0.0066)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

Birth order	0.349	.0004	0.0037
	(0.253)	(0.0003)	(0.021)

MARITAL STATUS (REF: MARIED)

Single	(#)	(#)	0.176
			(0.187)

RESIDENCE

Urban	1.231	.0017	-0.0506
	(0.936)	(0.0011)	(0.0864)

RELIGION (REF. CHRISTIANITY)

Islam	1.288	(.001)	0.0505
	(0.793)		(0.0616)
Traditionalist	-1.537	-.0041	-0.5683**
	(1.401)	(0.007)	(0.2432)
_cons	15.28***		2.469***
	(2.119)		(0.282)
No of observations	400		
Prob >chi2	0.0000		
Pseudo R2	0.3018		

Table A25: Antenatal care utilisation in South West 1999

Variable	First Logit model Coef./Std Err	First Logit model Mar. Effect	Second NB model Coef./Std Err.
INCOME VARIABLES			
Poorest	-0.3802	-.013	-0.120
	(0.852)	(0.033)	(0.115)
Poorer	-0.2208	-.007	-0.274**
	(0.9624)	(0.034)	(0.105)
Middle	-0.2735	-.009	-0.094
	(0.7509)	(0.027)	(0.083)
Richer	0.0588	.002	-0.082
	(0.6346)	(0.018)	(0.061)
EMPLOYMENT STATUS			
not employed	-0.4252	-.020	0.023
	(0.3233)	(0.018)	(0.039)
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	-0.9569	-.038	-0.117
	(1.8049)	(0.097)	(0.138)
Primary	-0.1026	-.003	-0.139
	1.6967	(0.052)	(0.117)
Secondary	0.0477	.0013	-0.041
	(1.4837)	(0.043)	(0.102)
PARTNER'S EDUCATION (REF: HIGHIER)			
No education	-1.2019*	-.073	-0.164**
	(0.7004)	(0.059)	(0.0624)
Primary	-0.6640	-.029	-0.081*
	(0.6782)	(0.0331	0.048
Secondary	-0.9375	-.0464	-0.045
	(0.6427)	(0.038)	(0.043)
AGE OF THE RESPONDENTS			
Age	-0.0355	-.001	0.004
	(0.0443)	(0.001)	(0.006)
OTHER VARIABLES			
NUMBER OF CHILDREN OR BIRTH ORDER			
Birth order	0.1185	.0035	-0.033*
	(0.1221)	(0.004)	(0.018)
MARITAL STATUS (REF: MARIED)			
Single	(#)	(#)	0.103
			(0.086)
RESIDENCE			
Urban	0.7349	.022	0.000
	(0.5627)	(0.0162)	(0.057)
RELIGION (REF. CHRISTIANITY)			
Islam	0.2691	.0075	-0.075
	(0.4991)	(0.02)	(0.059)
Traditionalist	-1.505**	.038***	-0.118*
	(0.5467)	(0.013)	(0.064)
_cons	3.827**		2.4449***
	(1.571)		(0.1982)
No of observations	563		
Prob >chi2	0.0000		
Pseudo R2			

Table A26: Antenatal care utilisation in South West 1990

Variable	First Logit model Coef./Std Err	First Logit model Mar. Effect	Second NB model Coef./Std Err.
INCOME VARIABLES			
Poorest	-1.278***	-.089**	-0.313***
	(0.415)	(0.044)	(0.087)
Poorer	-0.843**	-.049	-0.232**
	(0.441)	(0.035)	(0.091)
Middle	-0.733*	-.040	-0.088
	(0.425)	(0.0301)	(0.076)
Richer	-0.589**	-.028*	-0.138***
	(0.295)	(0.0155)	(0.032)
EMPLOYMENT STATUS			
not employed	-0.425	-.020	0.023
	(0.3233)	(0.0178)	(0.0392)
EDUCATION VARIABLES			
RESPONDENT'S EDUCATION (REF: HIGHIER)			
No education	0.276	.0109	-0.027
	(0.765)	(0.029)	(0.081)
Primary	0.466	.0183	-0.029
	(0.746)	(0.028)	(0.076)
Secondary	0.825	.030	0.002
	(0.709)	(0.023)	(0.069)
PARTNER'S EDUCATION (REF: HIGHIER)			
No education	-1.202*	-.073	-0.164**
	(0.7004)	(0.059)	(0.062)
Primary	-0.664	-.029	-0.081*
	(0.678)	(0.033	0.048
Secondary	-0.938	-.046	-0.045
	(0.6427)	(0.038)	(0.0434)
AGE OF THE RESPONDENTS			
Age	0.007	.0003	-0.004
	(0.023)	(0.001)	0.003
OTHER VARIABLES			
NUMBER OF CHILDREN OR BIRTH ORDER			
Birth order	-0.078	-.003	0.001
	(0.0569)	(0.003)	(0.009)
MARITAL STATUS (REF: MARIED)			
Single	-0.404	-.019	0.034
	(0.469)	(0.028)	(0.079)
RESIDENCE			
Urban	0.6152*	.0298*	0.135**
	(0.3287)	(0.0188)	(0.058)
RELIGION (REF. CHRISTIANITY)			
Islam	0.199	.008	-0.027
	(0.2204)	(0.009)	(0.0292)
Traditionalist	-0.681	-.0385	-0.239
	(0.559)	(0.042)	(0.166)
_cons	3.385***		2.369***
	(0.906)		(0.121)
No of observations	1957		
Prob >chi2	0.0000		
Pseudo R2	0.1279		

Appendix 11: regional regression results for skilled delivery utilisation

Table A27: Skilled delivery care utilisation in the North Central 2013, 2008 and 2003

Variable	NDHS 2013 Coef./Std Err	NDHS 2013 Mar. Effect	NDHS 2008 Coef./Std Err	NDHS 2008 Mar. Effect	NDHS 2003 Coef./Std Err	NDHS 2003 Mar. Effect
WEALTH VARIABLES						
Poorest	-1.2799***	-.0463***	-1.1262***	-.0304***	-1.5953***	-.0531***
	(0.1900)	(0.0044)	(0.1310)	(0.0029)	(0.2641)	(0.0078)
Poorer	-0.5020***	-.0246***	-0.9225***	-.0269***	-1.2354***	-.0390***
	(0.1209)	(0.0053)	(0.1178)	(0.0030)	(0.2373)	(0.0061)
Middle	-0.3439***	-.0182***	-0.7379***	-.0226***	-0.6747***	-.0251***
	(0.0984)	(0.0050)	(0.1022)	(0.0028)	(0.2098)	(0.0068)
Richer		-.0032	-0.2223**	-.0073**	-0.4003**	-.0159**
	-0.0594	(0.0046)	(0.0913)	(0.0028)	(0.1815)	(0.0067)
	(0.0848)					
EMPLOYMENT						
not employed	0.1961***	.0115**	-0.3247***	-.0107***	-0.2215	-.0092
	(0.0668)	(0.0042)	(0.0666)	(0.0021)	(0.1443)	(0.0057)
PRICE VARIABLES						
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)						
big problem		-.0262***	-0.1719*	-.0060**	-0.3294	-.0144
	-0.5205***	(0.0035)	(0.0913)	(0.0032)	(0.3164)	(0.0139)
	(0.0761)					
Smalll problem					0.5554*	.0281
					(0.3163)	(0.0184)
TRANSPORT TO HEALTH FACILTY (REF : NOT A BIG PROBLEM)						
big problem	NO DATA	NO DATA	-0.0589	-.0021	0.3301	.0143
			(0.0980)	(0.0034)	(0.3238)	(0.0141)
Small problem	NO DATA	NO DATA	NO DATA	NO DATA	-0.1349	-.0057
					(0.3237)	(0.0133)

NO PROVIDER (REF : NOT A BIG PROBLEM)

big problem	NO DATA	NO DATA	-0.1015	-.0035	NO DATA	NO DATA
			(0.0812)	(0.0028)		
Small problem						

NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)   NO DATA   NO DATA

big problem			-0.1681	-.0056	0.2195	.0090
			(0.1085)	(0.0034)	(0.1797)	(0.0069)

INSURANCE STATUS

no insurance	-0.0394***	-.0022	-0.3106**	-.0126**	NO DATA	NO DATA
	(0.1273)	(0.0073)	(0.1233)	(0.0057)		

EDUCATION VARIABLES

RESPONDENT'S EDUCATION (REF:HIGHIER)

no education	-1.8866***	-.0956***	-1.8377***	-.0737***	-0.6187*	-.0277*
	(0.1203)	(0.0064)	(0.1320)	(0.0066)	(0.3526)	(0.0163)
Primary	-1.5254***	-.0701***	-1.2433***	-.0362***	-0.4950	-.0199
	(0.1107)	(0.0048)	(0.1176)	(0.0032)	(0.3388)	(0.0126)
Secondary	-0.8005***	-.0370***	-0.6542***	-.0189***	-0.0104	-.0005
	(0.0956)	(0.0038)	(0.1070)	(0.0026)	(0.3260)	(0.0142)

PARTNER'S EDUCATION

no education	-0.2833***	-.0148***	-0.5309***	-.0179***	-0.5396**	-.0221**
	(0.1077)	(0.0053)	(0.1146)	(0.0037)	(0.2106)	(0.0082)
Primary	-0.1322	-.0071	-0.3104***	-.0102***	-0.5178**	-.0208***
	(0.0943)	(0.0049)	(0.0994)	(0.0030)	(0.1873)	(0.0070)
Secondary	-0.0356	-.0019	-0.0816	-.0028	-0.0414	-.0017
	(0.0750)	(0.0041)	(0.0832)	(0.0028)	(0.1714)	(0.0074)

AGE OF THE RESPONDENTS

age	-0.2180***	-.0121***	-0.2275***	-.0080***	-0.2179***	-.0096***
	(0.0056)	(0.0003)	(0.0060)	(0.0003)	(0.0122)	(0.0006)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	0.5224***	.0290***	0.5030***	.0177***	0.4444***	.0195***
	(0.0175)		(0.0166)	(0.0007)	(0.0343)	(0.0016)

MARITAL STATUS (REF: MARIED)

Single	-0.6169***	-.0272***	-0.3209**	-.0100*	-0.2995	-.0116
	(0.1589)	(0.0055)	(0.1540)	(0.0042)	(0.2791)	(0.0097)

RESIDENCE

Urban	0.7734***	.0503***	0.4512***	.0178***	0.2374*	.01075*
	(0.0739)	(0.0056)	(0.0724)	(0.0032)	(0.1411)	(0.0066)

RELIGION (REF :CHRISTIANITY)

Islam		-.0016	-0.1699**	-.0059**	-0.3903**	-.0163**
	-0.0292	0.0034	(0.0683)	(0.0024)	(0.1467)	(0.0060)
	(0.0611)					
Traditionalist	-0.8112***	-.0324***	-0.4489	-.0130	-2.1656**	-.0421***
		(0.0098)	(0.3394)	(0.0080)	(0.7908)	(0.0060)
	(0.3615)					
_cons	5.1601***		6.0162***		4.4079***	
	(0.2253)		(0.2486)		(0.5162)	
No of observations	15286		17355		3670	
Prob >chi2	0.0000		0.0000		0.0000	
Pseudo R2	0.2825		0.2840		0.2796	

Table A28: Skilled delivery care utilisation in the North Central 1999

	NDHS 1999	
Variable	Coef./Std Err	Mar. Effect

WEALTH VARIABLES

Poorest	-0.7609**	-.0104***
	(0.3026)	(0.0035)

Poorer	-0.2476	-.0039
	(0.2654)	(0.0040)
Middle	-0.4203	-.0064**
	(0.2212)	(0.0032)
Richer	0.1083	.0019
	(0.1806)	(0.0033)
EMPLOYMENT		
not employed	-0.6767***	-.0106***
	(0.1744)	(0.0026)
no education	-1.6091***	-.0359***
	(0.3331)	(0.0099)
Primary	-1.0364***	-.0140***
	(0.3033)	(0.0034)
Secondary	-0.4261	-.0063*
	(0.2802)	(0.0035)
PARTNER'S EDUCATION		
no education	-0.4690*	-.0079*
	(0.2648)	(0.0045)
Primary	0.0736	.00128
	(0.2317)	(0.0041)
Secondary	0.1506	.0027
	(0.2113)	(0.0041)
AGE OF THE RESPONDENTS		
Age	-0.2335***	-.0040***
	(0.0166)	(0.0004)
OTHER VARIABLES		
NUMBER OF CHILDREN OR BIRTH ORDER		
birth order		
MARITAL STATUS (REF: MARIED)	0.4873***	.0084***
	(0.0405)	(0.0009)
Single	-0.4434	-.00629
	(0.4655)	(0.0054)

RESIDENCE

Urban	0.1992	.0036
	(0.1591)	(0.0029)

RELIGION (REF :CHRISTIANITY)

Islam	-0.0388	-.0007
	(0.2179)	(0.0036)
Traditionalist	-0.0167	-.0003
	(0.1649)	(0.0028)
_cons	4.3749***	
	(0.5424)	
No of observations	4656	
Prob >chi2	0.0000	
Pseudo R2	0.2471	

Table A29: Skilled delivery care utilisation in the North East 2013, 2008 and 2003

	NDHS 2013		NDHS 2008		NDHS 2003	
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
WEALTH VARIABLES						
Poorest	-1.5836***	-.0167***	-2.2592***	-.0229***	-1.9441***	-.0181***
	(0.1837)		(0.1933)	(0.0027)	(0.3323)	(0.0037)
Poorer	-0.9895***	-.0094***	-1.4541***	-.0095***	-1.1587***	-.0098***
	(0.1599)	(0.0014)	(0.1862)	(0.0012)	(0.2799)	(0.0024)
Middle	-0.5031***	-.0047***	-0.8009***	-.0054***	-0.6888**	-.0059***
	(0.1401)	(0.0011)	(0.1604)	(0.0009)	(0.2705)	(0.0021)
Richer	-0.1659	-.0017***	-0.2695*	-.0021**	-0.2981	-.0028
	(0.1184)	(0.0012)	(0.1486)	(0.0010)	(0.2309)	(0.0020)
EMPLOYMENT						
not employed	0.2062***	.0023***	-0.0169	-.0002	0.2280	.0024
	(0.0720)	(0.0009)	(0.0785)	(0.0007)	(0.1498)	(0.0017)

PRICE VARIABLES

DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)

big problem	-0.6428***	-.0065***	-0.1958*	-.0016*	-0.6780**	-.0071**
	(0.0991)	(0.0010)	(0.1103)	(0.0010)	(0.2856)	(0.0031)
Smalll problem					0.3422	.0039
					(0.2978)	(0.0038)

TRANSPORT TO HEALTH FACILTY (REF : NOT A BIG PROBLEM)

big problem	NO DATA	NO DATA	-0.2115**	-.0018**	-0.0997	-.0010
			(0.1122)	(0.0010)	(0.2637)	(0.0028)
Small problem	NO DATA	NO DATA	NO DATA	NO DATA	-0.2575	-.0025
					(0.2896)	(0.0026)

NO PROVIDER (REF : NOT A BIG PROBLEM)

big problem	NO DATA	NO DATA	0.0555	.0005	NO DATA	NO DATA
			(0.0837)	(0.0007)		
Small problem						

NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)

	NO DATA	NO DATA				
big problem			-0.1348	-.0011	0.0707	.0007
			(0.1054)	(0.0009)	(0.1965)	(0.0020)

INSURANCE STATUS

no insurance					NO DATA	NO DATA

EDUCATION VARIABLES

RESPONDENT'S EDUCATION (REF:HIGHIER)

no education	-1.5991***	-.0272***	-1.7953***	-.0281***	-1.5252***	-.0252**
	(0.1663)	(0.0044)	(0.2113)	(0.0057)	(0.3660)	(0.0094)
Primary	-1.2756***	-.0098***	-1.2559***	-.0074***	-1.1758***	-.0088***
	(0.1603)	(0.0011)	(0.2087)	(0.0010)	(0.3507)	(0.0022)
Secondary	-0.4971***	-.0045***	-0.6177***	-.0041***	-0.1117	-.0011
	(0.1427)	(0.0011)	(0.2008)	(0.0011)	(0.3215)	(0.0031)

PARTNER'S EDUCATION

no education	-0.6989***	-.0085***	-0.4696***	-.0044***	-1.0991***	-.0142***
	(0.1239)	(0.0017)	(0.1389)	(0.0015)	(0.2416)	(0.0041)
Primary	-0.3552***	-.0035***	-0.1926	-.0015	-1.0067***	-.0079***
	(0.1286)	(0.0011)	(0.1436)	(0.0011)	(0.2555)	(0.0018)
Secondary	0.0943	.0011	-0.2042	-.0016*	-0.4017*	-.0036**
	(0.1024)	(0.0012)	(0.1289)	(0.0010)	(0.2169)	(0.0017)

AGE OF THE RESPONDENTS

age	-0.2217***	-.0024***	-0.2235***	-.0019***	-0.2337***	-.0025***
	(0.0070)	(0.0001)	(0.0080)	(0.0001)	(0.0164)	(0.0003)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order		0.4343***	.0048***	0.4193***	.0036***	0.4934***
		(0.0170)	(0.0003)	(0.0176)	(0.0003)	(0.0396)

MARITAL STATUS (REF: MARIED)

Single	-0.1026	-.0011	-0.3005	-.0023	0.1136	.0013
	(0.1731)	(0.0018)	(0.2127)	(0.0014)	(0.3315)	(0.0039)

RESIDENCE

Urban	0.4750***	.0061***	0.5063***	.0050***	-0.1252	-.0012
	(0.0971)	(0.0015)	(0.0998)	(0.0012)	(0.1689)	(0.0017)

RELIGION (REF :CHRISTIANITY)

