

MULTINOMIAL LOGISTIC REGRESSION OF FACTORS AFFECTING UTILISATION OF  
ANTENATAL CARE AMONG WOMEN OF PREMENOPAUSAL AGE IN NIGERIA

BY

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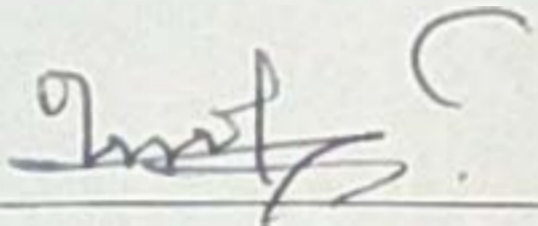
A DISSERTATION SUBMITTED TO THE DEPARTMENT OF EPIDEMIOLOGY AND  
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MASTERS OF SCIENCE DEGREE (M.Sc.) IN BIostatISTICS

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## CERTIFICATION

I certify that this research work was duly carried out directly under my supervision and also meets the regulation governing the award of the degree of M.Sc Biostatistics of the Department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine, University of Ibadan.



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## DEDICATION

To Almighty God and my Mum, Mrs. Victoria Nwimo.

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In give thanks to God for He is good and His mercy reigns forever. God has been faithful throughout this project.

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## ABSTRACT

Antenatal care (ANC) is the care a woman receives from healthcare professionals during pregnancy. In Africa, about 25% of maternal death occur during pregnancy which could be as a result of unsafe abortion, but mostly inadequate care during pregnancy. Studies have not really compared the sources of ANC with the factors affecting the utilisation of ANC and to what extent does these factors influence the source of ANC used. This study was based on the relationship between the factors affecting the utilisation of antenatal care and how these factors influence the choice of antenatal care used compared to non-utilisation.

This study was based on a cross-sectional study with data obtained from the 2013 Nigeria Demographic and Health Survey (NDHS). The NDHS data consists of 31, 482 women, there were 2 files extracted: the children and couples files. Chi-square and Binary Logistic Regression were used to measure the relationship between the socio demographic factors and utilisation of ANC among women of premenopausal age and Multinomial Logistic regression was applied to investigate factors influencing the sources of antenatal care taken compared with non-utilisation of antenatal care.

Out of all that interviewed, over 70% utilised antenatal care: health professionals, health associate professionals. Majority were young mothers (52%) and were from the North West (31.5%). Almost half had little education and almost 70% lived in the rural areas. Factors that were significantly associated with utilisation of ANC were religion, level of education and region. Furthermore, factors that were significantly associated with sources of ANC were Age, level of Education, Marital status, wealth index, region, place of residence, religion, and parity. However, there was a strong association between religion, region and antenatal care utilisation ( $p < 0.001$ ). Also, there was a strong association between sources of ANC and education as no educated respondents will rather not utilized ANC compared to the educated ( $OR = 18.53; 95\%CI = 11.27-30.47$ ), also a strong with parity as uniparous women are less likely not to utilise ANC compared to great grand multiparous women ( $OR = 0.69; 95\%CI = 0.58-0.81$ ), there is also association with region as non-utilisation is higher in the South South region ( $OR = 5.69; 95\%CI = 4.65-6.97$ ) and less likely in the South East ( $OR = 0.53; 95\%CI = 0.39-0.72$ ), and place of residence was also significantly strong as women in the rural areas are more likely to not utilise ANC ( $OR = 1.87; 95\%CI = 1.67-2.09$ ).



Religion, wealth index, level of education, region and type of residence are factors affecting utilisation of ANC. However, religion and region have a strong association with ANC utilization. Level of education, parity, place of residence and region have a strong association with sources of Antenatal care available and this association is statistically significant. Which means they can influence choice of Antenatal care to use.

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# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the study

Pregnancy stage is a very important stage in every woman's life, a lot of things are needed and expected of the woman during this period. Pre-menopausal women are women of reproductive age which has been defined according to WHO as those between 15-49, and these constitute more than one fifth of the world's population. This is a major concern to many developing countries and international organizations. To ensure safety and good health of mother and baby, there is a need for antenatal care.

Antenatal care also known as prenatal care is the care a woman receives from healthcare professionals during pregnancy; it is the routine health control of presumed healthy pregnant women with the aim is to provide regular check-ups that allow doctors or midwives to treat and prevent potential health problems throughout the course of the pregnancy while promoting healthy lifestyles that benefit both mother and child. ("Prenatal care" U.S National Library Medicine. 22 February 2012)

Antenatal care coverage helps us access health care during pregnancy. Antenatal care traditionally involves a number of routine visits for assessment to a variety of healthcare professionals on a regular basis throughout the period of pregnancy. This approach to antenatal care evolved as an art in an era that preceded the current, evidence-based approach to medicine. Essential interventions from complications like pre-eclampsia that affects about 5 percent of pregnant women with no noticeable symptoms, it shows up after 37 weeks and it starts developing at the first 48 hours. It can affect many organs and the baby would have to be delivered early. In addition, the baby may suffer the effects of prematurity for the need to deliver early to protect the health of the mother.

The World Health Organization (WHO) reported in 2015 that almost 830 women died every day from pregnancy and childbirth problems. Majority of the women who died lived in low income countries, only 5 of the women lived in high income countries.