Islam	-0.2992***	-.0036***	-0.6890***	-.0073***	-1.0815***	-.0169***
	(0.0969)	(0.0013)	(0.1058)	(0.0014)	(0.1893)	(0.0043)
Traditionalist	#	#	#	#	-0.0833	-.0008
					(1.0664)	(0.0104)
_cons	4.8736***		5.7040***		5.5814***	

	(0.2684)	(0.3437)	(0.6419)	

No of observations	23048	22536	5344
Prob >chi2	0.0000	0.0000	0.0000
Pseudo R2	0.3146	0.2939	0.3251

Table A30: Skilled delivery care utilisation in the Northeast 1999 and 1990

	NDHS 1999		NDHS 1990	
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
WEALTH VARIABLES				
Poorest	-0.5924	-.0013	-1.2070***	-.0067***
	(0.5319)	(0.0011)	(0.3233)	(0.0017)
Poorer	-0.1094	-.0002	-2.6383***	-.0151***
	(0.5727)	(0.0012)	(0.4297)	(0.0025)
Middle	-0.4597	-.0009	-1.4303***	-.0072***
	(0.5107)	(0.0009)	(0.3353)	(0.0016)
Richer	-0.0208	-.0001	-0.5152**	-.0031**
	(0.4031)	(0.0009)	(0.2428)	(0.0013)
EMPLOYMENT				
not employed	0.0421	.0001	0.2344	.0016
	(0.3075)	(0.0007)	(0.1608)	(0.0012)
EDUCATION VARIABLES				
RESPONDENT'S EDUCATION (REF:HIGHIER)				
no education	-1.3582**	-.0053*	-1.7809***	-.0291**
	(0.7104)	(0.0046)	(0.3441)	(0.0114)
Primary	-0.7638	-.0013	-1.5855***	-.0064***
	(0.6246)	(0.0009)	(0.3510)	(0.0012)
Secondary	0.6319	.0019	-0.4959***	-.0385***
	(0.5181)	(0.0022)	(0.1607)	(0.0111)

PARTNER'S EDUCATION

no education	-1.8761***	-.0074**	-1.8598***	-.0269***
	(0.5518)	(0.0038)	(0.3273)	(0.0090)
Primary	-0.3268	-.0006	-1.4207***	-.0063***
	(0.5179)	(0.0009)	(0.3588)	(0.0014)
Secondary	-0.4241	-.0008	-0.7147**	-.0039**
	(0.3666)	(0.0006)	(0.3431)	(0.0014)

AGE OF THE RESPONDENTS

Age	-0.2302***	-.0005***	-0.1978***	-.0014***
		(0.0001)	(0.0161)	(0.0002)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	0.4752***	.0010753***	0.5055***	.00358***
	(0.0707)	(0.0003)	(0.0395)	(0.0005)

MARITAL STATUS (REF: MARIED)

Single	#	#	-0.2878	-.001785
			(0.4535)	(0.0025)

RESIDENCE

Urban	0.6481*	.0017*	0.1268	.0009
	(0.3647)	(0.0013)	(0.2630)	(0.0020)

RELIGION (REF :CHRISTIANITY)

Islam	-0.4848	-.0009	-1.0871***	-.0113***
	(0.5420)	(0.0008)	(0.2195)	(0.0035)
Traditionalist	-2.0198***	-.0119**	-0.6118	-.0031
	(0.3823)	(0.0051)	(0.8374)	(0.0033)
_cons	4.3418***		5.6021***	
	(1.1068)		(0.6748)	
No of observations				
Prob >chi2	3857		6600	

Pseudo R2	0.0000	0.0000	
	0.3899	0.3099	

Table A31: Skilled delivery care utilization in the North West 2013, 2008, and 2003

Variable	NDHS 2013		NDHS 2008		NDHS 2003	
	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
WEALTH VARIABLES						
Poorest	-1.8639***	-.0105***	-2.4274***	-.0081***	-2.0306***	-.0078***
	(0.1823)	(0.0012)	(0.2406)	(0.0010)	(0.5251)	(0.0018)
Poorer	-1.3691***	-.0064***	-1.8848***	-.0058***	-1.18656***	-.0055***
	(0.1659)	(0.0008)	(0.2056)	(0.0008)	(0.3466)	(0.0016)
Middle	-0.6594***	-.0030***	-1.1405***	-.0030***	-1.3670***	-.0059***
	(0.1341)	(0.0005)	(0.1689)	(0.0004)	(0.3106)	(0.0015)
Richer	-0.2543**	-.0013**	-0.6948***	-.0019***	-0.8887***	-.0040***
	(0.1155)	(0.0005)	(0.1358)	(0.0004)	(0.2208)	(0.0011)
EMPLOYMENT						
not employed	-0.0489	-.0003	0.3055***	.0011***	0.3165**	.0019*
	(0.0752)	(0.0004)	(0.0929)	(0.0004)	(0.1621)	(0.0010)
PRICE VARIABLES						
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)						
big problem	-0.2795***	-.0015***	-0.2270	-.0008	-0.7993**	-0.005**
	(0.0904)	(0.0005)	(0.1756)	(0.0006)	(0.3904)	(0.0023)
Smalll problem					-0.1927	-.0011
					(0.4735)	(0.0024)

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TRANSPORT TO HEALTH FACILTY (REF : NOT A BIG PROBLEM)

big problem	0.2383	.0009	0.0051	.00003		
	(0.1810)	(0.0007)	(0.3835)	(0.0022)		
Small problem			-0.4585	-.0023		
			(0.4969)	(0.0021)		

NO PROVIDER (REF : NOT A BIG PROBLEM)

big problem			0.0748	.0003		
			(0.1131)	(0.0004)		
Small problem						

NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)

big problem			-0.1475*	-.0005***	-0.4265*	-.0024*
			(0.1185)	(0.0004)	(0.2355)	(0.0014)

INSURANCE STATUS

no insurance

EDUCATION VARIABLES

RESPONDENT'S EDUCATION (REF:HIGHIER)

no education	-1.5747***	-.0164***	-1.671***	-.0119***	-2.5168***	-.0395***
	(0.1915)	(0.0035)	(0.212)	(0.0028)	(0.4008)	(0.0139)
Primary	-1.2092***	-.0045***	-1.793***	-.0036***	-1.5724***	-.0053***
	(0.1895)	(0.0005)	(0.2214)	(0.0004)	(0.3755)	(0.0011)
Secondary	-0.5271***	-.0024***	-0.677***	-.0018***	-0.9847***	-.0038***
	(0.1733)	(0.0006)	(0.1913)	(0.0004)	(0.3409)	(0.0010)

PARTNER'S EDUCATION

no education	-0.3789***	-.0023***	-0.735***	-.0032***	-0.2122	-.00126
	(0.1215)	(0.0008)	(0.159)	(0.0009)	(0.2630)	(0.0016)
Primary	-0.1446	-.0008	-0.3046*	-.0010	-0.1526	-.0008

	(0.1364)	(0.0007)	(0.1645)		(0.2989)	(0.0015)
Secondary	-0.0191	-.0001	-0.1153	-.0004	0.1867	.0012
	(0.1046)	(0.0006)	(0.1400)	(0.0005)	(0.2157)	(0.0014)

AGE OF THE RESPONDENTS

age	-0.2180***	-.0012***	-0.217***	-.0007***	-0.2027***	-.0012***
	(0.0073)	(0.0001)	(0.0092)	(0.0001)	(0.0170)	(0.0002)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	0.4142***	.0023***	0.461***	.0016***	0.4190***	.00240***
	(0.0177)	(0.0002)	(0.0225)	(0.0002)	(0.04303)	(0.0004)

MARITAL STATUS (REF: MARIED)

Single	#	#	#	#	-0.4874	-.0022
					(0.4542)	(0.0017)

RESIDENCE

Urban	0.3413***	.0022***	0.5325***	.0024***	0.6354***	.0043*
	(0.0982)	(0.0007)	(0.1259)	(0.0007)	(0.2173)	(0.0017)

RELIGION (REF :CHRISTIANITY)

Islam	-1.2180***	-.0126***	-1.036***	-.0061***	-1.3670***	-.0151***
	(0.1030)	(0.0018)	(0.1471)	(0.0013)	(0.2506)	(0.0049)
Traditionalist						
_cons	5.2068***		4.9883***		4.3638***	
	(0.2940)		(0.3538)		(0.7034)	
No of observations	37091		27041		6470	
Prob >chi2	0.0000		0.0000		0.0000	
Pseudo R2	0.2882		0.3042		0.3745	

Table A32: Skilled delivery care utilisation in the Northwest 1999 and 1990

Variable	NDHS 1999		NDHS 1990	
	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
WEALTH VARIABLES				
Poorest	-2.8949***	-.0058***	-3.2461***	-.0176***
	(0.9942)	(0.0018)	(0.6103)	(0.0029)
Poorer	-1.6428**	-.0035**	-2.4593***	-.0137***
	(0.7361)	(0.0016)	(0.4456)	(0.0025)
Middle	-1.3440**	-.0026**	-1.6013***	-.0106***
	(0.5263)	(0.0010)	(0.2610)	(0.0023)
Richer	-0.5306	-.0011	-0.3767**	-.0029***
	(0.4359)	(0.0008)	(0.1848)	(0.0014)
EMPLOYMENT				
not employed	-0.3511	-.0010	-0.4069**	-.0034**
	(0.3422)		(0.1725)	(0.0016)
EDUCATION VARIABLES				
RESPONDENT'S EDUCATION (REF:HIGHIER)				
no education	-1.0556	-.0043	-1.8945***	-.0396*
	(0.9192)	(0.0057)	(0.5283)	0.0221
Primary	-1.0119	-.0018	-1.2813***	-.0069***
	(0.8194)	(0.0012)	(0.4979)	(0.0020)
Secondary	-0.1025	-.00026	-0.7389	-.0046**
	(0.6762)	(0.0016)	(0.5084)	(0.0023)
PARTNER'S EDUCATION				
no education	-1.3040*	-.0051	-0.3418	-.0033
	(0.7261)	(0.0045)	(0.3307)	(0.0036)
Primary	-0.3767	-.0009	0.6235**	.0070
	(0.6451)	(0.0013)	(0.2931)	(0.0043)

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Secondary	-0.5235	-.00113	0.6884**	.0083*
	(0.6961)	(0.0012)	(0.2895)	(0.0048)

AGE OF THE RESPONDENTS

Age

OTHER VARIABLES	-0.2016***	-.0005***	-0.1350***	-.0012***
	(0.0328)	(0.0001)	(0.0145)	(0.0002)

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	0.5390***	.0014***	0.2964***	.0026***
	(0.0631)	(0.0004)	(0.0374)	(0.0005)

MARITAL STATUS (REF: MARIED)

Single	0.4064	.0013	0.4820	.00537
	(0.7601)	(0.0030)	(0.4614)	(0.0064)

RESIDENCE

Urban	0.2887	.0008351	0.0737	.0007
	(0.4012)		(0.1659)	(0.0015)

RELIGION (REF :CHRISTIANITY)

Islam	-0.9688*	-.0017*	-1.1968***	-.0186***
	(0.6376)	(0.0009)	(0.2231)	(0.0063)
Traditionalist	-1.0907***	-.0047		
	(0.5154)	(0.0034)		
_cons	3.7431***		3.7334***	
	(1.3408)		(0.6779)	
No of observations	3430		5821	
Prob >chi2	0.0000		0.0000	
Pseudo R2	0.2799		0.3274	

Table A33: Skilled delivery care utilisation in the Southeast 2013, 2008, 2003

Variable	NDHS 2013		NDHS 2008		NDHS 2003	
	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
WEALTH VARIABLES						
Poorest	-0.8903***	-.0434***	-0.9654***	-.0358***	-0.8198**	-.0201***
	(0.1772)	(0.0063)	(0.2094)	(0.0057)	(0.3221)	(0.0066)
Poorer	-0.7391***	-.0406***	-0.6937***	-.0288***	-0.3572	-.0099
	(0.1288)	(0.0059)	(0.1592)	(0.0055)	(0.2696)	(0.0069)
Middle	-0.5764***	-.0349***	-0.4285***	-.0201***	-0.3643	-.0103*
	(0.0965)	(0.0055)	(0.1237)	(0.0054)	(0.2360)	(0.0062)
Richer	-0.2830***	-.0179***	-0.2748**	-.0132***	-0.3310	-.0091
	(0.0870)	(0.0053)	(0.0996)	(0.0046)	(0.2383)	(0.0060)
EMPLOYMENT						
not employed	0.3540***	.0266***	0.4141***	.0242***	-0.0061	-.0001
	(0.0873)	(0.0075)	(0.0963)	(0.0066)	(0.1777)	(0.0054)
PRICE VARIABLES						
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)						
big problem	-0.1696**	-.0111**	0.0398	.0020	0.3677	.0114
	(0.0686)	(0.0045)	(0.1000)	(0.0051)	(0.2978)	(0.0095)
Smalll problem					-0.1093	-.0032
					(0.2954)	(0.0086)
TRANSPORT TO HEALTH FACILTY (REF : NOT A BIG PROBLEM)						
big problem			-0.4021***	-.0208***	-0.1640	-.0050
			(0.1024)	(0.0054)	(0.3405)	(0.0106)
Small problem					0.4024	.0135
					(0.3304)	(0.0123)
NO PROVIDER (REF : NOT A BIG PROBLEM)						

	(1)	(2)	(3)	(4)	(5)	(6)
big problem			0.0549	.0028		
			(0.0970)	(0.0050)		
Small problem						
NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)						
big problem			-0.1194	-.0058	-0.2698	-.0091
			(0.1233)	(0.0058)	(0.2832)	(0.0105)
INSURANCE STATUS						
no insurance	-0.4690**	-.0379**	0.0498	.0025		
	(0.1902)	(0.0184)	(0.3316)	(0.0161)		

EDUCATION VARIABLES

RESPONDENT'S EDUCATION (REF:HIGHIER)

	(1)	(2)	(3)	(4)	(5)	(6)
no education	-1.5293***	-.0672***	-1.4788***	-.0552***	-2.6809***	-.0660***
	(0.1903)	(0.0056)	(0.2017)	(0.0059)	(0.4325)	(0.0115)
Primary	-1.0544***	-.0654***	-1.1669***	-.0562***	-1.3385***	-.0389***
	(0.1205)	(0.0072)	(0.1435)	(0.0071)	(0.3181)	(0.0100)
Secondary	-0.4845***	-.0309***	-0.5099***	-.0237***	-0.4956*	-.0133**
	(0.0995)	(0.0061)	(0.1315)	(0.0056)	(0.2940)	(0.0070)

PARTNER'S EDUCATION

	(1)	(2)	(3)	(4)	(5)	(6)
no education	-0.7401***	-.0396***	-0.7252***	-.0305***	0.0062	.0002
	(0.1865)	(0.0079)	(0.2087)	(0.0072)	(0.3758)	(0.0115)
Primary	-0.6054***	-.0403***	-0.1926	-.0098	-0.2043	-.0063
	(0.1121)	(0.0077)	(0.1448)	(0.0074)	(0.3179)	(0.0099)
Secondary	-0.0953	-.0062	0.0675	.0035	-0.0435	-.0013
	(0.1081)	(0.0070)	(0.1418)	(0.0075)	(0.3321)	(0.0099)

AGE OF THE RESPONDENTS

	(1)	(2)	(3)	(4)	(5)	(6)
age	-0.2595***	-.0173***	-0.2631***	-.0134***	-0.3127***	-.0096***
	(0.0066)	(0.0006)	(0.0075)	(0.0006)	(0.0178)	(0.0010)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

Variable						
birth order	0.5292***	.0352***	0.5035***	.0256***	0.6417***	.0196***
	(0.0191)	(0.0013)	(0.0205)	(0.0014)	0.0466	(0.0021)

MARITAL STATUS (REF: MARIED)

Single	-0.2307**	-.0143**	-0.4556***	-.0202***	-0.1741	-.0049
		(0.0073)	(0.1514)	(0.0058)	(0.3069)	(0.0082)
	(0.1267)					

RESIDENCE

Urban	0.0781	.0054	0.0208	.00106	-0.2389	-.0072
	(0.0694)	(0.0045)	(0.0810)	(0.0041)	(0.1595)	(0.0049)

RELIGION (REF :CHRISTIANITY)

Islam	-0.0780	-.0050	-2.0736***	-.0469***		
	(0.4495)	(0.0280)	(0.6964)	(0.0058)		
Traditionalist	-0.8638***	-.0413***	-1.5873***	-.0475***	-0.3673	-.0097
	(0.2809)	(0.0092)	(0.2817)	(0.0050)	(0.4194)	0.0097
_cons	7.7312***		7.2278***		8.5808***	
	(0.3069)		(0.4345)		(0.7062)	
No of observations						
Prob >chi2	10681		8542		2210	
Pseudo R2	0.0000		0.0000		0.0000	
	0.3707		0.3792		0.3219	

Table A34: Skilled delivery care utilisation in the Southeast 1999 and 1990

Variable	NDHS 1999		NDHS 1990	
	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
WEALTH VARIABLES				
Poorest	-0.4791*	-.0068*	-0.7255***	-.0288***
	(0.3035)	(0.00378)	(0.1642)	(0.0058)

	(1)	(2)	(3)	(4)
Poorer	-0.1642	-.0026	-0.8668***	-.0309***
	(0.2143)	(0.0033)	(0.1749)	(0.0050)
Middle	-0.0108	-.0002	-0.4737***	-.0191***
	(0.1896)	(0.00318)	(0.1448)	(0.0054)
Richer	0.0820	.00141	-0.2371*	-.0099**
	(0.1872)	(0.0033)	(0.1311)	(0.0051)

EMPLOYMENT

not employed	0.5331***	.0108**	0.0425	.0019
	(0.1532)	(0.0039)	(0.1112)	(0.0051)