Antenatal care is the entry point for many evidence-based interventions designed to improve these health outcomes (WHO/UNICEF, 2004; Bergsjø and Villar 1997). In low income countries where morbidity and mortality burdens are greatest, almost all antenatal care (ANC) is delivered by midwives. Therefore, midwives offering ANC can make a major contribution on achieving the Millennium Development Goals (MDGs). This is true for sub-Saharan Africa where half of all child and maternal deaths and 75% of mother-to-child HIV transmission infections occur (Kinney et al., 2010; UNAIDS, 2012). There was a review done by the World Health Organization and after the review of the evidence, a randomized clinical trial was conducted (Bergsjø and Villar, 1997; Majoko et al. 2007; Munjanja et al. 1996; WHO, 2001), almost all African countries have changed their antenatal standard of care from a 10-visit model to Focused Antenatal Care (FANC) or a 4-visit, patient centered model.

In Eastern Africa, Rwanda precisely, antenatal services are offered for free in public hospitals and health centers, in the past pregnant women often did not make use of them mainly due to ignorance and carelessness. Also in South Africa, the maternal mortality rate stands at 269 deaths per 100,000 live births Antenatal care is free in South Africa's public health system and almost all pregnant women and girls attend an antenatal clinic at least once during their pregnancy. However, most pregnant women do not access antenatal care until the latter stage of pregnancy. Such delays have been associated with nearly a quarter of avoidable maternal deaths in South Africa.

Utilisation of antenatal care simply means having made at least one antenatal visit before delivery. There are different types of Antenatal care and they are as follows:

- 1) Midwife care: One-on-one care or teams of mid wives care.
- 2) Shared care: Most women are cared for by their General Practitioner (family doctor) and community mid wife during pregnancy and little visits to hospitals, they only go for scans

and problems. She is then transferred to the hospital for birth, after this, she is returned back to her doctor and midwife when she has given birth.

- 3) **Consultant care:** Women with pre-existing medical problems may have regular checks with a Health Professionals on consultant and all their care may need to be carried out in the hospital. Conditions like diabetes which requires the care of 2 specialists: a medical expert and an obstetrician.
- 4) **Independent Midwives:** Some women prefer to be cared for by an independent midwife who charges a fee for care given during pregnancy, at birth and after birth. Appointments depend on the situation of the individual involved. At least 10 appointments for first births and 7 for pregnant mothers with children.

## 1.2 Multinomial Logistic Regression

Multinomial Logistic Regression also known Multiclass Logistic regression is a classification method that generalizes logistic regression to more than 2 possible discrete outcomes. It is an extension of binomial logistic regression but allows the dependent variable to have more than two categories.

Multinomial Logistic Regression can either have nominal or continuous independent variables and can have interactions between independent variables to predict the dependent variable. It shows a model used to predict the probabilities of the different possible outcomes of a categorical dependent variable and a set of independent variables. It is used when the dependent variable falls into a set of categories.

Multinomial logistic regression is sometimes considered an attractive analysis, this is because; it does not assume normality, linearity, or homoscedasticity. Multinomial logistic regression assumes independence among the dependent variable choices. This assumption states that the choice of or membership in one category is not related to the choice or membership of another category (i.e., the dependent variable).

### 1.2.1 Assumptions:

- 1) Multinomial Logistic Regression assumes that data are specific, that is, each independent variable has single values which it can be broken down into more than 2 levels.
- 2) Multinomial Logistic Regression also assumes that the dependent variable cannot be perfectly predicted for any case of the independent variables.
- 3) The odds of preferring one class over another does not depend on the presence of other irrelevant alternatives.

### 1.3 Problem statement:

Good knowledge of ANC links the woman and her family with the formal health system, this increases the chance of using a skilled attendant at birth and contributes to good health through the life cycle. Inadequate care during this time breaks a critical link in the continuous care.

Every year, over half a million women die from pregnancy related causes and most of these deaths occur in sub-Saharan Africa. (WHO. Reproductive Health. Report of the fifty-seventh World Health Assembly, 2004, WHO. Geneva).

In Africa, about 25 percent of maternal death occur during pregnancy (WHO 2005), well, this could be as a result of unsafe abortion, violence and diseases, but most maternal deaths are due to causes which are directly related to inadequate care during pregnancy (Ornella et al., 2013).

Furthermore, among women who had given birth in the last 5 years; 65% received antenatal care during their last pregnancy. Considering urban and rural areas, the proportion that received ANC was higher among urban (82%) compared to rural areas (57%). South East geographic zone had the highest proportion (86%) of pregnant women who received ANC in their last pregnancy, while the lowest proportion was recorded in the North West (49%) (NARHS, 2012). The highest proportion that received ANC from traditional birth attendants (TBA) was recorded in the South West and South-South zones (NARHS 2012). This is encouraging but compared to reports from

NAHRS 2005 where less than two-thirds of pregnant women received antenatal care, only about half were attended to at pregnancy delivery by skilled attendants (FMOH, 2006a). Things have not really changed as shown in the 2008 NDHS which revealed that 58% of women age 15-49 years received antenatal care (ANC) from a skilled provider (doctors, nurses/midwives or auxiliary nurses ) during their last pregnancy. Thirty percent of women received ANC services from a nurse or midwife, while 23 percent received ANC services from a doctor, Three percent of women received ANC services from TBA, and 36% did not receive ANC at all (NPC [Nigeria] & ICF Macro, 2009).

#### 1.4 Justification:

The health care given to a mother during pregnancy to the time of delivery and afterwards is very important for the survival and well-being of both the mother and her child. Therefore, achieving a greater improvement in the health of women is providing maternal health services, such as antenatal care (ANC) during pregnancy. Indeed the Fifth Millennium Development goal recognizes this and therefore aimed at reducing maternal deaths by three-quarters by 2015 (to achieve a maternal mortality ratio of 54 per 100,000 live births) by improving the preventive health care delivered to women during pregnancy.

In a global view of antenatal care, in 2007, it was estimated at 71 percent (Omella et al., 2013). In Nepal, they have high maternal mortality ratio (MMR) compared to many developed countries (Hogan et al., 2010). According to a survey conducted in 2008 and 2009, the MMR in Nepal was estimated to be 229 per 100,000 live births, which accounted for over 10% of all deaths among women of reproductive age (15-49 years) (Pradhan et al., 2010).

For women in developed countries, its 95 percent while in the Sub-Saharan Africa, 69 percent of pregnant women had at least one antenatal care visit (Ornella et al., 2013).

In Gambia, the level of maternal mortality in the Gambia are relatively high and ranked among the highest in Africa, estimated at 1,050 per 100,000 live births and are higher in rural than in urban areas (Oelman, 1991).

WHO recently reported the MMR in South Sudan as 2,054 per 100,000 (World Health Organization: South Sudan Country Cooperation Strategy at a glance. WHO - Regional Office for Africa: World Health Organization: 2014). These high levels of maternal mortality in Southern Sudan are associated with poor access to quality reproductive health services, including ANC services,

trained health personnel at delivery and family planning services (Ministry of Health, National Bureau of Statistics. The Republic of South Sudan., 2013, Government of Southern Sudan Ministry of Health, Southern Sudan Commission for Census. 2007, South Sudan National Bureau of Statistics. National Baseline Household Survey 2009 -Report for South Sudan. Juba, South Sudan: National Bureau of Statistics; 2012).

The MMR is also high in Ghana. According to the Reproductive and Child Health unit of the Public health division, the maternal mortality ratio in Ghana is 230/100,000 live births (Reproductive and Child Health Unit. 2007).

The above statistics show how many mothers are lost during birth due to non-utilisation of ANC. These studies show the great importance of ANC to the world at large. Studies have been done on ANC looking at the factors affecting the utilisation and also its greater importance to pregnant women in Nigeria (e.g Fagbamigbe, Idemudia, 2015; Iyaniwura, Yusuf, 2009 etc.), these studies looked at how ANC affects child birth and also the patterns of use of maternity services. Further studies done on antenatal care in Nigeria helped identify that there is a rural-urban difference in the use of antenatal care. (Dairo and Owoyokun, 2010). This study is looking at women of reproductive age considering the factors affecting the sources of antenatal care and how it influences their decision on which type of ANC to use or not use at all.

However, looking at studies on ANC, limited studies have compared the sources of ANC and the factor associated with them using multinomial logistic regression. This study wants to know how to improve the utilisation of antenatal care among pregnant women based on how some common factors inform their utilisation of antenatal care and to know if there is a relationship between these factors and the type of antenatal care utilised by pregnant women.

## **1.5 General objective:**

To test a theoretical model that investigates the relationship between the reasons for non-utilisation of Antenatal care considering the sources of antenatal care given.

### **1.5.1 Specific objectives:**



- 1) To investigate the level of antenatal care utilisation among premenopausal women in Nigeria.
- 2) To identify factors associated with utilisation of antenatal care among premenopausal women in Nigeria.
- 3) To identify factors associated with sources of Antenatal care used.
- 4) Investigating association between selected factors and sources of Antenatal care used.

# CHAPTER TWO

## LITERATURE REVIEW

### 2.1 Introduction

Antenatal care is a clinical assessment of mother and fetus during pregnancy, for the purpose of obtaining the best possible outcome for both the mother and child. Antenatal care involves 'routine' visits for assessment, to a variety of healthcare professionals, regularly throughout the pregnancy period. This approach to antenatal care evolved as an art in an era that preceded the current, evidence-based approach to medicine.

Early monitoring and on-going care during pregnancy is associated with more favorable birth outcomes. Some antenatal care has a beneficial effect on adverse factors such as preterm delivery, low birth weight, maternal and perinatal mortality. Antenatal care is not only centered on clinical assessment, with emphasis on the regularity of visits, rather, there is focus on what can be achieved at key visits during the antenatal period.

### 2.2 Overview of antenatal care

Antenatal care (ANC) is simply care given to a woman during pregnancy. The primary aim of ANC is to protect and promote good health for the women and their unborn babies during pregnancy so as to achieve at the end of the pregnancy a HEALTHY MOTHER and a HEALTHY BABY.

The major goals are:

- 1) To reduce the mortality and morbidity of mothers and children by ensuring that pregnant women understand the complications of pregnancies which may lead to death and how to prevent these complications.
- 2) To improve the physical, mental, and social well-being of women, children, and their families.