EDUCATION VARIABLES

RESPONDENT'S EDUCATION (REF:HIGHIER)

no education	-3.1226***	-.0329***	-2.1978***	-.1283***
	(0.4560)	(0.00444)	(0.3375)	(0.0269)
Primary	-1.7992***	-.0349***	-1.7050***	-.0662***
	(0.3090)	(0.0079)	(0.3239)	(0.0122)
Secondary	-0.9662***	-.0128***	-0.8138**	-.0271***
	(0.2849)	(0.0033)	(0.3235)	(0.0078)

PARTNER'S EDUCATION

no education	0.8561***	.0186*	-0.1982	-.0088
	(0.3651)	(0.0105)	(0.2308)	(0.0102)
Primary	0.6258***	.01070**	-0.1294	-.0057
	(0.2771)	(0.0051)	(0.2040)	(0.0090)
Secondary	0.5521**	.0110*	-0.2150	-.0089
	(0.2764)	(0.0067)	(0.2085)	(0.0081)

AGE OF THE RESPONDENTS

age	-0.2403***	-.0040***	-0.2197***	-.0098***
	(0.0140)	(0.0004)		(0.0005)
			(0.0089)	

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	0.4900***	.0083***	0.4713***	.0211***
	(0.0354)	(0.0009)	(0.0215)	(0.0012)
MARITAL STATUS (REF: MARIED)				
Single	-0.5570***	-.0078**	-0.2545	-.0107***
	(0.2899)	(0.0034)	(0.1770)	(0.0067)
RESIDENCE				
Urban	0.2242	.0040	0.1715	.0081
	(0.1756)	(0.0034)	(0.1062)	(0.0053)
RELIGION (REF :CHRISTIANITY)				
Islam	-0.4546***	-.0074***	-0.1955	-.0080
	(0.1414)	(0.0023)	(0.3027)	(0.0115)
Traditionalist			-1.3356***	-.0373***
			(0.3257)	(0.0052)
_cons	4.5362***		5.7374***	
	(0.5086)		(0.4246)	
No of observations				
Prob >chi2	4573		7557	
Pseudo R2	0.0000		0.0000	
	0.2789		0.2941	

Table A35: Skilled delivery care utilization in the South South 2013, 2008 and 2003

	NDHS 2013		NDHS 2008		NDHS 2003	
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
WEALTH VARIABLES						
Poorest	-1.7370***	-.0371***	-1.2762***	-.0389***	-1.5563***	-.0385***
	(0.6219)	(0.0056)	(0.1958)	(0.0038)	(0.3435)	(0.0072)
Poorer	-1.0587***	-.0323***	-1.2553***	-.0438***	-0.7054**	-.0207**
	(0.1592)	(0.0035)	(0.1367)	(0.0037)	(0.3007)	(0.0076)
Middle	-0.7951***	-.0300***	-1.0370***	-.0408***	-0.6200**	-.0192***
	(0.0997)	(0.0034)	(0.1157)	(0.0039)	(0.2469)	(0.0068)

Richer	-0.5767***	-.0231***	-0.5763***	-.0246***	-0.3268*	-.0109*
	(0.0818)	(0.0032)	(0.0918)	(0.0036)	(0.2065)	(0.0065)
EMPLOYMENT						
not employed	-0.0175	-.0008	0.1593*	.0079*	0.0018	.0001
	(0.0828)	(0.0035)	(0.0890)	(0.0047)	(0.2092)	(0.0076)

PRICE VARIABLES

DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)

big problem	-0.6230***	-.0250***	-0.2798**	-.0129**	-0.2743	.0101
	(0.0737)	(0.0028)	(0.1133)	(0.0051)	(0.3175)	(0.0120)
Small problem					0.5636**	.0244
					(0.2960)	(0.0152)

TRANSPORT TO HEALTH FACILTY (REF : NOT A BIG PROBLEM)

			-0.4301***	-.0191***	-0.4545	.0171
			(0.1235)	(0.0052)	(0.3304)	(0.0131)
big problem					-0.7189**	-.0325**
					(0.2926)	
						(0.0165)
Small problem						

NO PROVIDER (REF : NOT A BIG PROBLEM)

			-0.4521***	-.0202***		
			(0.0785)	(0.0034)		
big problem						
Small problem						

NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)

big problem			-0.2075***	-.0092*	0.1068	.0037
			(0.1306)	(0.0054)	(0.2183)	(0.0075)

INSURANCE STATUS

no insurance	0.0266	.0011	0.0083	.0004		
	(0.1675)	(0.0070)	(0.1617)	(0.0076)		

EDUCATION VARIABLES

RESPONDENT'S EDUCATION (REF:HIGHIER)

no education	-1.9868***	-.0475***	-1.5904***	-.0485***	-1.5256***	-.0379***

	(0.1858)	(0.0029)	(0.1980)	(0.0041)	(0.4657)	(0.0084)
Primary	-1.5584***	-.0658***	-1.1936***	-.0559***	-0.8718***	-.0308**
	(0.1191)	(0.0055)	(0.1362)	(0.0067)	(0.3105)	(0.0113)
Secondary	-0.8977***	-.0357***	-0.5677***	-.0251***	-0.2838	-.0098
	(0.1038)	(0.0040)	(0.1233)	(0.0051)	(0.2775)	(0.0091)

PARTNER'S EDUCATION

no education	-0.3846**	-.0142**	-0.0185	-.0009	-0.8989**	-.0239**
	(0.1974)	(0.0062)	(0.1877)	(0.0088)	(0.4544)	(0.0088)
Primary	-0.2701**	-.0111**	-0.3373***	-.0153***	-0.3635	-.0127
	(0.1065)	(0.0042)	(0.1201)	(0.0052)	(0.2612)	(0.0090)
Secondary	-0.2210**	-.0094**	-0.1418	-.0067	-0.2686	-.0094
	(0.0884)	(0.0038)	(0.1010)	(0.0047)	(0.2258)	(0.0077)

AGE OF THE RESPONDENTS

age	-0.1984***	-.0085***	-0.2021***	-.0096***	-0.2380***	-.0086***
	(0.0056)	(0.0003)	(0.0065)	(0.0004)	(0.0172)	(0.0009)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	0.4403***	.0189***	0.3813***	.0181***	-0.5038***	-.0182***
	(0.0168)	(0.0008)	(0.0173)	(0.0009)	(0.0428)	(0.0020)

MARITAL STATUS (REF: MARIED)

Single	-0.5395***	-.0193***	-0.4146**	-.0171**	-0.2253	-.0075
	(0.1482)	(0.0044)	(0.1747)	(0.0062)	(0.3155)	(0.0098)

RESIDENCE

Urban	0.6448***	.0315***	0.2924***	.0149***	0.4852**	.0192**
	(0.0691)	(0.0039)	(0.0832)	(0.0046)	(0.1774)	(0.0078)

RELIGION (REF :CHRISTIANITY)

Islam	0.8362***	.0519***	0.4094**	.0231**	-0.6121	-.0169

	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
	(0.1798)	(0.0154)	(0.1705)	(0.0113)	(0.6536)	(0.0138)
Traditionalist	-0.9240**	-.0268**	-0.1963	-.0085	0.2616	.0106
	(0.6157)	(0.0113)	(0.2868)	(0.0115)	(0.5655)	(0.0255)
_cons	4.9636***		5.3949***		4.6766***	
	(0.2524)		(0.2831)		(0.6029)	

No of observations						
Prob >chi2	13510		10884		2210	
Pseudo R2	0.0000		0.0000		0.0000	
	0.2612		0.2657		0.3219	

Table A36: Skilled delivery care utilisation in the South West 2013, 2008 and 2003

	NDHS 2013		NDHS 2008		NDHS 2003	
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
WEALTH VARIABLES						
Poorest	-3.5769***	-.09478***	-0.9697***	-.0574***	-0.6279**	-.0405**
	(0.4602)	(0.0038)	(0.1883)	(0.0076)	(0.3223)	(0.0177)
Poorer	-1.3301***	-.0711***	-0.7419***	-.0504***	-0.73952**	-.0438***
	(0.1711)	(0.0057)	(0.1256)	(0.0069)	(0.3009)	(0.0139)
Middle	-0.4953***	-.0354***	-0.5237***	-.0381***	0.0277	.0021
	(0.1029)	(0.0064)	(0.1048)	(0.0066)	(0.2941)	(0.0225)
Richer	-0.327***	-.0257***	-0.2231***	-.0177***	-0.0896	-.0066
	(0.0639)	(0.0048)	(0.0776)	(0.0058)	(0.1881)	(0.0134)
EMPLOYMENT						
not employed	0.2923***	.0266**	0.0154	.0013	0.3208	.0271
	(0.0951)	(0.0096)	(0.0904)	(0.0076)	(0.2568)	(0.0246)

PRICE VARIABLES

DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)

big problem	-0.4078***	-.0297***	-0.1410	-.0114	0.3140	.0220
	(0.0977)	(0.0063)	(0.0966)	(0.0076)	(0.4054)	(0.0266)
Smalll problem					0.0103	.0008
					(0.4392)	(0.0332)

TRANSPORT TO HEALTH FACILTY (REF : NOT A BIG PROBLEM)

big problem			-0.0933	-.0076	0.0056	.0004
			(0.1026)	(0.0082)	(0.4527)	(0.0339)
Small problem					0.1710	.0135
					(0.4840)	(0.0405)

NO PROVIDER (REF : NOT A BIG PROBLEM)

big problem			-0.3658***	-.0275***		
			(0.1099)	(0.0074)		
Small problem						

NO FEMALE PROVIDER (REF: NOT A BIG PROBLEM)

big problem			0.2386*	.0215*	-0.0576	-.0044
			(0.1292)	(0.0125)	(0.3275)	(0.0256)

INSURANCE STATUS

no insurance	-0.5524***	-.0562**	-0.1550	-.0137	-0.1633	-.0115
	(0.1694)	(0.0209)	(0.1898)	(0.0178)	(0.4325)	(0.0286)

EDUCATION VARIABLES

RESPONDENT'S EDUCATION (REF:HIGHIER)

no education	-1.7652	-.0916***	-1.5939***	-.0966***	-1.4656*	-.0641***
	(0.15307)	(0.0053)	(0.1524)	(0.0072)	(0.7897)	(0.0179)
Primary	-1.2868***	-.0886***	-1.1860***	-.0856***	-1.37889	-.0888***
	(0.1041)	(0.0063)	(0.1217)	(0.0080)		(0.0209)
Secondary	-0.8222***	-.0655***	-0.6758***	-.0526***	-0.8769***	-.0569***
	(0.0873)	(0.0069)	(0.1043)	(0.0077)	(0.3135)	(0.0179)

PARTNER'S EDUCATION

no education	-0.3822**	-.0279***	-0.7102***	-.0494***	-0.6530**	-.0434**

	(1)	(2)	(3)	(4)	(5)	(6)
	(0.1495)	(0.0097)	(0.1506)	(0.0085)	(0.3085)	(0.0182)
Primary	-0.4534***	-.0339***	-0.3376***	-.0266***	-0.7237***	-.0479***
	(0.0960)	(0.0066)	(0.1097)	(0.0082)	(0.2513)	(0.0149)
Secondary	-0.3349***	-.0270***	-0.2851***	-.0231***	-0.5724**	-.0402***
	(0.0786)	(0.0063)	(0.0919)	(0.0073)	(0.2109)	(0.0141)

AGE OF THE RESPONDENTS

	(1)	(2)	(3)	(4)	(5)	(6)
Age	-0.27516***	-.0225***	-0.25387***	-.0211***	-0.2582***	-.0193***
	(0.0058)	(0.0005)	(0.0062)	(0.0006)	(0.0147)	(0.0013)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

	(1)	(2)	(3)	(4)	(5)	(6)
birth order	0.6239***	.0511***	0.5817***	.0484***	0.5898***	.0443***
	(0.0182)	(0.0016)	(0.0204)	(0.0018)	(0.0443)	(0.0034)

MARITAL STATUS (REF: MARIED)

	(1)	(2)	(3)	(4)	(5)	(6)
Single	-0.8734***	-.0531***	-0.7138***	-.0459***	-0.4117	-.0292
	(0.1560)	(0.0068)	(0.1981)	(0.0095)	(0.2763)	(0.0186)

RESIDENCE

Urban

RELIGION (REF :CHRISTIANITY)

	(1)	(2)	(3)	(4)	(5)	(6)
Islam	0.0067	.0005	0.1449**	.0122**	0.1248	.0095
	(0.0578)	(0.0048)	(0.0629)	(0.0054)	(0.1414)	(0.0109)
Traditionalist	#	#	#	#	#	#
_cons	8.3163***		7.1554***		6.7761***	
	(0.2654)		(0.2812)		(0.6628)	
No of observations	13704		10829		2242	
Prob >chi2	0.0000		0.0000		0.0000	
Pseudo R2	0.3436		0.3100		0.3259	

Table A37: Skilled delivery care utilization in the South West 1999 and 1990

	NDHS 1999		NDHS 1990	
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
WEALTH VARIABLES				
Poorest	-0.7384***	-.0164***	-0.6199**	-.04370***
	(0.2477)	(0.0045)	(0.2489)	(0.0139)
Poorer	-0.5622**	-.0131**	-0.0796	-.0067
	(0.2576)	(0.0049)	(0.21760)	(0.0179)
Middle	-0.3349*	-.0085*	-0.2361	-.0191
	(0.2066)	(0.0047)	(0.1786)	(0.0134)
Richer	-0.1107	-.0030	-0.0522	-.0045
	(0.1512)	(0.0040)	(0.0828)	0.0071
EMPLOYMENT				
not employed	0.2623	.0081	0.1835*	.0169
	(0.1625)	(0.0059)	(0.1052)	(0.0104)
EDUCATION VARIABLES				
RESPONDENT'S EDUCATION (REF:HIGHIER)				
no education	-1.4840***	-.0379***	-1.0664***	-.0847***
	(0.2873)	(0.0072)	(0.1889)	(0.0140)
Primary	-0.9257***	-.0225***	-1.1483***	-.0922***
	(0.2524)	(0.0055)	(0.1729)	(0.0132)
Secondary	-0.4082*	-.0105**	-0.4959***	-.0385***
	(0.2307)	(0.0054)	(0.1607)	(0.0111)

PARTNER'S EDUCATION

no education	0.0645	.0018	-0.4398**	-.0349***
	(0.2518)	(0.0073)	(0.1633)	(0.0117)
Primary	-0.3096	-.0082	-0.1621	-.0138
	(0.2036)	(0.0051)	(0.1266)	(0.0106)
Secondary	-0.1288	-.0035	-0.1583	-.0134
	(0.1776)	(0.0047)	(0.1192)	(0.0098)

AGE OF THE RESPONDENTS

Age	-0.2515***	-.00707***	-0.2446***	-.0213***
	(0.0137)	(0.0005)	(0.0079)	(0.0007)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	0.4845***	.0136***	0.5294***	.0460***
	(0.0325)	(0.0012)	(0.0201)	(0.0019)

MARITAL STATUS (REF: MARIED)

Single	-0.5428	-.0122	-0.3815**	-.0290**
	(0.4675)	(0.0083)	(0.1873)	(0.0123)

RESIDENCE

Urban	0.0263	.0007	0.475***	.0382***
	(0.1451)	(0.0041)	(0.1449)	(0.0106)

RELIGION (REF :CHRISTIANITY)

Islam	0.0834	.0024	0.0189	.0016
	(0.1375)	(0.0039)	(0.0764)	(0.0068)
Traditionalist	-0.0500	-.0013	-0.5173	-.0367**
	(0.1540)	(0.0042)	(0.3246)	(0.0185)
_cons	5.4576***		5.5813***	
	(0.4858)		(0.3047)	
No of observations	4788		7339	
Prob >chi2	0.0000		0.0000	

Pseudo R2   0.2471   0.2832

Appendix 111: regional regression results for immunisation utilisation

Table A38: Immunisation utilisation in the North Central 2013, 2008, 2003

Variable	NDHS 2013		NDHS 2008		NDHS 2003	
	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect		
WEALTH VARIABLES OF MOTHER (REF:RICHEST)						
Poorest	-0.3442	-.0666	-0.9601***	-.2145***	-2.1501***	-.3710***
	(0.2724)	(0.0557)	(0.2501)	(0.0579)	(0.6283)	(0.1291)
Poorer	-0.5156**	-.0997**	-0.9799***	-.2197***	-1.5319**	-.2547**
	(0.2471)	0.0503	(0.2436)	(0.0566)	(0.6088)	(0.1236)
Middle	-0.2217	-.0409	-0.8487***	-.1891***	-1.6173**	-.2727**
	(0.2345)	(0.0441)	(0.2347)	(0.0544)	(0.5838)	(0.1201)
Richer	-0.2553	-.0482	-0.6240**	-.1400**	-0.2667	-.0345
	(0.2203)	(0.0431)	(0.2297)	(0.0542)	(0.5564)	(0.0753)
MOTHER'S EMPLOYMENT (REF:EMPLOYED)						
not employed	-0.2710**	-.0509**	-0.5347***	-.1156***	-0.8638***	-.1218**
	(0.1058)	(0.0206)	(0.0920)	(0.0205)	(0.2950)	(0.0467)
PRICE VARIABLES						
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)						
big problem	-0.0426	-.0077	-0.3234**	-.0678**	-0.2222	-.0274
	(0.1025)	(0.0187)	(0.1276)	(0.0269)	(0.8550)	(0.1051)
Small problem					-0.2928	-.0380
					(0.6972)	(0.0954)
NO PROVIDER (REF NOT A BIG PROBLEM)						
big problem			0.5948***	.1157***		
			(0.1507)	(0.0270)		
TRANSPORT TO HEALTH FACILTY (REF NOT A BIG PROBLEM)						

big problem			0.2153	.0444	-0.8603	-.1070
			(0.1327)	(0.0270)	(0.8700)	(0.1083)
Small problem					-0.7572	-.1068
					(0.7209)	(0.1131)
NO IMMUNIZATION DRUGS						
Big problem			0.0699	.0145		
			(0.1340)	(0.0277)		