Antenatal care provides an essential link between pregnant women and the health systems and also offers essential health care services in line with national policies, including:

- 1) Counseling about the dangerous signs of pregnancy and complications during delivery and where to seek care in case of any emergency.
- 2) Counseling on birth preparedness, emergency readiness, and also the development of a birth plan.
- 3) Providing advice on proper nutrition during pregnancy.
- 4) Detecting complications that influence choice of birthing location.
- 5) In certain settings, providing treatment for conditions that affect pregnant women, such as malaria, tuberculosis, hookworm infection, iodine deficiency, and sexually transmitted infections, including HIV/AIDS.
- 6) Providing information about breastfeeding and contraceptives.

### **2.3 Brief history of antenatal care:**

Antenatal care has involved some kind of relationship between three elements in society: women, the state and the medical profession. It represents the attempt to control the behavior of women's bodies. Some aspects of the relationship between women's situation and the practice of antenatal care have already been discussed; for example the continuing high rate of maternal mortality in the 1920s and early 1930s focused the attention of antenatalists - of both the state and the medical profession (The captured womb: A history of the medical care of pregnant women (1984), Chapter 11).

According to WHO (2003), pregnant women should visit health care facility at least four times during pregnancy based on the risks identified with the pregnancy on the first contact. These visits (four) have different maternal and child health goals, these goals revolve around confirmation of the pregnancy and expected date of delivery (Lincetto et al., 2006).

The World Health Organization recommends at least four ANC visits for pregnant women without complications. The Federal Ministry of Health in Nigeria recommends four ANC visits as part of its national strategic health development plan 2010 – 2015.

The World Health Organization (WHO) estimated that about 580,000 women of reproductive age die yearly as a result of complications associated with pregnancy, and a large proportion of these deaths occur in the Sub-Saharan Africa. This region has a maternal mortality of about 686 per 100,000 live births, which is one of the highest in the World (World Bank, 1994).

World Health Statistics further showed that ANC coverage, between 2006 and 2013, was indirectly correlated with maternal mortality ratio (MMR) worldwide. This indicates that countries with low ANC coverage are the countries with very high MMR (Lincetto, 2010, Bustreo, 2013, Osungbade, 2011, Doctor HV., 2011, Ashir, 2013).

In India, a study was done by Nomita et al., in 2006 to determine antenatal care utilisation in rural areas and to analyze possible factors contributing to women obtaining antenatal care. In this study, 5433 pregnant women were studied and 73.9% had at least one antenatal contact with an auxiliary nurse midwife (ANM) or had a visit to a Government Health Facility for antenatal services. There was a statistically significant reduction in the proportion of women obtaining antenatal care services with increasing age, parity, and number of living children. The study further showed that there was no association with outcome of previous pregnancy and presence of health facility in the village.

Dairo et al., 2010 studied factors affecting the utilisation of antenatal care services in Ibadan, Oyo State, Nigeria. In this study, 400 respondents interviewed, 92 sought traditional antenatal care while 24 neither sought modern nor traditional antenatal care. Respondents that attended ANC clinic at least once during their last pregnancy were 307, out of these, 86 attended a private hospital for their ANC clinic, 75 attended a PHC center, 48 attended a state specialist hospital, 43 attended a general hospital, 27 attended a maternity home, 26 attended a teaching hospital and 2 attended a missionary hospital for their antenatal care. Respondents who neither sought modern nor traditional antenatal care during pregnancy gave various reasons for not seeking ANC care at all. Fourteen respondents said they could not afford cost of antenatal care as the reason for not obtaining antenatal care at all. The other reasons reported from the women who did not seek antenatal care at all included the attitude of care givers (14.8%), 8 respondents said their reason was that the long time that they were going to spend before obtaining antenatal care while 16 respondents did not think antenatal care was even important, 6 respondents said distance to the place where they could access antenatal care was there reason, one person said religious rea-

sons while the remaining 8 respondents claimed they had no chance to attend. After considering all these, we can see the major factors affecting antenatal care utilisation. These factors differ due to the development of the country.

## 2.4 Factors affecting utilisation of antenatal care

Tukur and Oche, 2015 studied determinants of antenatal care, institutional delivery and postnatal care services utilisation in Nigeria. In this study, about 54% of the women had at least four ANC visits during their last pregnancies five year period before the survey. Women in the younger age group of 15-24 year were more likely to have four ANC visits compared to women in other age groups. Women in the South of the country utilised ANC services more compared to those in the northern of Nigeria. Women who are resident in urban area had more ANC visits than women residing in rural areas (79% against 40%). Increasing level of women's education as well as their husband's level of education increased linearly with use of ANC; 81% of women with secondary level of education and above. About 84% of rich women had at least four ANC visits while only 28% of women in the poor households have had up to four ANC visits. Christian women have higher utilisation rate of ANC than women of other religions. Also having health insurance coverage increased the utilisation (92%). Women with at least four ANC visits were more likely to deliver in health facilities (56% of women who had at least four ANC visits delivered in health facilities compared to 40% of women with less than four ANC visits).

### 2.4.1 Patterns of antenatal care usage:

Patterns of Antenatal Care utilisation were studied in the south-east with relation to age, education, and socioeconomic status. This study was done by Ijeoma et al., 2016.

- 1) **Socio-demographic characteristics of respondents from the household survey.** The mean age of respondents was 30 years and the majority of these respondents (96.8%) were married with over 30% having primary education and more than half of the respondents having completed secondary education.

- 2) **Health seeking pattern for antenatal care.** The results also showed that the mean gestational age at booking was 4.29 (1.86) months, mean ANC attendance was 5.21 (1.38) visits, and the facility that was mostly used was either a private clinic or a hospital.
- 3) **Relationship between age and health seeking pattern of antenatal care.** There is a significant relationship between the age of respondents and the number of ANC visits. However, there was no significant relationship between age of respondent and the facilities used for ANC.
- 4) **Relationship between educational level and health seeking pattern for antenatal care.** Educational level showed a strong relationship with the number of ANC visits in their last pregnancy. Majority (91.7%) of respondents with tertiary education attended antenatal clinic 4 times and above. There were significant relationships between respondents' level of education and the use of PHC, teaching hospital, and maternity home.
- 5) **Relationship between socioeconomic status and antenatal care seeking pattern** showed that there was a significant relationship between socioeconomic status of the respondents and the number of ANC visits in their last pregnancy. Similarly, significant relationships existed between the respondents. In this study, 65.6% of the respondents booked late for ANC.

Iyaniwura et al., 2009 studied utilisation of antenatal care and delivery services in Sagamu, South western Nigeria. A total of 392 women were involved in this study. Married women were 380 (78.8%), while 2.3% were single. Amongst the 351 who indicated their type of marriage, 61.8% were in monogamous union. Christians in this study were 58.9%, 34.4% were Muslims and 6.6% practiced the traditional religion. More than four fifths were Yorubas, 9.9% were Igbos while 7.1% were Hausas. Respondents with no formal education were 56 (14.3%), 55.1% had more than primary school education. The highest consideration for their choice of facility for Antenatal care was that the service was good (71.5%). While 8% used the facility of their husband's choice, 6.9% chose the facility because of the closeness to their house. Women who used government facilities for ANC were most likely to indicate that their services were good (83.9%). Considerations for choosing private clinics were good service (64.6%), privacy (12.7%) and nearness (10.1%). Irrespective of their primary consideration, 94.3% still sought their husband's permission before using any facility. Compared to users of other facilities, more women who used traditional birth attendant (TBA) facilities (36.1%) and spiritual homes (19.1%) did

this to please their husbands. A higher proportion of the women who were aged less than 20 years (19%) did not use ANC facilities compared to women in the older age groups. The proportion of the women that had ANC increased with respect to respondent's educational status and the husband's educational level. The traditional worshippers were less likely to have received ANC compared to Christians and Muslims.

#### **2.4.2 Perception of antenatal care:**

The knowledge and utilisation of antenatal care was studied among women of child bearing age in the North Central of Nigeria, Ilorin-East local Government. In this study, 355 of the respondents were aware of antenatal care. Perception of ANC amongst the 355 respondents were 248. There was high antenatal care attendance, 311 of the respondents attended antenatal care with high patronage of government health facilities. (Adewoye et al., 2013).

#### **2.4.3 Region and wealth index:**

Also looking at another study on the determinants of the demand for antenatal care in Colombia. The importance of region was considered, Pacific region was studied. Women living in Pacific region were compared to women living in Bogotá. There were poor infrastructure and inaccessibility to public health services. Women living here had no challenges with; Place of residence and time in months of living in the place as regards utilisation of antenatal care. Education of Mothers had a strong positive effect in both first visit and further consultations. Age of delivery was a relevant variable only in determining the first visit. Multiple pregnancies were important factors which increased the number of consultations. Parity was also strongly related with small antenatal care visits. (Andrés I. Vecino Ortiz:, 2007).

Also in Ghana, a study was done on the effect of wealth as a factor determining the utilisation of antenatal care. The study was focused on the introduction of the free maternal health care policy in April 2005 in Ghana with the aim of reducing financial barrier on the use of maternal health care services and to help reduce high rate of maternal deaths. Before this policy was introduced, studies had shown that wealth has a positive and significant influence on the use of Antenatal care. It is thus expected that with the policy, wealth should not influence the use of maternal

health care significantly. The results revealed that wealth still has a significant influence on adequate use of Antenatal care. Age, Education, Parity, Transportation and health insurance amongst others were factors found influencing the utilisation of Antenatal care in Ghana. Women in higher wealth index are more likely to make more ANC visits than women in the lowest wealth index. They inferred that even though the service is provided freely, it may come with costs either directly or indirectly and those with the resources are more likely to afford it. (Eric Arthur, 2012).

There was also another study on determinants of antenatal care in rural Nigeria. The Sentinel Survey of the National Population Programme Baseline Report of 2007 showed that about 48% of the women reported saw somebody for Antenatal Care. The report further showed that only 42% of women dwelling in the rural area received antenatal care from doctors. Traditional Birth Attendants (TBAs) is highest in the South-South geopolitical zone of the country. (National Population Commission, Abuja 2009).