MOTHER'S INSURANCE STATUS (REF: INSURED)

no insurance	0.7092**	.1493*	0.3931	.0876		
	(0.3400)	(0.0797)	(0.3689)	(0.0868)		

EDUCATION VARIABLES

MOTHER'S EDUCATION (REF: HIGHER)

no education	-1.1868***	-.2257***	-1.0222***	-.2125***	0.1671	.0205
	(0.3396)	0.0659	(0.3560)	(0.0727)	(1.0374)	(0.1270)
Primary	-0.8974**	-.1779**	-0.5542	-.1202	1.2637	.1367
	(0.3368)	(0.0710)	(0.3501)	(0.0783)	(1.0394)	(0.0994)
Secondary	-0.7389**	-.1462**	-0.4277	-.0936	0.9874	.0989
	(0.3245)	(0.0685)	(0.3430)	(0.0781)	(1.0685)	(0.0855)

FATHER'S EDUCATION (REF: HIGHER)

no education	-0.3626**	-.0685**	-0.5150**	-.1099**	-0.2732	-.0352
	(0.1880)	(0.0368)	(0.2005)	(0.0435)	(0.4482)	(0.0608)
Primary	-0.5140***	-.1005**	-0.1659	-.0352	-0.2182	-.0279
	(0.1783)	(0.0371)	(0.1965)	(0.0424	(0.4235)	(0.0563)
Secondary	-0.2946*	-.0546*	-0.2320	-.0493	0.0767	.0093
	(0.1634)	(0.0309)	(0.1820)	(0.0393)	(0.4138)	(0.0502)

MOTHER'S AGE

Age	-0.0275**	-.0049**	0.0045	.0009	-0.0392	-.0048
	(0.0106)	(0.0019)	(0.0095)	(0.0020)	(0.0295)	(0.0037)

CHILLD AGE

Child age	0.2566***	.0465***	0.2656***	.0554***	0.5800***	.0716***
	(0.0348)	(0.0062)	(0.0312)	(0.0065)	(0.1000)	(0.0119)

CHILD SEX(REF. MALE)						
Female	-0.0925	.0167	0.0659	.0137	0.1671	.0206
	(0.0912)	(0.0165)	(0.0844)	(0.0176)	(0.2360)	(0.0292)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	0.1149***	.0208***	0.0475*	.0099*	0.2266***	.0280***
	(0.0346)	(0.0062)	(0.0285)	(0.0059)	(0.0799)	(0.0101)

MARITAL STATUS OF MOTHER (REF: MARIED)

Single	-0.0995	-.0184	0.4283*	.0815*	1.2848*	.1040***
	(0.2968)	(0.0565)	0.2533	(0.0435)	(0.7564)	(0.0374)

RESIDENCE OF MOTHER

Urban	0.5417***	.0908***	0.2637**	.0532**	0.068**	.00823**
	(0.1509)	(0.0233)	(0.1338)	(0.0261)	(0.3115)	(0.0378)

RELIGION OF MOTHER (REF :CHRISTIANITY)

Islam	-0.2241**	-.0405**	-0.1382	-.0289	-1.1637***	-.1567***
	(0.1073)	(0.0194)	(0.1004)	(0.0211)	(0.3205)	(0.0466)
Traditionalist	-0.5753**	-.1183*	-1.1084***	-.2632***	-1.5662***	-.2979
	(0.2722)	(0.0619)	(0.2854)	(0.0703)	(0.5609)	(0.1343)
_cons	2.0467***		1.3800**		2.5368*	
	(0.5104)		(0.5170)		(1.4429)	
No of observations						
Prob >chi2	2718		2975		398	
Pseudo R2	0.0000		0.0000		0.0000	
	0.0692		0.2856		0.2069	

Table A39: Immunisation care utilisation in the North Central 1999

	NDHS 1999	
Variable	Coef./Std Err	Mar. Effect

WEALTH VARIABLES OF

MOTHER(REF:RICHEST)

Poorest	-2.8186***	-.6073***
	(0.8654)	(0.1360)
	-2.3974***	
	(0.8304)	
Poorer		-.5358***
		(0.1511)
Middle	-2.5066***	-.5537***
	(0.8024)	(0.1425)
Richer	-2.1315**	-.4774***
	(0.7800)	(0.1536)

MOTHER'S EMPLOYMENT (REF:EMPLOYED)

not employed	(-0.2426)	-.0512
	(0.2772)	(0.05940

EDUCATION VARIABLES

MOTHER'S EDUCATION (REF: HIGHER)

no education	-1.8774	-.3725
	(1.4047)	(0.2507)
Primary	-1.0412	-.2347
	(1.3740)	(0.3194)
Secondary	-0.9198	-.2097
	(1.3614)	(0.3241)

FATHER'S EDUCATION (REF: HIGHER)

no education	-0.3433	-.0732
	(0.5534)	(0.1190)
Primary	-0.3813	-.0823
	(0.5402)	(0.1188)
Secondary	0.0409	.0085
	(0.5563)	(0.1157)

MOTHER'S AGE

Age	-0.0182	-.0038
	(0.0282)	(0.0059)

CHILLD AGE

	Coef./Std Err	Mar. Effect
Child age	0.5243***	.1098***
	(0.1580)	(0.0332)
CHILD SEX(REF. MALE)		
Female	0.2331	.0488
	(0.2570)	(0.0535)

OTHER VARIABLES

	Coef./Std Err	Mar. Effect
NUMBER OF CHILDREN OR BIRTH ORDER		
birth order	0.1785**	.0374**
	(0.0925)	(0.0192)
MARITAL STATUS OF MOTHER (REF: MARIED)		
Single	0.1573	.0319
	(0.7137)	(0.14020
RESIDENCE OF MOTHER		
Urban	0.6210**	.1223**
	(0.3169)	(0.0584)
RELIGION OF MOTHER (REF :CHRISTIANITY)		
Islam	-1.0229*	-.2403*
	(0.5944)	(0.1457)
Traditionalist	-0.5145	-.1073*
	(0.3130)	(0.0639)
_cons	3.9069**	
	(1.7303)	
No of observations		
Prob >chi2		
Pseudo R2		

Table A40: Immunisation care utilisation in the North East 2013, 2008, 2003

	NDHS 2013		NDHS 2008		NDHS 2003
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect	

WEALTH VARIABLES OF MOTHER (REF:RICHEST)

Poorest	- (.8206)***	-.2015***	-0.904***	-.2021***	-0.0805	-.0170
	(0.2415)	(0.0575)	(0.3116)	(.0680)	(0.5075)	(0.1076)
Poorer	-.4622**	-.1144**	-0.5294*	-.1237*	-0.2574	-.0555
	(0.2356)	(0.0574)	(0.3117)	(.0745)	(0.5017)	(0.1108)
Middle	-.2931	-.0726	-0.2815	-.0654	-0.1343	-.0287
	(0.2256)	(0.0552)	(0.3063)	(.0727)	(0.5063)	(0.1099)
Richer	-.1652	-.0411	-0.2514	-.0584	-0.2964	-.0647
	(0.2190)	(0.0542)	(0.3078)	(.0734)	(0.5076)	(0.1144)

MOTHER'S EMPLOYMENT (REF:EMPLOYED)

not employed	-.5378***	-.1334***	-0.2256***	-.0511***	-0.3042**	-.0642**
	(0.0697)	(0.0171)	(0.0687)	(.01561)	(0.1444)	(0.0303)

PRICE VARIABLES

DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)

big problem	.0510	.0127	-0.2604**	-.0587**	0.1282	.0269
	(0.0746)	(0.0186)	(0.1119)	(.0251)	(0.2307)	(0.0486)
Small problem					-0.1083	-.0230
					(0.2275)	(0.0490)

NO PROVIDER (REF NOT A BIG PROBLEM)

big problem			-0.1778*	-.0401*		
			(0.0979)	(.0220)		

TRANSPORT TO HEALTH FACILTY (REF NOT A BIG PROBLEM)

big problem	-0.1743	-.0393	-0.4538**	-.0951**		
	(0.1114)	(.0251)	(0.2274)	(0.0472)		
Small problem			0.0074	.0015		
			(0.2247)	(0.0472)		

NO IMMUNIZATION DRUGS

Big problem			-0.4604***	-.1046***		
			(0.0979)	(.0222)		

MOTHER'S INSURANCE STATUS (REF: INSURED)

	(1)	(2)	(3)	(4)	(5)	(6)
no insurance	-.7248	-.1755*				
	(0.4586)	(0.1032)				

EDUCATION VARIABLES

MOTHER'S EDUCATION (REF: HIGHER)

	(1)	(2)	(3)	(4)	(5)	(6)
no education	.1120	.0279	-13.646***	-.9361***	-14.528***	-.9557***
	(0.2940)	(0.0732)	(0.3298)	(.0053)	(0.5299)	(0.0052)
Primary	.4398	.1092	-13.161***	-.9386***	-14.598***	-.9626***
	(0.2981)	(0.0729)	(0.3396)	(.0031)	(0.5291)	(0.0028)
Secondary	.2984	.0743	-13.1555***	-.8402***	-13.958***	-.8841
	(0.2858)	(0.0708)	(0.3340)	(.0059)	(0.5417)	

FATHER'S EDUCATION (REF: HIGHER)

	(1)	(2)	(3)	(4)	(5)	(6)
no education	-.8905***	-.2189***	-0.4570**	-.1007**	-0.8120**	-.1654**
	(0.1682)	(0.0399)	(0.1913)	(.0409)	(0.3484)	(0.0675)
Primary	-.2097	-.0521	-0.0163	-.0036	-0.8500**	-.1930**
	(0.1804)	(0.0445)	(0.2034)	(.0462)	(0.3667)	(0.0867)
Secondary	-.2905*	-.0720*	-0.0598	-.0136	-0.2002	-.0433
	0.1698	(0.0416)	(0.2020)	(.0462)	(0.3641)	(0.0807)

MOTHER'S AGE

	(1)	(2)	(3)	(4)	(5)	(6)
Age	.02013**	.0050*	0.0275***	.0062***	0.0053	.0011
	(0.0085)	(0.0021)	(0.0084)	(.0019)	(0.0183)	(0.0039)

CHILLD AGE

	(1)	(2)	(3)	(4)	(5)	(6)
Child age	.1222***	.0305***	0.2734***	.0618***	0.4222***	.0889***
	(0.0248)	(0.0062)	(0.0245)	(.0055)	(0.0522)	(0.0102)

CHILD SEX(REF. MALE)

	(1)	(2)	(3)	(4)	(5)	(6)
Female	.0903	.0225	0.0554	.0125	0.1587	.0334
	(0.0671)	(0.0168)	(0.0662)	(.01496)	(0.1402)	(0.0295)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	-.0269	-.0067	-0.0083	-.0019	0.0013	.0002
	(0.0218)	(0.0054)	(0.0212)	(.0048)	(0.0444)	(0.0094)

MARITAL STATUS OF MOTHER (REF: MARIED)

Single	.6697***	.1633***	0.8167***	.1578***	0.0170	.0035
	(0.2389)	(0.0549)	(0.2535)	(.0398)	(0.3839)	(0.0803)

RESIDENCE OF MOTHER

Urban	-.2530***	-.0628*	-0.4388***	-.1024***	-0.0398	-.0084
	(0.1125)	(0.0277)	(0.1063)	(.0253)	(0.1799)	(0.0381)

RELIGION OF MOTHER (REF :CHRISTIANITY)

Islam	-1.2248***	-.287***	-0.8365***	-.1700***	0.0216	.0045
	(0.1375)	(0.0278)	(0.1243)	.02204	(0.2502)	(0.0530)
Traditionalist	1.1555***	-.256***	-1.3374***	-.3224***	-0.5642	-.1297
	(0.4126)	(0.0734)	(0.2874)	(.0641)	(0.7083)	(0.1734)
_cons	2.1540***		14.4074***		14.5360***	
	(0.5421)		(0.4059)		(0.8235)	
No of observations	4286		4560		1043	
Prob >chi2	0.0000		0.0000		0.0000	
Pseudo R2	0.1241		0.1244		0.1132	

Table A41: Immunisation care utilisation in the North East 1999 and 1990

Variable	NDHS 1999		NDHS 1990	
	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
WEALTH VARIABLES OF MOTHER(REF:RICHEST)				
Poorest	-0.5986	-.1318	-1.6937***	-.2834***
	(0.5014)	(0.1064)	(0.3624)	(0.0495)
Poorer	0.1853	.0426	-1.5689***	-.2724***
	(0.4941)	(0.1151)	(0.3471)	(0.0513)
Middle	-0.3646	-.0794	-1.1851***	-.1969***
	(0.4709)	(0.0981)	(0.3422)	(0.0456)
Richer	0.2027	.0469	-0.6617**	-.1190**
	(0.5288)	(0.1250)	(0.3101)	(0.0492)
MOTHER'S EMPLOYMENT STAUS (REF:EMPLOYED)				
not employed	-0.8094***	-.1932***	0.1358	.0273
	(0.2832)	(0.0690)	(0.1411)	(0.0283)
EDUCATION VARIABLES				
MOTHER'S EDUCATION (REF: HIGHER)				
no education	-13.1037***	-.9542***	-1.2138**	-.2783**
	(0.7664)	(0.0194)	(0.5126)	(0.1235)
Primary	-12.6518***	-.6443***	-0.4425	-.0823
	(0.7936)	(0.0290)	(0.5293)	(0.0900)
Secondary	-11.2905	-.5537***	0	
	(0.6996)	(0.0279)		
FATHER'S EDUCATION (REF: HIGHER)				
no education	-0.0008	-.0001	-0.9496	-.2101
	(0.5224)	(0.1186)	(0.5769)	(0.1353)
Primary	0.6889	.1652	-0.4752	-.0878
	(0.5711)	(0.1408)	(0.6127)	(0.10300
Secondary	0.1106	.0253	-0.2295	-.0443***

	(0.5247)	(0.1217)	(0.6042)	(0.1113)

MOTHER'S AGE

Age	-0.0290	-.0065	-0.0100	-.0020
	(0.0242)	(0.0055)	(0.0141)	(0.0029)

CHILLD AGE

Child age	0.4502***	.1021***	0.3479***	.0702***
	(0.1359)	(0.0303)	(0.0498)	(0.0100)
CHILD SEX(REF. MALE)				
Female	0.3063	.0695	-0.0956	-.0193
	(0.2205)	(0.0500)	(0.1378)	(0.0279)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	0.0897	.0203	0.1120***	.0226***
	(0.0683)	(0.0154)	(0.0402)	(0.0081)

MARITAL STATUS OF MOTHER (REF: MARIED)

Single	0.6637	.1608	0.4313	0.1519
	(1.1489)	(0.2870)	(0.6497)	(0.5340)

RESIDENCE OF MOTHER

Urban	1.3826***	.3266***	0.5746**	.1250**
	(0.2827)	(0.0645)	(0.2315)	(0.0534)

RELIGION (REF :CHRISTIANITY)

Islam	-0.0823	-.0184	-1.1513***	-.2602**
	(0.7974)	(0.1764)	(0.2014)	(0.0477)
Traditionalist	-1.2920***	-.3119***	-1.0143	-.1582**
	(0.4532)	(0.1056)	(0.6296)	(0.0701)
_cons	13.2687***		2.3788***	
	(0.8581)		(0.8150)	
No of observations	549		1297	
Prob >chi2	0.0000		0.0000	

	Pseudo R2	0.2299		0.1832	

Table A42: Immunisation care utilisation in the North West 2013, 2008 AND 2003 North West

	NDHS 2013		NDHS 2008		NDHS 2003	
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect		
WEALTH VARIABLES OF MOTHER (REF:RICHEST)						
Poorest	-0.0384	-.0065	-0.2757	-.0688	-1.1934***	-.287***
	(0.2035)	(0.0350)	(0.2061)	(0.0513)	(0.3932)	(0.0921)
Poorer	0.0578	.0098	-0.1816	-.0453	-1.0836***	-.2592***
	(0.2012)	(0.0341)	(0.2032)	(0.0507)	(0.3761)	(0.0887)
Middle	-0.1550	-.0273	0.1806	.0451	-0.8306**	-.1998**
	(0.1924)	(0.0350)	(0.1989)	(0.0495)	(0.3680)	(0.0889)
Richer	-0.0906	-.0158	-0.1371	-.0342*	-0.6661**	-.1612**
	(0.1847)	(0.0330)	(0.1912)	(0.0477)	(0.3318)	(0.0815)
MOTHER'S EMPLOYMENT (REF:EMPLOYED)						
not employed	-0.328***	-.0576***	-0.4393***	-.1093***	-0.4633***	-.1082***
	(0.0577)	(0.0103)	(0.0566)	(0.0140)	(0.1235)	(0.0287)
PRICE VARIABLES						
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)						
big problem	-0.1074*	-.0185*	-0.0669	-.0167	0.6192**	.1436**
	(0.0596)	(0.0103)	(0.0878)	(0.0220)	(0.2266)	(0.0519)
Small problem					0.4172**	.0935**
					(0.2075)	(0.0444)
NO PROVIDER (REF NOT A BIG PROBLEM)						
big problem			0.0968	.0241		
			(0.0926)	(0.0231)		
TRANSPORT TO HEALTH FACILTY (REF NOT A BIG PROBLEM)						
big problem			0.1481*	.0369*	-0.0399	-.0093
			(0.0884)	(0.0221)	(0.2264)	(0.0529)

Small problem					0.1061	.0245
					(0.2105)	(0.0483)
NO IMMUNIZATION DRUGS						
Big problem			-0.3145***	-.0784***		
			(0.0929)	(0.0231)		
MOTHER'S INSURANCE STATUS (REF: INSURED)						
no insurance	-1.1240	-.1361**	-1.2387	-.2747*		
	(0.7746)	(0.0598)	(0.8928)	(0.1550)		
EDUCATION VARIABLES						
MOTHER'S EDUCATION (REF: HIGHER)						
no education	0.4006	.0733	-0.9336**	-.2237**	0.2931	.0695
	(0.3493)	(0.0679)	(0.3794)	(0.0837)	(0.6897)	(0.1660)
Primary	0.5708	.0857*	-0.4791	-.1183	0.6226	.1348
	(0.3551)	(0.0461)	(0.3821)	(0.0920)	(0.6971)	(0.1373)
Secondary	0.5054	.0760*	0.1168	.0291	0.8273	.1718
	(0.3374)	(0.0440)	(0.3874)	(0.0965)	(0.6695)	(0.1189)
FATHER'S EDUCATION (REF: HIGHER)						
no education	-0.715***	-.1145***	-0.2601*	-.0648*	-0.2611	-.0605
	(0.1535)	(0.0229)	(0.1398)	(0.0347)	(0.3119)	(0.0717)
Primary	-0.517***	-.0972***	0.1094	.0273	-0.1557	-.0368
	(0.1650)	(0.0337)	(0.1477)	(0.0369)	(0.3293)	(0.0787)
Secondary	-0.3465**	-.0635**	0.1588	.0396	0.0284	.0066
	(0.1597)	(0.0312)	(0.1505)	(0.0374)	(0.3174)	(0.0738)
MOTHER'S AGE						
Age	-0.0007	-.0001	0.0004	.0001	0.0163	.0037
	(0.0072)	(0.0012)	(0.0068)	(0.0017)	(0.0165)	(0.0039)
CHILLD AGE						
Child age	0.1992***	.0341***	0.1634***	.0408***	0.2756***	.0643***
	(0.0214)	(0.0036)	(0.0202)	(0.0050)	(0.0448)	(0.0104)

CHILD SEX(REF. MALE)						
Female	-0.0831	-.0142	0.1020*	.0255**	-0.0268	-.0062
	(0.0555)	(0.0095)	(0.0552)	(0.0138)	(0.1183)	(0.0277)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER						
birth order	0.0310*	.0053*	0.0291	.0072	0.0103	.0024
	(0.0185)	(0.0032)	(0.0182)	(0.0045)	(0.0404)	(0.0094)
MARITAL STATUS OF MOTHER (REF: MARIED)						
Single	0.2334	.0374	-0.0120	-.0029	0.0383	.0089
	(0.2250)	(0.0337)	(0.2312)	(0.0578)	(0.39820)	(0.0921)
RESIDENCE OF MOTHER						
Urban	-0.481***	-.0890***	-0.0484	-.0121	-0.5090**	-.1219**
	(0.0919)	(0.0182)	(0.1017)	(0.0254)	(0.1923)	(0.0467)

RELIGION OF MOTHER (REF :CHRISTIANITY)

Islam	-0.0621	-.0104	-1.2826***	-.2871**	-0.7575**	-.1571**
	(0.1970)	(0.0327)	(0.2138)	(0.0382)	(0.3554)	(0.0628)
Traditionalist	-0.1600	-.0286	2.3631?***	-.4227***	-1.1305	-.2752
	(0.3419)	(0.0637)	(0.3153)	(0.0274)	(0.8852)	(0.2023)
_cons	2.5099***		3.3255***		0.8930	
	(0.8329)		(0.9491)		(0.8447)	
No of observations	7644		5767		1371	
Prob >chi2	0.0000		0.0000		0.0000	
Pseudo R2	0.0290		0.0666		0.0912	

Table A43: Immunisation care utilisation in the North West 1999 and 1990

	NDHS 1999		NDHS 1990	
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
WEALTH VARIABLES OF				

MOTHER(REF:RICHEST)

Poorest	-1.9814***	-.3547***	-1.0701***	-.1969***
	(0.6993)	(0.1030)	(0.3242)	(0.0507)
Poorer	-1.1879*	-.2213**	-0.9176***	-.1722***
	(0.6781)	(0.1104)	(0.3147)	(0.0516)
Middle	-0.4402	-.0878	-1.1944***	-.2198***
	(0.6452)	(0.1219)	(0.2961)	(0.0465)
Richer	-0.3571	-.0703	-0.4382	-.0871*
	(0.6373)	(0.1170)	(0.2689)	(0.0501)

MOTHER'S EMPLOYMENT STAUS (REF:EMPLOYED)

not employed	-0.0981	-.0208	-0.2208	-.0465
	(0.2810)	(0.0603)	(0.1528)	(0.0320)

EDUCATION VARIABLES

MOTHER'S EDUCATION (REF: HIGHER)

no education	-10.0756**	-.8922***	3.2116	.3666***
	1.4740	(0.0218)	(2.1144)	(0.1089)
Primary	-9.3186***	-.4564***	3.7707*	.6921***
	(1.4858)	(0.0374)	(2.0766)	(0.1530)
Secondary	-8.8067***	-.4064***	3.4333*	.6419***
	(1.3987)	(0.0312)	(2.0643)	(0.1530)

FATHER'S EDUCATION (REF: HIGHER)

no education	0.2709	.0556	-2.6594***	-.5813***
	(0.6818)	(0.1364)	(1.0311)	(0.1733)
Primary	0.9040	.2097	-2.1227**	-.2983***
	(0.7204)	(0.1755)	(1.0218)	(0.0839)
Secondary	1.0648	.2486	-1.6337	-.2395**
	(0.6944)	(0.1683)	(1.0871)	(0.0961)

MOTHER'S AGE

Age	0.0317	.0066	0.0397**	.0084**
	(0.0270)	(0.0057)	(0.0167)	(0.0035)

CHILLD AGE

Child age	0.4147**	.0872**	0.2519***	.0532***
	(0.1609)	(0.0338)	0.0491	(0.0104)

CHILD SEX(REF. MALE)

Female	-0.0680	-.0142	0.1937	.0409**
	(0.2312)	(0.0486)	(0.1439)	(0.0304)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	0.0582	.0122	-0.0579	-.0122
	(0.0649)	(0.0137)	(0.0451)	(0.0095)

MARITAL STATUS OF MOTHER (REF: MARIED)

Single	0.6674	.1549	-0.0533	-.0111
	(0.7629)	(0.1886)	(0.6078)	(0.1259)

RESIDENCE OF MOTHER

Urban	0.7480	.1714	0.1568	.0337
	(0.4874)	(0.1182)	(0.2072)	(0.0453)

RELIGION (REF :CHRISTIANITY)

Islam	0.1505	.0325	-0.4224	-.0951
	(0.9943)	(0.2206)	(0.3434)	(0.0815)
Traditionalist	-1.4965**	-.3545**		
	(0.6483)	(0.1492)		
_cons	9.8095***		-1.9714***	
	(1.4434)		(1.3909)	
No of observations	474		1079	
Prob >chi2	0.0000		0.0000	
Pseudo R2	0.2351		0.1383	

Table A44: Immunisation care utilisation in the South East   2013, 2008 and 2003

Variable	NDHS 2013		NDHS 2008		NDHS 2003	
	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
WEALTH VARIABLES OF MOTHER (REF:RICHEST)						
Poorest	-1.3496***	-.0980**	-1.5520***	-.3430***	-0.9651	-.172
	(0.3992)	(0.0442)	(0.3963)	(0.0946)	(0.7463)	(0.1532)
Poorer	-1.0528***	-.0633**	-1.6203***	-.3532***	-1.4127*	-.2628**
	(0.3505)	(0.0284)	(0.3536)	(0.0826)	(0.6418)	(0.1372)
Middle	-0.7700**	-.0388**	-0.8687***	-.1697**	-0.5408	-.0888
	(0.3222)	(0.0191)	(0.3117)	(0.0656)	(0.6150)	(0.1098)
Richer	-0.9455***	-.0487**	-0.5177*	-.0969*	-1.0404*	-.1894
	(0.3070)	(0.0189)	(0.29650)	(0.0584)	(0.6267)	(0.1300)
MOTHER'S EMPLOYMENT (REF:EMPLOYED)						
not employed	-0.4938**	-.0238**	-0.3796**	-.0711*	0.1427	.0210
	(0.2086)	(0.0116)	(0.1966)	(0.0385)	(0.4404)	(0.0640)
PRICE VARIABLES						
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)						
big problem	-0.4679**	-.0208**	0.3398*	.0602*	-0.4592	-.0699
	(0.1676)	(0.0079)	(0.1984)	(0.0353)	(0.8606)	(0.1331)
Small problem					-0.0809	-.0123
					(0.6318)	(0.0972)
NO PROVIDER (REF NOT A BIG PROBLEM)						
big problem			-0.2373	-.0424		
			(0.2959)	(0.0534)		
TRANSPORT TO HEALTH FACILTY (REF NOT A BIG PROBLEM)						
big problem	-0.3527*	-.0621*	0.3705	.0560		
	(0.2124)	(0.0373)	(0.9374)	(0.1426)		
Small problem			0.4757	.0672		
			(0.7001)	(0.0923)		
NO IMMUNIZATION DRUGS						

Big problem	0.4195	.0741				
	(0.2918)	(0.0511)				

MOTHER'S INSURANCE STATUS (REF: INSURED)

no insurance	0.5642					
	(0.7312)					

EDUCATION VARIABLES

MOTHER'S EDUCATION (REF: HIGHER)

no education	-1.1054**	-.0720**	-0.1963	-.0361	-1.0865	-.1962
	(0.5024)	(0.0468)	(0.4774)	(0.0914)	(0.6958)	(0.1435)
Primary	-0.6840	-.0313	0.1146	.0202	-0.3639	-.0546
	(0.4465)	(0.0223)	(0.4240)	(0.0748)	(0.6722)	(0.1011)
Secondary	-0.2571	-.0109	0.0761	.0133	-0.1712	-.0265
	(0.4496)	(0.0193)	(0.4104)	(0.0718)	(0.7191)	(0.1150)

FATHER'S EDUCATION (REF: HIGHER)

no education	-15.09***	-.9846***	-1.1468**	-.2436**	0.6122	.0806*
	(0.3973)	(0.0013)	(0.4976)	(0.1172)	(0.8574)	(0.0973)
Primary	-15.1548***	-.9989***	-0.9391**	-.1755**	0.7411	.1075
	(0.2691)	(0.0002)	(0.4453)	(0.0862)	(0.7321)	(0.1017)
Secondary	-15.0006***	-.9840***	-0.3067	-.0551	0.6318	.0888
	(0.1989)	(0.0025)	(0.4141)	(0.0753)	(0.6795)	(0.0887)

MOTHER'S AGE

Age	0.0254	.0010	0.0218	.0038	-0.0242	-.0036
	(0.0173)	(0.0007)	(0.0168)	(0.0030)	(0.0375)	(0.0056)

CHILLD AGE

Child age	0.2228***	.0093***	0.4514***	0798***	0.5267***	.0792***
	(0.0639)	(0.0026)	(0.0649)	(0.0110)	(0.1304)	(0.0179)

CHILD SEX(REF. MALE)

Female	0.0254	.0010	0.0736	.0130	-0.2788	-.0419
	(0.1636)	(0.0069)	(0.1572)	(0.0278)	(0.3163)	(0.0477)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

Variable						
birth order	-0.0611	-.0025	0.0565*	.0099*	0.1112	.0167
	(0.0484)	(0.0020)	(0.0484)	(0.0085)	(0.1154)	(0.0174)

MARITAL STATUS OF MOTHER (REF: MARIED)

Single	0.5736*	.0192*	0.3059	.0501	-0.3893	-.0649
	(0.3899)	(0.0103)	(0.3565)	(0.0539)	(0.5918)	(0.1076)

RESIDENCE OF MOTHER

Urban	-0.0597	-.0024	-0.2563	-.0459	0.5369	.0794
	(0.1822)	(0.00760	(0.1718)	(0.0312)	(0.4181)	(0.0605)

RELIGION OF MOTHER (REF :CHRISTIANITY)

Islam	-2.670***	-.3520*	0.6681	.0972	#	#
	(0.8587)	(0.2042)	(1.2710)	(0.1468)		
Traditionalist	-1.0222**	-.0676	0.0278	.0048	0.4482	.0594
	(0.4381)	(0.0426)	(0.2732)	(0.0478)	(0.6480)	(0.0754)
_cons	16.9156***				1.3587	
	(0.7352)				(1.5008)	
No of observations	1076		1018		281	
Prob >chi2	0.0000		0.0000		0.0305	
Pseudo R2	0.1572		0.1516		0.1353	

Table A45: Immunisation care utilisation in the South East   1999 and 1990

	NDHS 1999		NDHS 1990	
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect

WEALTH VARIABLES OF MOTHER(REF:RICHEST)

Poorest	-0.0886	-.0150	-1.8934***	-.4346***
	(0.6777)	(0.1174)	(0.4107)	(0.0845)
Poorer	-0.3629	-.0643	-1.7659***	-.4148***
	(0.6005)	(0.1124)	(0.4232)	(0.0879)
Middle	-0.8380	-.1547	-1.8564***	-.4331***
	(0.5186)	(0.1018)	(0.4077)	(0.0837)
Richer	-1.2262**	-.2384**	-1.4418***	-.3439***
	(0.5136)	(0.1089)	(0.3998)	(0.0900)

MOTHER'S EMPLOYMENT STAUS (REF:EMPLOYED)

not employed	-0.8583**	-.1579**	-0.6597***	-.1577***
	(0.3456)	(0.0689)	(0.1790)	(0.0438)

EDUCATION VARIABLES

MOTHER'S EDUCATION (REF: HIGHER)

no education	-1.8024*	-.3972*	-13.493***	-.9976***
	(0.9944)	(0.2328)	(0.4989)	(0.0006)
Primary	-1.4894	-.2494	-13.0852***	-.9967***
	(0.9201)	(0.1535)	(0.4778)	(0.0008)
Secondary	-0.4503	-.0770	-11.8725***	-.8896***
	(0.9091)	(0.1597)	(0.5042)	(0.0084)

FATHER'S EDUCATION (REF: HIGHER)

no education	0.3020	.0468	-0.6963	-.162
	(0.7080)	(0.1021)	(0.4702)	(0.1108)
Primary	0.2180	.0362	-0.4842	-.1109
	(0.6027)	(0.0998)	(0.4534)	(0.1036)
Secondary	0.2530	.0409	-0.3997	-.0945

	(0.6312)	(0.0990)	(0.4705)	(0.1142)

MOTHER'S AGE

Age	0.0053	.0008	0.0072	.0016
	(0.0362)	(0.0060)	(0.0155)	(0.0035)

CHILLD AGE

Child age	0.8903***	.1481***	0.1992***	.0456***
	(0.2063)	(0.0313)	(0.0490)	(0.0112)

CHILD SEX(REF. MALE)

Female	0.2695	.0448	-0.0221	-.0050
	(0.3283)	(0.0550)	(0.1313)	(0.0301)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	0.0219	.0036	0.0286	.0065
	(0.0928)	(0.0155)	(0.0370)	(0.0085)

MARITAL STATUS OF MOTHER (REF: MARIED)

Single	-0.7662	-.1505	0.2233	.0495
	(0.5731)	(0.1271)	(0.2494)	(0.0535)

RESIDENCE OF MOTHER

Urban	-0.2410	-.0418	0.0952	.0216
	(0.3723)	(0.0669)	(0.1880)	0.0423)

RELIGION (REF :CHRISTIANITY)

Islam	0.6118**	.0984**	0.7741**	.1548***
	(0.3078)	(0.0480)	(0.3191)	(0.0537)
Traditionalist	#	#	0.1719	.0384
			(0.2801)	(0.0611)
_cons	1.2985		14.9939***	
	(1.3652)		(0.7757)	
No of observations				
Prob >chi2	306		1171	

Pseudo R2	0.0000		0.0000		
	0.1879		0.1325		

Table A46: Immunisation care utilisation in the South South 2013, 2008 and 2003

	NDHS 2013		NDHS 2008		NDHS 2003	
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect		
WEALTH VARIABLES OF MOTHER (REF:RICHEST)						
Poorest	-2.002***	-.4287***	-1.7393***	-.3320***	-1.2685**	-.2076
	(0.6532)	(0.1569)	(0.3931)	(0.0910)	(0.6654)	(0.1323)
Poorer	-0.6547**	-.1060**	-1.5227***	-.2588***	-0.1175	-.0153
	(0.2972)	(0.0547)	(0.3509)	(0.0708)	(0.6912)	(0.0931)
Middle	-0.8158***	-.1250***	-1.2452***	-.1954***	-1.1734**	-.1869
	(0.2527)	(0.0422)	(0.3416)	(0.0619)	(0.5795)	(0.1108)
Richer	-0.7635***	-.1142***	-0.9030***	-.1320**	-1.2094**	-.1896**
	(0.2437)	(0.0388)	(0.3218)	(0.0519)	(0.4928)	(0.0911)
MOTHER'S EMPLOYMENT (REF:EMPLOYED)						
not employed	-0.4813***	-.0732**	-0.4288**	-.0594***	-0.2136	-.0283
	0.1600	(0.0268)	(0.1717)	(0.0260)	(0.4022)	(0.0562)
PRICE VARIABLES						
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)						
big problem	-0.4443***	-.0629***	0.0967	.0122	0.6758	.0830
	(0.1298)	(0.0189)	(0.2389)	(0.0301)	(0.6150)	(0.0731)
Small problem					-0.5285	-.0751
					(0.5566)	(0.0873)
NO PROVIDER (REF NOT A BIG PROBLEM)						
big problem	0.0636	.0080				

	(1)	(2)	(3)	(4)	(5)	(6)
	(0.2294)	(0.0288)				
TRANSPORT TO HEALTH FACILTY (REF NOT A BIG PROBLEM)						
big problem	-0.5457**	-.0731**	-0.1946	-.0250		
	(0.2360)	(0.0331)	(0.5889)	(0.0767)		
Small problem			0.1433	.0176		
			(0.5938)	(0.0712)		
NO IMMUNIZATION DRUGS						
Big problem			-0.7524***	-.0999***		
			(0.2286)	(0.0320)		