In Uganda (Eastern Africa), a study was done on patterns of seeking antenatal care among women in reproductive age of Masaka district, Uganda. WHO (2006) indicated that there was stagnation at 44% in the seeking of antenatal care in the African region. In 2006, only 60% of the mothers in developing countries attended antenatal care from a qualified medical worker (WHS, 2008). Furthermore, according to World Health Statistics (WHS, 2008), about 50 million of women who were meant to attend antenatal care, did not attend or seek assistance from medical personnel during pregnancy and childbirth. Some pregnant women reported late while others reported for less than the four visits recommended. Many more others sought assistance from traditional birth attendants. (Peter and Kenneth, 2014).

Also in the South-Eastern part of Nigeria, there was a comparative study which wanted to know if there is any difference between rural and urban communities based on utilisation of antenatal care among women of reproductive age. Most of the respondents in both urban, 286 and rural, 272, areas were Christians with Catholic denomination having the greater number in both areas, 148 respondents and 136, respectively. Also, married respondents in urban were 262 and in rural were 245, with a greater proportion of them having at least two or more deliveries prior to this survey. Respondents that were traders in urban areas were 116, public servants were 92, and farmers were 77, while the unemployed were 110. Farmers were known commoners in the rural



areas. Also the level of education was higher in the urban areas than the rural areas, with 112 respondents having tertiary education in the urban and 20 in the rural while 20 respondents in the urban areas had no formal education and 53 in the rural. In the urban area, 152 respondents received ANC services in government hospitals, 66 respondents received from private hospitals while in the rural areas, most of the clients received theirs from the Primary health care. Respondents that attended up to 4 visits to ANC centers in the urban were 140 while in the rural area, there were 102 respondents. Many women in the rural, 107 and urban 101 areas had some degree of problems during the course of their last pregnancy. (Duru et al., 2014).

#### **2.4.4 Type of antenatal care given:**

Study of Oligbo Community in the South-south zone of Nigeria, Osubor et al., 2005 observed that private maternity center was the most preferred place for child birth, followed by traditional birth attendant (TBAs) while the least preferred was Government health facilities. Maternal health services are essentially preventive and they provide ways for early detection of mothers and infants at high risk of illness and reduce mortality. Majority of the patients utilising such services are usually not ill.

#### **2.4.5 Religion and literacy:**

Furthermore, another study was done on barriers to utilisation of antenatal care services in Nepal which showed that religion, education status of husband, wealth index of the family, women autonomy and media exposure has an effect on the utilisation of ANC. This study suggested that women from advantaged ethnicity having higher level of autonomy and with higher wealth index had higher chance of using at least 4 ANC services compared to women who were from disadvantaged ethnic groups, with low level of autonomy and from poor families, respectively. Looking into religion, 77% of women were Hindu. Mothers who were multiparous were 72% and over 6% of the women became a mother below the age of 20 years. Respondents from disadvantaged ethnic groups were 48%. Women who were literate were 94% (9 of 10). (Krishna et al., 2015)

#### 2.4.6 Wives and husbands socio demographics:

A systematic review of studies identified women's and their husbands' education, economic status, parity, place of residence and accessibility to health services as major determinants of use of ANC services. To this effect, a cross-sectional study was done in two states in Nigeria. The two surveys showed that the proportion of pregnant women who had not attended any ANC services in Nigeria were 33.9% and 34.9% respectively. The majority of the women who didn't utilise ANC during the period covered were rural dwellers at 82.5%, 57.3% of them had no education and 93% of the non-users were either currently married or living with sexual partners. North East was the geographical zone in Nigeria that had the highest number of non-users (42.1%) compared with 3.6% in the South East. Of all the respondents from the North East, 96.5% of them, were employed while 50.6% were of Hausa/Fulani tribe. Also 43.3% of mothers were urban area dwellers, 61.7% among these mothers are in the poorest wealth index and they did not use ANC compared to 8% among those urban dwelling mothers in the wealthiest index. The problem of getting permission from the respondents' husbands to attend ANC were cited by 22.0% of the respondents, 14.3% had a problem getting permission from parents or guardian and 14.6% had a problem in getting permission from other family members, cultural or religious leaders. Respondents who were non-users that reported having a problem with getting money to go for the ANC services were 56.4% while 44.1% claimed that they did not go because transport facilities to the service providers were not available. The reasons given were significantly associated with most socio-demographic characteristics of the respondents except employment status. Respondents who were of the non-users were 48.8%, the reason given was that providers were far from them. This problem was significantly associated with lower educational status, poorer wealth index, Northern geopolitical zones, ethnicity and employment status of the respondents. Some non-users (21.4%) did not utilise ANC because "the service providers were of the opposite sex". Based on facility related factors, 25.5% did not attend ANC clinic because the clinics did not have skilled health workers, 24.1% did not utilise ANC because of poor attitudes of the workers while 20% did not because the non-users could not trust the workers with their personal infor-

mation, and 22.6% did not because the facilities did not have good drugs for the attendees. (Simkhada et al., 2008).