MOTHER'S INSURANCE STATUS (REF: INSURED)

	(1)	(2)	(3)	(4)	(5)	(6)
no insurance	-0.5980	-.068	-0.4289	-.0470		
	(0.5722)	(0.0524)	(0.7869)	(0.0735)		

EDUCATION VARIABLES

MOTHER'S EDUCATION (REF: HIGHER)

	(1)	(2)	(3)	(4)	(5)	(6)
no education	-3.4878***	-.6973***	-0.6936	-.1063	-1.2624	-.2182
	(0.7830)	(0.1117)	(0.5726)	(0.1026)	(1.0128)	(0.2163)
Primary	-2.2250***	-.3725***	-0.2126	-.0274	0.0081	.0010
	(0.7661)	(0.1388)	(0.5344)	(0.0699)	(0.9159)	(0.1161)
Secondary	-1.5785**	-.2254**	0.4334	.0544	-0.2279	-.0291
	(0.7407)	(0.1066)	(0.5233)	(0.0654)	(0.8566)	(0.1106)

FATHER'S EDUCATION (REF: HIGHER)

	(1)	(2)	(3)	(4)	(5)	(6)
no education	-0.4094	-.0637	-0.5232	-.0774	-0.1571	-.0209
	(0.3457)	(0.0599)	(0.3604)	(0.0605)	(0.6945)	(0.0967)
Primary	0.1790	.0241	-0.1970	-.0259	0.3200	.0388
	(0.2548)	(0.0333)	(0.3094)	(0.0419)	(0.5612)	(0.0649)
Secondary	0.3947**	.0556*	-0.3558	-.0448	0.2336	.0295
	(0.2331)	(0.0333)	(0.2772)	(0.0344)	(0.4837)	(0.0609)

MOTHER'S AGE

	(1)	(2)	(3)	(4)	(5)	(6)
Age	0.0320**	.0044**	0.0360**	.0045**	0.0914**	.0116**
	(0.0138)	(0.0019)	(0.0160)	(0.0021)	(0.0474)	(0.0059)

CHILLD AGE

Child age	0.2553***	.0354***	0.4566***	.0580***	0.3617**	.0459***
	(0.0506)	(0.0070)	(0.0564)	(0.0070)	(0.1310)	(0.0168)

CHILD SEX(REF. MALE)

Female	0.0234	.0032	-0.4208***	-.0535***	-0.3978	-.0505
	(0.12680	(0.0176)	(0.1416)	(0.0179)	(0.3209)	(0.0417)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	-0.0499	-.006	-0.0372	-.0047	0.0002	.0001
	(0.0371)	(0.0052)	(0.0403)	(0.0052)	(0.1094)	(0.0139)

MARITAL STATUS OF MOTHER (REF: MARIED)

Single	0.7293**	.0810***	0.3357	.0383	-0.2317	-.0316
	0.3408	(0.0292)	(0.3747)	(0.0378)	(0.8895)	(0.1305)

RESIDENCE OF MOTHER

Urban	-0.0436	-.0060	0.2700	.0326	0.0720	.0090
	(0.1616)	(0.0227)	(0.2344)	(0.0270)	(0.4044)	(0.0504)

RELIGION OF MOTHER (REF :CHRISTIANITY)

Islam	1.8492***	.1411***	1.6071**	.1199***		
	(0.6025)	(0.0208)	(0.7680)	(0.0284)		
Traditionalist	-1.2657**	-.2469	-0.3664	-.0524	-0.1032	-.0135
	(0.6436)	(0.1553)	(0.3874)	(0.0619)	(1.2725)	(0.1730)
_cons	3.3269***		2.5108**		-0.4851	
	(0.8777)		(1.2127)		(1.7062)	

No of observations			
Prob >chi2	1821	1543	315
Pseudo R2	0.0000	0.0000	0.0000
	0.1663	0.2126	0.1682

Table A47: Immunization care utilization in the South West 2013, 2008 AND 2003

Variable	NDHS 2013		NDHS 2008		NDHS 2003	
	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect		
WEALTH VARIABLES OF MOTHER (REF:RICHEST)						
Poorest	-1.2333**	-.184**	-0.6799**	-.1060*	-1.1583*	-.0352
	(0.4548)	(0.0921)	(0.3107)	(0.0572)	(0.6230)	( )
Poorer	-0.6905**	-.0840*	-0.1155	-.0152	-1.2069**	-.0424
	(0.3200)	(0.0466)	(0.2650)	(0.0361)	(0.4991)	( )
Middle	-0.4442*	-.0494	-0.1958	-.0264		
	(0.2678)	(0.0331)	(0.2505)	(0.0354)		
Richer	-0.3682*	-.0387	-0.0760	-.0099	-0.2477	-.0058
	(0.2133)	(0.0235)	(0.2097)	(0.0277)	(0.8292)	(.01997)
MOTHER'S EMPLOYMENT (REF:EMPLOYED)						
not employed	-0.5165***	-.0596**	-0.2029	-.0275	0.1762	.0035
	(0.1840)	(0.0241)	(0.2067)	(0.0295)	(1.0809)	(.0196)
PRICE VARIABLES						
DISTANCE TO HEALTH FACILITY (REF: NOT A BIG PROBLEM)						
big problem	-0.7048***	-.0831***	-0.1159	-.0151	-0.3790	-.0074
	(0.1721)	0.0239	(0.1947)	(0.0259)	(0.8383)	(.01109)
Small problem					-0.6813	-.0191
					0.8517	(.0166)
NO PROVIDER (REF NOT A BIG PROBLEM)						
big problem			-0.7047**	-.1074**		
			(0.3102)	(0.0543)		
TRANSPORT TO HEALTH FACILTY (REF NOT A BIG PROBLEM)						
big problem	-0.0911	-.0110	1.4976*	.0523		
	(0.2026)	(0.0269)	(0.8582			
Small problem			1.1065	.0165		
			(0.9551)			

NO IMMUNIZATION DRUGS

	(1)	(2)	(3)	(4)	(5)	(6)
Big problem					0.6402**	.0717**
					(0.2929)	(0.0282)

EDUCATION VARIABLES

MOTHER'S EDUCATION (REF: HIGHER)

	(1)	(2)	(3)	(4)	(5)	(6)
no education	-2.1741***	-.3581***	-1.6376**	-.2868**	-15.475***	-.9988***
	(0.5327)	(0.1118)	(0.6395)	(0.1357)	(2.2921)	(.00105)
Primary	-1.8103***	-.2411***	-1.3360**	-.2029*	-15.4690***	-.9985
	(0.5009)	(0.0798)	(0.6203)	(0.1072)	(2.6980)	
Secondary	-1.4513***	-.1595***	-0.6006	-.0805	-15.4275***	-.9937
	(0.4793)	(0.0558)	(0.5935)	(0.0825)	(2.8551)	

FATHER'S EDUCATION (REF: HIGHER)

	(1)	(2)	(3)	(4)	(5)	(6)
no education	-0.3538	-.0389	-0.7919	-.1220	-0.7150	-.0191
	(0.3247)	(0.0396)	(0.4535)	(0.0812)	(1.0753)	(.0256)
Primary	0.1530	.0146	-0.7376*	-.1074	-0.2628	-.0060
	(0.2788)	(0.0258)	(0.4259)	(0.0691)	(1.0227)	(.0239)
Secondary	0.1988	.0197	-0.4652	-.0609	0.2601	.0055
	(0.2446)	(0.0242)	(0.4105)	(0.0548)	(1.0963)	(.02116)

MOTHER'S AGE

	(1)	(2)	(3)	(4)	(5)	(6)
Age	0.0166	.0016	0.0267*	.0034*	-0.0195	-.0004
	(0.0165)	(0.0016)	(0.0151)	(0.0019)	(0.0487)	(.0009)

CHILLD AGE

	(1)	(2)	(3)	(4)	(5)	(6)
Child age	0.3586***	.0355***	0.3909***	.0503***	0.5084***	.0109
	(0.0563)	(0.0058)	(0.0525)	(0.0068)	(0.1762)	

CHILD SEX(REF. MALE)

	(1)	(2)	(3)	(4)	(5)	(6)
Female	0.3072**	.0304**	-0.0237	-.0030	0.1876	.0040
	(0.1408)	(0.0140)	(0.1362)	(0.0176)	(0.4626)	(.0081)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
birth order	-0.0513	-.0050	-0.0811*	-.0104*	-0.0616	-.0013
	(0.0512)	(0.0051)	(0.0493)	(0.0063)	(0.1277)	(.0021)
MARITAL STATUS OF MOTHER (REF: MARIED)						
Single	1.2363**	.0781**	-0.4756	-.0713		
	(0.8672)	(0.0299)	(0.4506)	(0.0773)		
RESIDENCE OF MOTHER						
Urban	0.4144**	.0430**	0.2239	.0286	-0.7928	-.0171
	(0.1942)	(0.0210)	(0.1789)	(0.0227)	(0.6376)	
RELIGION OF MOTHER (REF :CHRISTIANITY)						
Islam	0.0886	.0087	0.1964	.0249	1.0861**	.0212
	(0.1556)	(0.0152)	(0.1448)	(0.0180)	(0.5448)	
Traditionalist	0.7252	.0545	-0.7903**	-.1305	0.3993	.0072
	(1.1520)	(0.0629)	(0.4752)	(0.0956)	(1.2662)	(.01621)
_cons	2.0632***		1.8709***		17.5419***	
	(0.6929)		(0.6415)		(3.3970)	
No of observations	1913		1670		367	
Prob >chi2	0.0000		0.0000		0.0000	
Pseudo R2	0.213		0.1511		0.2030	

Table A48: Immunisation care utilisation in the South West 1999 and 1990

	NDHS 1999		NDHS 1990	
Variable	Coef./Std Err	Mar. Effect	Coef./Std Err	Mar. Effect
WEALTH VARIABLES OF MOTHER(REF:RICHEST)				
Poorest	-1.067***	-.2156**	-1.0671***	-.2156**
	(0.3759)	(0.0882)		(0.0882)

			(0.3759)	
Poorer	-.6780*	-.1286	-0.6781	-.1286
	(0.3761)	(0.0809)	(0.3761)	(0.0809)
Middle	-.8852	-.1727**	-0.8852	-.1727**
	(0.3250)	(0.0728)	(0.3250)	(0.0728)
Richer	-.3549*	-.0596*	-0.3550*	-.0596*
	(0.1918)	(0.0333)	(0.1918)	(0.0333)

MOTHER'S EMPLOYMENT STAUS (REF:EMPLOYED)

not employed	-.2697	-.0460	-0.2697	-.0460
	(0.2296)	(0.0413)	(0.2296)	(0.0413)

EDUCATION VARIABLES

MOTHER'S EDUCATION (REF: HIGHER)

no education	.1400	.0222	0.1400	.0222
	(0.4982)	(0.0776)	(0.4982)	(0.0776)
Primary	.0790	.0126	0.0791	.0126
	(0.4640)	(0.0739)	(0.4640)	(0.0739)
Secondary	.6247	.0931	0.6247	.093
	(0.4559)	(0.0626)	(0.4559)	(0.0626)

FATHER'S EDUCATION (REF: HIGHER)

no education	-.4992	-.0880	-0.4992	-.0880
	(0.3890)	(0.0742)	(0.3890)	(0.0742)
Primary	-.2528	-.0414	-0.2528	-.0414
	(0.3519)	0.0587	(0.3519)	(0.0587)
Secondary	-.4909	-.0835	-0.4910	-.0835
	(0.3441)	(0.0613)	(0.3441)	(0.0613)

MOTHER'S AGE

Age	.0493***	.0079**	0.0494***	.0079**
	(0.0178)	(0.0029)	(0.0178)	(0.0029)

CHILLD AGE

Child age	.3758***	.0606**	0.3758***	.0606***
	(0.0587)	(0.0090)	(0.0587)	(0.0090)

CHILD SEX(REF. MALE)

Female	-.0492	-.0070	-0.0493	-.0079
	(0.1521)	(0.0246)	(0.1521)	(0.0246)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	-.1990***	-.0321***	-0.1990***	-.0321***
	(0.0494)	(0.0079)	(0.0494)	(0.0079)

MARITAL STATUS OF MOTHER (REF: MARIED)

Single	.1894	.0289	0.1895	.0289
	(0.4040)	(0.0585)	(0.4040)	(0.0585)

RESIDENCE OF MOTHER

Urban	.7017**	.1250**	0.7018**	.1250**
	(0.2529)	(0.0492)	(0.2529)	(0.0492)

RELIGION (REF :CHRISTIANITY)

Islam	.3823**	.0602**	0.3823**	.0602**
	(0.1655)	(0.0255)	(0.1655)	(0.0255)
Traditionalist	-.6029	-.113	-0.6029	-.1138
	0.4294	(0.0919)	(0.4294)	(0.0919)
_cons	-.3146		-0.3147	
	(0.6429)			
No of observations	1165		1165	
Prob >chi2	0.0000		0.0000	
Pseudo R2	0.1716		0.1716	

Appendix 1v: regional regression results for bed nets utilization

Table A49 Bed nets utilization in the North Central Region 2013 and 2008

	NDHS 2013		NDHS 2008	
No bed net (base outcome)	Only treated nets	Only untreated nets	Only treated nets	Only untreated nets

Variable	Coef. / Std. Err.	Coef. / Std. Err.	Marginal effect	Coef. / Std. Err.	Coef. / Std. Err.	Marginal effect
WEALTH VARIABLES OF MOTHER (REF:RICHEST)						
Poorest	.0579 (.2403)	-2.2451** (1.0780)	.0130 (0.0377)	-.8497** (.4185)	1.158** (.4342)	-.0524 (0.0367)
Poorer	.2034 (.1927)	-.6019 (.4923)	-.0209 (0.0319)	.1054 (.3315)	.9388** (.4224)	-.0554** (0.03114)
Middle	.2771 (.1728)	.3860 (.3356)	-.0493* (0.0282)	.2402 (.2699)	1.110*** (.3998)	-.0714** (0.03118)
Richer	.1229 (.1601)	.0712 (.2911)	-.0196 (0.0255)	-.3820 (.2816)	.7929** (.4104)	-.0365 (0.0308)
MOTHER'S EMPLOYMENT (REF:EMPLOYED)						
not employed	-.1078 (.0998)	.0960* (.2072)	.0133 (0.015)	.1868 (.1772)	-.6496*** (.1856)	.0202** (0.0087)
PRICE VARIABLES						
INSURANCE STATUS OF MOTHER (REF: INSURED)						
no insurance	.1328 (.2445)	-.0805 (.3980)	-.0168** (0.0349)	-.2167 (.3232)	1.2217 (1.0731)	-.0261 (0.0203)
MOTHER'S EDUCATION (REF: HIGHER)						
no education	-.3087 (.2113)	-.217 (.3771)	.0477 (0.0306)	-1.547 (.3634)	-.6168 (.4545)	.0684*** (0.0219)
Primary	-.0116022 .1958936	-.0182 (.3535)	.0020 (0.0299)	-.8998*** (.3186)	-.3627 (.4412)	.0371** (0.0192)
Secondary	-.1141 (.1735)	-.113 (.3241)	.0185 (0.0259)	-.2914 (.2777)	-.6263 (.4338)	.0315** (0.0162)
FATHER'S EDUCATION (REF: HIGHER)						
no education	-.7681*** (.1726)	-.524 (.3078)	.1077*** (0.0203)	-.2970 (.3264)	-.7683** (.2978)	.0384** (0.0139)

Primary	-.272* (.1488)	-.486 (.3045)	.0462** (0.0206)	.1010 (.2535)	-.2643 (.2869)	.0079 (0.0137)
Secondary	-.4361*** (.1237)	-.5949** (.2384)	.0718*** (0.0176)	-.4601* (.2486)	-.0490 (.2580)	.0141 (0.0130)

MOTHER'S AGE

Age	-.0137 (.0099)	.0035 (.0201)	.0019 (0.0015)	.0155 (.0176)	-.0176 (.0167)	.0003 (0.0009)

CHILLD AGE

Child age	-.1017*** (.0315)	.0125 (.0640)	.0145*** (0.0048)	-.1005 (.0613)	-.0451 (.0511)	.0048* (0.0029)

CHILD SEX(REF. MALE)

Female	.1411* (.0847)	.3152* (.1822)	-.0266** (0.0130)	-.0176 (.1628)	-.0333 (.1419)	.00197 (0.0079)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	.0319 (.0310)	.0298 (.0657)	-.0052 (0.0048)	-.0538 (.0562)	.0377 (.0479)	-.0002 (0.0027)

MARITAL STATUS OF MOTHER (REF: MARIED)

Single	-1.102*** (.3988)	-.2267 (.7241)	.1174*** (0.0308)	-1.2528 (.9965)	.1877 (.3707)	.0119 (0.0223)

RESIDENCE OF MOTHER

Urban	-.0273 (.1266)	.6307** (.2497)	-.0101 (0.0196)	.5129* (.2185)	-.6011 (.2259)	.0068 (0.0114)

RELIGION (REF :CHRISTIANITY)

Islam	-.3452*** (.0978)	.5815 (.2166)	.0384** (0.0152)	-.0045 (.1825)	-.1703 (.1744)	.00753 (0.0093)
Traditionalist	.0253 (.3139)	1.0179 (.7645)	-.0360 (0.0592)	.5746 (.6959)	.4607 (.4389)	-.0449 (0.0419)
_cons	-.7203* (.3996)	-3.882 .8219***		-2.034*** (.6823)	-3.278*** (1.0987)	

No of observations	3789		3767
Prob >chi2	0.0000		0.0000
Pseudo R2			0.0716

Table A50 Bed nets utilization in the North Central Region 2003

	NDHS 2003		
No bed net (base outcome)	Only treated nets	Only untreated nets	
Variable	Coef. / Std. Err.	Coef. / Std. Err.	Marginal effect
WEALTH VARIABLES OF MOTHER (REF:RICHEST)			
Poorest	1.286	.98178	-.0276
	(1.2621)	(.9207)	(0.0308)
Poorer	-14.357*** (.9852)	.6215	-.0134
		(.8668)	(0.0252)
Middle	-.1545	-.1454	.0029
	(1.5056)	(.8193)	(0.0159)
Richer	2.494**	.3258	-.00837
	(.9295)	(.8061)	(0.0193)
MOTHER'S EMPLOYMENT (REF:EMPLOYED)			
not employed	.9806	.00447	-.0003
	(.7823)	(.6035)	(0.0125)
PRICE VARIABLES			
INSURANCE STATUS OF MOTHER (REF: INSURED)			
no insurance	-14.344*** (.8096)	.67113	-.0188
		(1.1247)	(0.0427)
MOTHER'S EDUCATION (REF: HIGHER)			
no education	-3.515**	-.8214	.0168

	(1.2813)	(1.1513)	(0.0213)
Primary	-3.368492 1.282567	-1.2264	.0229
		(1.1396)	(0.0185)
Secondary	-2.500 **	-1.004	.0169
	(1.1040)	(1.2310)	(0.0161)

FATHER'S EDUCATION (REF: HIGHER)

no education	.8255	-.8394	.0142
	(.9419)	(.7002)	(0.0090)
Primary	.2763	-.0447	.0007
	(.6498)	(.5160)	(0.0105)
Secondary	-1.573	.2310	-.0047
	(1.296)	(.5193)	(0.0117)

MOTHER'S AGE

Age	-.0208	.0156	-.0003
	(.1315)	(.0523)	(0.0010)

CHILLD AGE

Child age	-.1010	.0664	-.0013
	(.2588)	(.1158)	(0.0024)

CHILD SEX(REF. MALE)

Female	.7953	-.2133	.00427
	(.5925)	(.3361)	(0.0070)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	.0065	-.0976	.0020
	(.3373)	(.1271)	(0.0025)

MARITAL STATUS OF MOTHER (REF: MARIED)

Single	-14.344*** (.8096)	.67113	-.0188
		(1.1247)	(0.0427)

RESIDENCE OF MOTHER

Urban	-2.764**	-2.3572***	.0424***			
	(1.0792)	(.6252)	(0.0102)			

RELIGION (REF :CHRISTIANITY)

Islam	.2610	1.586	-.0426**			
	(.7816)	(.5773)	(0.0176)			
Traditionalist	-15.42***	-15.6998***	.0282***			
	.7573)	(.4353)	(0.0081)			
_cons	-2.612	-2.5122				
	(3.1615)	(1.7004)				
No of observations	817					
Prob >chi2	0.0000					
Pseudo R2	0.1745					

Table A51 Bed nets utilisation in the North East 2013 and 2008

No bed net (base outcome)	NDHS 2013			NDHS 2008		
	Only treated nets	Only untreated nets		Only treated nets	Only untreated nets	
Variable	Coef. / Std. Err.	Coef. / Std. Err.	Marginal effect	Coef. / Std. Err.	Coef. / Std. Err.	Marginal effect
WEALTH VARIABLES OF MOTHER (REF:RICHEST)						
Poorest	.2692	1.5887 (1.5435)	-.0346	-1.117**	.0999	.0179
	(.2632)		(0.0301)	(.4241)	(.4311)	(0.0305)
Poorer	.5269**	1.8149 (1.4692)	-.0671**	-.2644	.1614	-.0055
	(.2511)		(0.0324)	(.4099)	(.4296)	(0.0318)
Middle	.5069**	(1.5890) (1.4788)	-.0678**	-.1717	.0279	.0017
	(.2348)		(0.0339)	(.3911)	(.4301)	(0.0301)
Richer	.3553	1.5970 (1.2803)	-.0498	.4963	.6884*	-.0682
	(.2186)		(0.0309)	(.3706)	(.4101)	(0.0433)
MOTHER'S EMPLOYMENT (REF:EMPLOYED)						
not employed	.0934	-.7790* (.4316)	-.0075	.1093	-.3393***	.0191**

	(1)	(2)	(3)	(4)	(5)	(6)
	(.0922)		(0.0098)	(.1505)	(.1120)	(0.0079)

PRICE VARIABLES

INSURANCE STATUS OF MOTHER (REF: INSURED)

	(1)	(2)	(3)	(4)	(5)	(6)
no insurance	-.5107	-1.2797	.0702			
		(1.3678)				
	(.3673)		(0.0566)			

MOTHER'S EDUCATION (REF: HIGHER)

	(1)	(2)	(3)	(4)	(5)	(6)
no education	-.3167	.9373	.0321	-.9524**	-1.465***	.1519**
		(1.3706)			(.4699)	
	(.2985)		(0.0343)	(.4974)		(0.0576)
Primary	-.1488	1.4536	.0074	-.7279	-1.356***	.0758***
		(1.3645)			(.4616)	
	(.2891)		(0.0305)	(.4852)		(0.0179)
Secondary	.0753	.6647	-.0104	-.8847*	-1.5208***	.0759***
		(1.3106)				
	(.2721)		(0.0305)	(.4873)	(.4766)	(0.0136)

FATHER'S EDUCATION (REF: HIGHER)

	(1)	(2)	(3)	(4)	(5)	(6)
no education	-.1951	-.2568	.0212	-1.3860***	.4152	.0121
		(.6563)				
	(.1781)		(0.0191)	(.2411)	(.2559)	(0.0177)
Primary	.0841	.2802	-.0098	-.9364***	.1535	.0048
		(.5399)				
	(.1776)		(0.0195)	(.2476)	(.2777)	(0.0205)
Secondary	-.0018	-.4477	.00129	-.9129***	.2232	-.0008
		(.5617)				
	(.1558)		(0.0163)	.2490	(.2747)	(0.0211)

MOTHER'S AGE

	(1)	(2)	(3)	(4)	(5)	(6)
age	.0080	.0068	-.0009	-.0086	-.0280**	.0019**
	(.0108)	(.0472)	(0.0011)	(.0193)	(.0145)	(0.0011)

CHILLD AGE

	(1)	(2)	(3)	(4)	(5)	(6)
Child age	-.0822**	.1656	.0081**	-.1153	-.0138	.0034
		(.13462)			(.0374)	
	(.0308)		(0.0032)	(.0517)		(0.0027)

CHILD SEX(REF. MALE)

	(1)	(2)	(3)	(4)	(5)	(6)
Female	.0985	-.2928	-.0094	.2079	.1370	-.0133*
		(.3614)				
	(.0854)		(0.0089)	(.1460)	(.1024)	(0.0075)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

Variable						
birth order	-.0381	-.1061 (.1138)	.0043	.0381	.0216	-.0022
	(.0285)		(0.0030)	(.0463)	(.0353)	(0.0026)

MARITAL STATUS OF MOTHER (REF: MARIED)

Single	.1503	-.2869 (1.0319)	-.0158	-13.9457***	-.1973 (.3676)	.0420
	(.2586)		(0.0302)	(.1532)		(0.0213)

RESIDENCE

Urban	.4685***	1.7555*** (.4933)	-.0623***	-.4979**	-.0890 (.1505)	.0152
	(.1312)		(0.0168)	(.2110)		(0.0103)

RELIGION (REF :CHRISTIANITY)

Islam	-.6319***	-1.8443*** (.5129)	.0866***	.9770***	.5258*** (.1774)	-.0464***
	.1257		(0.0179)	(.2519)		(0.0096)
Traditionalist	.6245	.3549 (1.1738)	-.0825	.2998	-14.108*** (.2137)	.0720**
	(.3847)		(0.0617)	(1.0601)		(0.0352)
_cons	-1.231**	-4.7922** (2.2314)		-1.4707		
	(.4679)			(.7554)		
No of observations						
Prob >chi2	5151			5012		
Pseudo R2	0.0000			0.0000		
	0.0476			0.0483		

Table A52: Bed nets utilization in the North West 2013 and 2008

	NDHS 2013			NDHS 2008		
No bed net (base outcome)	Only treated nets	Only untreated nets		Only treated nets	Only untreated nets	
Variable	Coef. / Std. Err.	Coef. / Std. Err.	Marginal effect	Coef. / Std. Err.	Coef. / Std. Err.	Marginal effect

WEALTH VARIABLES OF

MOTHER (REF:RICHEST)

	(1)	(2)	(3)	(4)	(5)	(6)
Poorest	.0208	-.1445	-.0010	-1.2315***	-.4078	.0617**
	(.1921)	(.5987)		(.3655)	(.3137)	(0.0244)
Poorer	.1769	.7359	-.0322	-.5851* (.3338)	-.4124	.0457**
	(.1886)	(.5749)	(0.0265)		(.3064)	(0.02360)
Middle	.3754**	.3688	-.0559**	-.6103** (.3136)	-.2918	.0357*
	(.17790)	(.5519)	(0.0279)		(.2926)	(0.0211)
Richer	.1831	.2094	-.0266	-.3817	-.4355	.0389**
	(.1731)	(.4967)	(0.0251)	(.2678)	(.2892)	(0.0184)

MOTHER'S EMPLOYMENT (REF:EMPLOYED)

not employed	-.0199	-.1075 (.1916)	.0037	-.0325	-.3229***	.0257***
	(.0666)		(0.0087)	(.1375)	(.0946)	(0.0084)

PRICE VARIABLES

INSURANCE STATUS OF MOTHER (REF: INSURED)

no insurance	.5903	-.3950 (1.1278)	-.0539	13.627***	1.063	-.0879***
	(.5292)		(0.0483)	(.3664)	(1.002)	(0.0324)

MOTHER'S EDUCATION (REF: HIGHER)

no education	-.2642	-1.1602 (.8271)	.0529	-.7075*	.1466	.0149***
	(.3017)		(0.0462)	(.4113)	(.4242)	(0.0367)
Primary	-.4701	-.9454 (.8476)	.0605**	-.7886** (.4147)	-.3096	.0395
	(.30410		(0.0308)		(.4346)	(0.0300)
Secondary	-.4633	-.3946 (.8220)	.0549*	-.0243	-.0912	.0075
	(.2993)		(0.0301)	(.3838)	(.4268)	(0.0342)

FATHER'S EDUCATION (REF: HIGHER)

no education	-.5080***	.0998	.0659***	-.5935** (.2469)	-.9448***	.1001***
	(.1346)	(.4617)	(0.0195)		(.2011)	(0.0218)
Primary	-.5459***	-.5633	.0658***	-1.0421*** (.2907)	-.8828***	.0770***
	(.1481)	(.5448)	(0.0152)		(.2116)	(0.0116)

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	(1)	(2)	(3)	(4)	(5)	(6)
Secondary	-.3588** (.1357)	.5788 (.4595)	.0323** (0.0167)	-.4668** (.2317)	-.8235*** (.2126)	.0614*** (0.0115)
MOTHER'S AGE						
age	-.0303*** (.0083)	.0024 (.0208)	.0038*** (0.0011)	-.0267 (.0169)	-.0135 (.0112)	.0018* (0.0010)
CHILLD AGE						
Child age	-.0584 (.0226)	-.1556** (.0654)	.0091*** (0.0029)	.0210 (.0490)	-.1146*** (.0333)	.0082** (0.0029)
CHILD SEX(REF. MALE)						
Female	.0820 (.0624)	.2257 (.1815)	-.0128 (0.0082)	.1069 (.1352)	.0718 (.0910)	-.0086 (0.0082)
OTHER VARIABLES						
NUMBER OF CHILDREN OR BIRTH ORDER						
birth order	.0262 (.0209)	-.0124 (.0573)	-.0031 (0.0027)	.0541 (.0449)	.0019 (.0309)	-.0017 (0.0027)
MARITAL STATUS OF MOTHER (REF: MARIED)						
Single	.2291 (.2309)	.0111 (.7379)	-.0312 (0.0352)	-.6671 (.7723)	.6899** (.3513)	-.0575 (0.0479)
RESIDENCE OF MOTHER						
Urban	.2158** (.0967)	-.5444* (.3062)	-.0231* (0.0137)	-.0254 (.2079)	-.7149*** (.1710)	.0459*** (0.0111)
RELIGION (REF :CHRISTIANITY)						
Islam	.8131*** (.2233)	.3689 (.4094)	-.0827*** (0.0166)	-.9757 *** (.2285)	-.3581 (.2339)	.0713** (0.0262)
Traditionalist	-.5412 (.6329)	.1005 (1.0991)	.0548 (0.0555)	-1.4842** (.7332)	-2.8191** (1.0489)	.1097*** (0.0098)
_cons	-1.748*** (.6204)	-3.2401** (1.2495)		-13.53*** (.6130)	-1.0919 (1.1159)	
No of observations	7992			5835		
Prob >chi2	0.0000			0.00		

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Pseudo R2	0.0212	0.04 19

Table A53: Bed nets utilisation in the North West 2003

	NDHS 2003		
No bed net (base outcome)	Only treated nets	Only untreated nets	
Variable	Coef. / Std. Err.	Coef. / Std. Err.	Marginal effect
WEALTH VARIABLES OF MOTHER (REF:RICHEST)			
Poorest	.7623 (.8155)	-.0519 (1.1209)	.0001 (.0056)
Poorer	-.4036 (.9193)	-.0267 (1.0907)	.0002 (.0055)
Middle	.6081 (.8639)	-1.8428 (1.1739)	.0065* (.0037)
Richer	-15.797*** (.4548)	-1.2385 (1.2844)	.0085** (0037)
MOTHER'S EMPLOYMENT (REF:EMPLOYED)			
not employed	-.0697 (.4223)	-.3879 (.3203)	.0019 (.0018)
MOTHER'S EDUCATION (REF: HIGHER)			
no education	-.4963 (1.3100)	15.692*** (4.7908)	-.2752 (.2800)
Primary	-1.5279 (1.3784)	15.7438*** (4.5970)	-.9988***

cii

			(.00147)
Secondary	-.6526	15.3081***	-.9987***
	(1.2146)	(4.4355)	
			(.0018)

FATHER'S EDUCATION (REF: HIGHER)

no education	-1.5132	.3342	-.0013
	(1.0226)	(.7569)	(.0039)
Primary	-1.9484	(.2448)	-.0011
	(1.3187)	(.7869)	(.0048)
Secondary	-1.5195	-.2748	.0015
	(1.1719)	(1.0549)	(.0044)

MOTHER'S AGE

age	-.0150	.0040 (.0339)	-.0001
	(.0472)		(.0002)

CHILLD AGE

Child age	-.1784	-.0641	.0003
	(.1365)	(.1148)	(.0006)

CHILD SEX(REF. MALE)

Female	-.1472	-.3234	.0016
	(.4395)	(.3004)	(.0016)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	.0509	.0179	-.0001
	(.0929)	(.0821)	(.0004)

MARITAL STATUS OF MOTHER (REF: MARIED)

Single	-15.6467***	-15.536***	.0073**
	(.3903)	(.3559)	(.0030)

RESIDENCE OF MOTHER

Urban	-.0282	-.4511	.0021
	(.6707)	(.4074)	(.0017)

RELIGION (REF :CHRISTIANITY)

Islam	15.6457 ***	15.895***	-.0149**
	(.4648)	(.3772)	(.0062)
Traditionalist	-.9192	-.7472	.0028

	(.8801)	(.6862)	(.0019)
_cons	-17.139***	-33.976***	
	(2.0771)	(4.6965)	
No of observations	1442		
Prob >chi2	-		
Pseudo R2	0.1003		

Table A54: Bed nets utilisation in the South East 2013 and 2008

	NDHS 2013			NDHS 2008		
No bed net (base outcome)	Only treated nets	Only untreated nets		Only treated nets	Only untreated nets	
Variable	Coef. / Std. Err.	Coef. / Std. Err.	Marginal effect	Coef. / Std. Err.	Coef. / Std. Err.	Margina l effect
WEALTH VARIABLES OF MOTHER (REF:RICHEST)						
Poorest	.6444**	.9120	-.1420**	.8675** (.4036)	1.2758 ** (.5829)	-.1478**
	(.2558)	(.7623)	(0.0584)			(0.0645)
Poorer	1.1757***	1.9038*** (.4653)	-.2735***	.9651***	1.1870**	-.1513***
	(.1954)		(0.0451)	(.3340)	(.5121)	(0.0527)
Middle	.6461*** (.1614)	1.7892***	-.1512***	.3968	-.1544	-.0332
		(.4145)	(0.0341)	(.2966)	(.5246)	(0.0339)
Richer	.3217**	1.1591** (.4379)	-.0746**	.5623**	.1005	-.0559*
	.1489		(0.0291)	(.2540)	(.4671)	(0.0297)
MOTHER'S EMPLOYMENT (REF:EMPLOYED)						
not employed	.0510	.0763	-.0101	-.5046** (.2179)	-.4629	.0508***
	(.1296)	(.3723)	(0.0245)		(.3491)	(0.0174)

PRICE VARIABLES

INSURANCE STATUS OF MOTHER (REF: INSURED)

civ

	(1)	(2)	(3)	(4)	(5)	(6)
no insurance	.2551 (.3362)	-.1865 (.7324)	-.0408 (0.0550)	.5045 (1.0267)	13.0161*** (.4458)	-.0693 (0.0623)

MOTHER'S EDUCATION (REF: HIGHER)

	(1)	(2)	(3)	(4)	(5)	(6)
no education	-.9917*** (.3338)	-1.796*** (.6216)	.1517*** (0.0353)	.2612 (.4668)	.0291 (.6919)	-.0251 (0.0524)
Primary	-.5440** (.2235)	-1.5294*** (.4487)	.1052*** (0.0361)	-.1463 (.3576)	-.1318 (.6040)	.0159 (0.0354)
Secondary	-.4959*** (.1769)	-1.937*** (.3657)	.1141*** (0.0334)	-.0695 (.3251)	.1172 (.5347)	.0026 (0.0329)

FATHER'S EDUCATION (REF: HIGHER)