## 2.5 Parity

To the obstetrics: this is the classification of women by the number of live-born children and still-births she has delivered at more than 20 weeks of gestation. Commonly parity is noted with the total number of pregnancies and represented by the word *para*. In epidemiology, Parity is referred to as the classification of a woman by the number of live-born children she has delivered. (Mosby's Medical Dictionary, 9th edition. 2009). Another definition says Parity refers to a woman who has produced one or more viable offspring, regardless of whether the child or children were living at birth. Roman numerals are used to designate the number of such pregnancies, as *para 0* (none—nullipara), *para I* (one—primipara), *para II* (two—secundipara), etc (Dorland's Medical Dictionary for Health Consumers. 2007)

### 2.5.1 Types of Parity

- 1.) **Nulliparous women (nullip):** these are women who has not given birth previously (regardless of outcome).
- 2.) **Primiparous women (primip):** these are women who has given birth once.
- 3.) **Multiparous women (multip):** these are women who has given birth more than once.
- 4.) **Grand multipara:** this is a woman who has already delivered five or more infants who have achieved a gestational age of 24 weeks or more.
- 5.) **Great grand multipara:** this refers to women who has delivered seven or more infants beyond 24 weeks of gestation. (patient.info/doctor/gravidity-and-parity-definitions-and-their-implications-in-risk-Assessment).

Some literatures suggested the effect of Great Grand Multi-Parity on the health of a mother. A study was done to compare antenatal and intra-partum complications among women delivering for the 10<sup>th</sup> time and to compare them with women of lower parity. Great Grand Multi-Parity

women were more susceptible to diseases compared to women with children 2-5 children. (Abu-Heija and Chalabi., 2009).

In Tanzania, a cross-sectional study was done to look at the effect of Grand Multi-Parity on pregnancy. The term “grand multipara” was introduced in 1934 by Solomon, who called grand multiparas the “the dangerous multiparas” (Lyrenas, 2002). Grand-multiparity is one of the major contributing factor to increasing maternal mortality (Abro et al., 2009). This study showed us that Grand Multi-Parity women predominantly gave birth through Caesarian Section, and has serious complications such as diabetes mellitus and there was a prevalence of neonatal loss. (Andrew et al., 2013).

Another study looked at Grand Multi-Parity as a risk factor during pregnancy. Grand Multi-Parity is from 5 and above (Fuchs et al., 1995). In this study, women of Grand Multi-Parity didn't attend antenatal care which affected them at delivery, some had ruptured uteruses and some complications such as anemia, hypertension and diabetes. (Rita et al., 2015).

In Nigeria, another study was done to further look at the effect of Grand Multi-Parity on pregnant women. This study showed us that women with Grand Multi-Parity were likely to have pre-labor fetal membrane, hypertension and other medical illnesses. (Adcola and Adewale, 2013).

A lot of other studies has been done on parity and its effects, and they all corroborated that more children has an adverse effect on children and mothers. (Eidelman et al., 1988, Tai et al., 1991, Nassar et al., 2006, Nicholson et al., 2006, Ogbe et al., 2010, Andre jevic et al., 2011. Agrawal et al., 2011.)

After considering all these literatures, we can see the major factors affecting antenatal care utilisation. These factors differ due to the development of the country. In Nigeria, these factors has being looked into and conclusions have being drawn to help increase utilisation. This study wants to explore a better way to analyze the non-utilisation of antenatal care.

## 2.6 Multinomial logistic regression

Multinomial logistic regression considers the independent variables by the dependent variables at different levels. Multinomial logistic regression is a predictive analysis, It is used to describe data and also to explain the relationship between one dependent variable and one or more continuous-level (interval or ratio scale) independent variables. Multinomial regression is a multi-equation model, similar to multiple linear regression.

Determinants of timing of the first antenatal care visit was studied using multinomial logistic regression analysis. A bivariate model was first used where women with unwanted pregnancy remained more likely not to receive ANC compared to those who reported their pregnancy as wanted/timed. With the use of multinomial logistic regression, characteristics of women were looked into to determine if there is any relationship. Educational background was first compared amongst the women. As expected, women with no education were more likely not to receive ANC while those with at least secondary education were less likely not to receive ANC compared to those with primary education. Furthermore, Women from middle and rich households were less likely not to receive ANC, while, women from rich households were less likely not to receive ANC late compared to those from poor households. Also, never married women were 4.3 times more likely not to receive ANC while those aged 25–34 years were less likely not to receive ANC compared to those under 25 years.

Another study was done using multinomial logistic regression. The effect of daily activities on prenatal care utilisation in the rural part of South Africa (Talia M. M., 2004). In this study, patterns of utilisation was studied, where participants jointly affected utilisation levels. The outcome variable were multiple unordered categories. Standard multinomial logit model was used to measure study participants at different levels of utilisation. Even though the response variable appears to be an ordered response, which revealed the ordinal restrictions are invalid for these. A high p-value was desired for a cumulative logit model, which is appropriate for measuring ordered responses. In the case of three response categories ( $J=3$ ), therefore,

$$Pr(y_i = 1|x_i) = P_{i1} = \frac{\exp(x_i^T \beta_1)}{1 + \exp(x_i^T \beta_1) + \exp(x_i^T \beta_2)}$$

$$Pr(y_i = 2|x_i) = P_{i2} = \frac{\exp(x_i^T \beta_2)}{1 + \exp(x_i^T \beta_1) + \exp(x_i^T \beta_2)}$$

$$Pr(y_i = 3 | x_i) = P_{i3} = \frac{1}{1 + \exp(x_i^1 \beta_1) + \exp(x_i^1 \beta_2)}$$