	(1)	(2)	(3)	(4)	(5)	(6)
no education	-.1194 (.2969)	1.3862** (.6472)	-.0081 (0.0553)	-1.234** (.4741)	-1.5540** (.6087)	.1014*** (0.0207)
Primary	.0153 (.2001)	.6190 (.4570)	-.0097 (0.0371)	-.9126*** (.3279)	-.7934* (.4790)	.0988*** (0.0325)
Secondary	-.0387 (.1863)	-.1115 (.4613)	.0081 (0.0345)	-.7495** (.2969)	-.6706 (.4872)	.0773*** (0.0268)

MOTHER'S AGE

	(1)	(2)	(3)	(4)	(5)	(6)
age	.0197594 .012015	-.0104 (.0314)	-.0035 (0.0022)	.0081 (.0166)	.0169 (.0287)	-.0012 (0.0016)

CHILLD AGE

	(1)	(2)	(3)	(4)	(5)	(6)
Child age	-.1476*** (.0384)	-.1173 (.0977)	.0279*** (0.0071)	-.1855*** (.0559)	-.1259 (.0887)	.0194*** (0.0057)

CHILD SEX(REF. MALE)

	(1)	(2)	(3)	(4)	(5)	(6)
Female	-.1554 (.1018)	-.3849 (.2732)	.0320* (0.0189)	.0158 (.1587)	-.0402 (.2425)	-.0002 (0.0157)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

	(1)	(2)	(3)	(4)	(5)	(6)
birth order	(-.0051) .0326221	.0239 (.0732)	.0007 (0.0060)	-.0646 (.0479)	-.1245 (.0787)	.0090* (0.0048)

MARITAL STATUS OF MOTHER (REF: MARIED)

Single	-.1659 (.2197)	-1.6791 (1.0631)	.0388 (0.0378)	-2.442** (1.0169)	-.2274 (.6418)	.1014*** (0.0224)

RESIDENCE OF MOTHER

Urban	.2731*** (.1122)	.3164 (.3108)	-.0515** (0.0199)	-.3705** (.1877)	-.6158** (.3133)	.0480** (0.0182)

RELIGION (REF :CHRISTIANITY)

Islam	-.3531 (1.0611)	-13.191*** (.8755)	.0706 (0.1615)	-13.459*** (.6953)	-12.566*** (.8439)	.1336*** (0.0099)
Traditionalist	-.1845 (.3458)	-13.425*** (.3202)	.0464 (0.0585)	-1.1730** .5117887	1.7492*** .3700365	-.0503 (0.0494)
_cons	-1.5852*** (.5283)	-2.355** (1.1806)		-1.4769 (1.2094)	-15.2360*** (.9796)	
No of observations	2211			1651		
Prob >chi2	0.0000			0.0000		
Pseudo R2	0.0407			0.0855		

Table A55: Bed nets utilisation in the South East 2003

	NDHS 2003		
No bed net (base outcome)	Only treated nets	Only untreated nets	
Variable	Coef. / Std. Err.	Coef. / Std. Err.	Marginal effect

WEALTH VARIABLES OF MOTHER (REF:RICHEST)

Poorest	5.3680 (3.8749)	10.7736** (4.1241)	-.7606 (0.6151)
Poorer	2.8804 (2.3993)	10.7472*** (3.7478)	-.6680 (0.6409)
Middle	4.5368 (2.8913)	8.9513*** (3.0658)	-.2872 (0.4711)
Richer	-14.6647***	-11.6806***	.0037*

	(1.5089)	(1.7655)	(0.0021)
MOTHER'S EMPLOYMENT (REF:EMPLOYED)			
not employed	-1.5278 (1.7048)	-.0850 (.6445)	.0001 (0.0003)

PRICE VARIABLES

INSURANCE STATUS OF MOTHER (REF: INSURED)

no insurance

MOTHER'S EDUCATION (REF: HIGHER)

no education	.6061 (1.3595)	-3.9907*** (1.3615)	.0007** (0.0003)
Primary	.4275 (1.2760)	-2.1455* (1.1568)	.0008** (0.0004)
Secondary	-2.494* (1.4582)	-3.2041** (1.2449)	.0012** (0.0005)

FATHER'S EDUCATION (REF: HIGHER)

no education	15.9425*** (2.0394)	1.4674 (1.7206)	-.8750*** (0.2085)
Primary	16.5691*** (2.1509)	1.8531 (1.7975)	-.0419 (0.0410)
Secondary	18.1933*** (2.0648)	1.7823 (1.5009)	-.9545*** (0.0657)

MOTHER'S AGE

age	-.0915 (.1246)	-.1585 (.0632)	.0001** (0.00003)

CHILLD AGE

Child age	-.4390 (.3864)	-.2077 (.1857)	.0001 (0.0001)

CHILD SEX(REF. MALE)

Female	.6732	(-.2064) .568417	.0001
	(.6869)		(0.0002)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	.0493	.2452	-.0001
	(.3709)	(.1924)	(0.0001)

MARITAL STATUS OF MOTHER (REF: MARIED)

Single	-17.108***	-16.5860*** (.5890)	.0010**
	(1.4550)		(0.0005)

RESIDENCE OF MOTHER

Urban	-1.462 *	-.3228	.0001
	(.8798)	(.4705)	(0.0002)

RELIGION (REF :CHRISTIANITY)

Islam	-17.140*** (1.2142)	1.6134* (.9022)	-.0013
			(0.0016)
Traditionalist			
_cons	-20.0893*** (4.7009)		
No of observations	396		
Prob >chi2	-		
Pseudo R2	0.2777		

Table A56: Bed nets utilisation in the South South 2013 and 2008

	NDHS 2013			NDHS 2008		
No bed net (base outcome)	Only treated nets	Only untreated nets		Only treated nets	Only untreated nets	
Variable	Coef. / Std. Err.	Coef. / Std. Err.	Margin al effect	Coef. / Std. Err.	Coef. / Std. Err.	Margina l effect

WEALTH VARIABLES OF

MOTHER (REF:RICHEST)

Poorest	.9096	1.5906	-.1959	1.254***	1.222*** (.4218)	-.2251***
	(.8185)	(1.2003)	(0.1908)	(.3277)		(0.0617)
Poorer	.8551***	.1396	-.1684***	.5469**	1.5059*** (.3571)	-.1669***
	(.1985)	(.5012)	(0.0441)	(.2832)		(0.0476)
Middle	.8189***	.2080	-.1498***	.8313*** (.2383)	1.2016***	-.1552***
	(.1558)	(.3446)	(0.0306)		(.3352)	(0.0376)
Richer	.250*	.1192	-.0429*	.3510	.0365	-.0309
	(.1479)	(.3408)	(0.0258)	(.2254)	(.3463)	(0.0281)

MOTHER'S EMPLOYMENT (REF:EMPLOYED)

not employed	-.0045	1.0296***	-.0048	.0594	-.2088	.0060
	(.1174)	(.2837)	(0.0196)	(.1751)	(.2116)	(0.0184)

PRICE VARIABLES

INSURANCE STATUS OF MOTHER (REF: INSURED)

no insurance	.1132	14.0301*** (.2945)	-.0240	-.7734**	(.3500) (.7579)	.0665
	(.3137)		(0.0494)	(.3673)		(0.0578)

MOTHER'S EDUCATION (REF: HIGHER)

no education	-.5634** (.2661)	1.0908**	.0727**	-.2197	.6517	-.0308
		(.5654)	(0.0335)	(.4520)	(.4731)	(0.0532)
Primary	-.4661** (.2114)	.2114	.0731**	-.1022	-.0579 (.4369)	.0109
		(.5334)	(0.0324)	(.3553)		(0.0376)
Secondary	-.6399*** (.1916)	-.4183	.1080**	.2541	-.0919	-.0148
		(.5570)	(0.0320)	(.3210)	(.4135)	(0.0353)

FATHER'S EDUCATION (REF: HIGHER)

no education	-.2828	-.1645	.0442	-1.3599*** (.4394)	-.6922* (.40711)	.0989***
	(.2842)	(.6357)	(0.0406)			(0.0205)
Primary	-.0223	-.6024	.0058	-.7016*** (.2392)	-.4183	.0695***
	(.1831)	(.4977)	(0.0305)		(.3101)	(0.0221)
Secondary	.2451	.3491	-.0418	-.8281*** (.2056)	-.4325	.0891***
	(.1598)	(.4328)	(0.0263)		(.2830)	(0.0243)

MOTHER'S AGE

age	.0149	.0446**	-.0026	.0230	.0218	-.0029*
	(.0101)	(.0224)	(0.0017)	(.0169)	(.0198)	(0.0018)

CHILLD AGE

Child age	-.0843**	-.0500	.0142**	-.1636***	-.1535**	.0209***
	(.0343)	(.0871)	(0.0057)	(.0546)	(.0623)	(0.0056)

CHILD SEX(REF. MALE)

Female	-.0779	.1983	.0121	.2136	.1143	-.0227
	(.0942)	(.2500)	(0.0159)	(.1439)	(.16420)	(0.0149)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	-.0146	.0733	.0021	-.0391	-.0386	.0051
	(.0287)	(.0659)	(0.0048)	(.0439)	(.0485)	(0.0046)

MARITAL STATUS OF MOTHER (REF: MARIED)

Single	-.5982**	-14.317***	.0918***	.3006	-.2129	-.0161
	(.2708)	(.2156)	(0.0316)	(.3761)	(.4775)	(0.0443)

RESIDENCE OF MOTHER

Urban	.1310	-.7762**	-.0193	-.6927***	-.2299	.0596***
	(.1124)	.(2929)	(0.019)	(.2251)	(.2665)	(0.0195)

RELIGION (REF :CHRISTIANITY)

Islam	.8509***	-13.9760***	-.1679***	.4431	.1075	-.0461
	(.2518)	(.2504)	(0.059)	(.3864)	(.4738)	(0.05138)
Traditionalist	-1.6891	-14.7032***	.1712***	.1114	-.1087	-.0035
	(1.082)	(.5552)	(0.0501)	(.5416)	(.5463)	(0.0556)
_cons	-1.577***	-19.612***		-1.7288**	-3.4481***	
	(.4379)	(.9075)		(.67050	(1.045)	
No of observations	2807			398		
Prob >chi2	0.0000			0.0000		
Pseudo R2	0.0428			0.3399		

Table A57: Bed nets utilisation in the South South 2003

	NDHS 2003		
No bed net (base outcome)	Only treated nets	Only untreated nets	
Variable	Coef. / Std. Err.	Coef. / Std. Err.	Marginal effect
WEALTH VARIABLES OF MOTHER (REF:RICHEST)			
Poorest	10.3467*** (2.2416)	6.1520** (2.3490)	-.6339** (0.3282)
Poorer	1.3781*** (2.0207)	4.552** (2.2816)	-.3420 (0.341)
Middle	-15.1240*** (2.6119)	4.4394** (2.0981)	-.2525 (0.2229)
Richer	8.897*** (1.8596)	2.993 (2.045)	-.0812 (0.0878)
MOTHER'S EMPLOYMENT (REF:EMPLOYED)			
not employed	-14.4423*** (1.2653)	-.2274 (.6029)	.0020 (0.0054)
PRICE VARIABLES			
INSURANCE STATUS OF MOTHER (REF: INSURED)			
no insurance			
MOTHER'S EDUCATION (REF: HIGHER)			
no education	17.853*** (1.678)	.7467 (1.2140)	-.0098 (0.0240)
Primary	-14.661*** (1.4713)	.1613 (1.1027)	-.0016 (0.0113)
Secondary	-9.2272*** (2.0867)	-.17161 (1.1235)	.0016 (0.0100)

FATHER'S EDUCATION (REF:

HIGHER)

no education	-33.7085*** (2.8495)	-23.185*** (.8920) (0.0184)	.0299
Primary	.1892 (2.3669)	-2.3433*** (.7332) (0.0106)	.0169
Secondary	-10.8750*** (2.1732)	-2.1538*** (.6279) (0.0152)	.0238

MOTHER'S AGE

age	-2.958*** (.1432)	.0594 (.0643) (0.0007)	-.0005

CHILLD AGE

Child age	4.5424*** (.2551)	-.0978 (.1633) (0.0017)	.0009

CHILD SEX(REF. MALE)

Female	7.9839*** (.8120)	-.2543 (.4185) (0.0044)	.0023

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	6.6952*** (.2863)	-.1224 (.1117) (0.0011)	.0011

MARITAL STATUS OF MOTHER (REF: MARIED)

Single	-5.1709*** (1.2858)	.3006 (.6374)	-.0033 (0.008)

RESIDENCE OF MOTHER

Urban	-8.7677*** (1.4248)	.8776 (.8015)	-.0098 (0.0086)

RELIGION (REF :CHRISTIANITY)

Islam	8.6862*** (2.9159)	2.718 (1.694)	-.1129 (0.1530)
Traditionalist	-13.7282*** (1.7976)	1.0170 (.9166)	-.0162 (0.0231)

	_cons	8.7973***	-5.8884**	
		(3.1581)	(2.6669)	
	No of observations	398		
	Prob >chi2	0.0000		
	Pseudo R2	0.3399		

Table A58: Bed nets utilisation in the South West 2013 and 2008

	NDHS 2013			NDHS 2008		
No bed net (base outcome)	Only treated nets	Only untreated nets		Only treated nets	Only untreated nets	
Variable	Coef. / Std. Err.	Coef. / Std. Err.	Marginal effect	Coef. / Std. Err.	Coef. / Std. Err.	Marginal effect
WEALTH VARIABLES OF MOTHER (REF:RICHEST)						
Poorest	.4547	-14.190***	-.0759	-.86200	.7634	.0008
	(.3525)	(.9046)	0.0708	(.6418)	(.4818)	(0.0249)
Poorer	.4168**	-.7243	-.0707*	-.5502	.6736	-.0006
	(.2095)	(.5435)	(0.0405)	(.4285)	(.3868)	(.0186)
Middle	-.0165	-.0483	.0028	.2282	.3251	-.0176
	(.1681)	(.3609)	(0.0266)	(.3173)	(.3692)	(0.0184)
Richer	-.3657***	-.7010**	.0584***	.0643	-.3084	.0035
	(.1237)	(.3415)	(0.0180)	(.2218)	(.3236)	(0.0113)

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MOTHER'S EMPLOYMENT (REF:EMPLOYED)

not employed	-.2359	.8241**	.0296	.2661	.0907	-.0137
	(.1448)	(.3259)	(0.0206)	(.236)	(.3185)	(0.0138)

PRICE VARIABLES

INSURANCE STATUS OF MOTHER (REF: INSURED)

no insurance	-.4605*	14.785***	.0766	-.6227	.6021	.0241
	(.2656)	(.2264)	(0.0534)	(.4256)	(1.1142)	(0.0337)

MOTHER'S EDUCATION (REF: HIGHER)

no education	-.2149	.1158	.0316	-.8448**	-.2989	.0325**
	(.2413)	(.60281)	(0.0347)	.3827	(.6220)	(0.0152)
Primary	-.2674	-.1213	.0411	-.7692**	-.6258	.0394**
	(.1931)	(.5353)	(0.0284)	(.3364)	(.5251)	(0.0146)
Secondary	-.0767	.4086	.0102	-.3958	-.5667	.0275**
	(.1602)	(.3984)	(0.0255)	(.2457)	(.4387)	(0.0138)

FATHER'S EDUCATION (REF: HIGHER)

no education	.1699	-1.7684**	-.0238	-.405	-.7286	.0267*
	(.2265)	(.8590)	(0.0392)	(.3893)	(.4961)	(0.0143)
Primary	.0541	-1.359**	-.0042	-.4253	-.6348	.0274**
	(.1776)	(.4995)	(0.0289)	(.3157)	(.4325)	(0.0132)
Secondary	-.0567	-1.0280***	.0138	-.6472	-.6309*	.0393***
	(.1411)	(.33640	(0.0225)	(.2276)	(.3670)	(0.0125)

MOTHER'S AGE

age	.0005	-.0428	.0001	.0154	-.0173	-.0002
	(.0108)	(.0325)	(0.0017)	(.0198)	(.0241)	(0.0009)

CHILLD AGE

Child age	-.0925***	-.0529	.0149***	-.1720**	-.1306	.0097***
	(.0323)	(.1089)	(0.0052)	(.0642)	(.0727)	(0.0031)

CHILD SEX(REF. MALE)

Female	.0468	-.5534**	-.0049	-.0783	-.2019	.0074
	(.0891)	(.2723)	(0.0143)	(.1742)	(.2148)	(0.0086)

OTHER VARIABLES

NUMBER OF CHILDREN OR BIRTH ORDER

birth order	-.0213	.1703	.0026	.0387	.0319	-.0022
	(.03410	(.1058)	(0.0055)	(.0704)	(.0778)	(0.0034)

MARITAL STATUS OF MOTHER (REF: MARIED)

Single	-.5249	-.0541	.07095	-1.0205	-14.48*** .2631***	.0564***
	(.4349)	(1.06450	(0.0494)	(1.0270)		(0.0176)

RESIDENCE OF MOTHER

Urban	-.5500***	-1.254***	.0994***	-.4682	-.9641*** (.2905)	.0411***
	(.1261)	(.2624)	(0.0225)	(.2064)		(0.0113)

RELIGION (REF :CHRISTIANITY)

Islam	-.3405***	-1.1074**	.0566***	-.4156**	-.3902	.0241**
	(.1035)	(.4202)	(0.0155)	(.2048)	(.2462)	(0.0091)
Traditionalist	-.2001	-14.798*** (.5540)	.0350	-14.397*** (.3200)	.0999	.0446
	(.6852)		(0.0967)		(1.0838)	(0.0281)
_cons	-.0423	-15.0712*** (.9668)		-1.0678	-1.4767	
	(.4376)			(.7693)	(1.2226)	
No of observations	3231			2534		
Prob >chi2	0.0000			0.0000		
Pseudo R2	0.0473			0.0659		