Where  $P_{ij}$  indicates the probability of the  $i$ th person being in the  $j$ th category ( $i=1$  to  $n$ ,  $j=1$  to  $J$ ), and  $\beta_1$  and  $\beta_2$  indicate the covariate effects specific to the first and second response categories with the third category used as the reference category. Estimation of the parameters for each covariate was carried out iteratively using maximum likelihood. The results from the multinomial logit model were expressed as odds and odds ratios (OR). The odds between categories  $j$  and the last category ( $J=3$ ) for a given  $i$  are:

$$\frac{P_{ij}}{P_{iJ}} = \exp(x_i^1 \beta_j), \quad j=1, 2, \dots, J-1$$

The log odds, or logit, can be seen as a linear function of  $x_i$ :

$$\text{Log} \left( \frac{P_{ij}}{P_{iJ}} \right) = x_i^1 \beta_j, \quad j=1, 2, \dots, J-1$$

Therefore, for any given explanatory variable,  $x_k$ ; the difference in coefficients ( $\hat{\beta}_{jk} - \hat{\beta}_{j'k}$ ) determined the direction of the change in the odds between categories  $j$  and  $j'$ : Since  $\hat{\beta}_J$  were all constrained to be zero, we have  $(\hat{\beta}_j - \hat{\beta}_J) = \hat{\beta}_j$  where the coefficients gave the comparison between category  $j$  and the last category. The positive difference told us that as  $x_k$  increased, there was a greater odds of observing alternative  $j$  rather than  $j'$ : Since we have chosen the third category (low) as the baseline category, observations of a change in odds between alternatives becomes high (1) versus low (3) and average (2) versus low (3).

Very few women started attending their prenatal care appointments during the third trimester and only two individuals did not utilise prenatal care. The three women who began their prenatal care appointments during the third trimester were five or more times likely to have had complications with their pregnancy. The least, low utilisers, resided outside the 5 km buffers surrounding the clinics. Many more of the high and average utilisers resided within the 5 km buffers than the low utilisers.

Bolajoko and Olumuyiwa, (2009) studied maternal and neonatal factors associated with mode of delivery under a universal newborn hearing screening programme in Lagos, Nigeria. Pattern of delivery and the associated maternal factors were established. Infant factors or neonatal outcomes associated with mode of delivery were determined as well as identification of possible links (direct or indirect) between mode of delivery and developmental deficits in early infancy under a UNHS programme in a developing country. There are three categories of delivery (vaginal, elective and emergency caesarean section) as specified in this study, they are sufficiently distinct to satisfy the assumption of independent alternatives. Unconditional univariable multinomial logistic regression analysis was first used to analyse each independent variable against the dependent variable (mode of delivery) to examine the unadjusted association with the three modes of delivery. In all, 2584 mothers had vaginal delivery, 1590 emergency caesarean section and 441 elective caesarean section. A total of 4615 out of 5636 consenting mothers with live births recorded deliveries (including perinatal deaths) at the hospital over the study period were enrolled. In all, 2584 mothers had vaginal delivery, 1590 emergency caesarean section and 441 elective caesarean section.

1.) *Emergency caesarean section compared with vaginal delivery:* Older mothers and those who were first-time mothers or who are in the middle social class had increased odds of emergency caesarean section although lower odds were observed among Yoruba mothers (24%). As expected, all the obstetric factors increased the odds of emergency caesarean section with antepartum haemorrhage, cephalopelvic disproportion, prolonged or obstructed labour, previous caesarean section and fetal distress showing the highest odds. Although maternal HIV was associated with emergency caesarean section as the odds increased by 40%, the difference was only marginally significant. Mothers who used herbal medications in pregnancy were found to have 24% lower odds for emergency caesarean section.

2.) *Emergency caesarean section compared with elective caesarean section:* Maternal age and occupation were the only socio-demographic factors associated with emergency caesarean section among those who required surgical intervention. Fetal distress was associated with the largest odds for emergency caesarean section while HIV-positive status and previous caesarean section were associated with emergency caesarean section as the odds decreased to over 50%. Hypertensive disorders, cephalopelvic disproportion, premature

rupture of membranes and mal-presentation were not discriminatory among mothers who had caesarean section.

3.) *Vaginal delivery compared with elective caesarean section:* Compared to women in the active childbearing age (20-35 years), older women (over 35 years) had 56% lower odds of vaginal delivery while being a Yoruba woman or having no occupation was associated with increased odds of vaginal delivery. Similarly, the odds of vaginal delivery for women living in owned residential accommodation increased by two-fold compared to those in rented accommodation while expectedly, living in an apartment without shared sanitation facilities influenced vaginal delivery by decreasing the odds to 26%. Almost all the obstetric factors including multiple pregnancies but excluding premature rupture of membranes which were associated with the decrease in the odds of vaginal delivery. Lack of antenatal care and use of herbal drug in pregnancy were not significantly associated with vaginal delivery. Overall, there was no significant relationship between marital status, religion and education with any mode of delivery while maternal age was a consistent socio-demographic predictor associated with vaginal delivery or caesarean section.

Looking through this studies, the need to analyze factors affecting non-utilisation of antenatal care using Multinomial logistic regression is the reason for my study. My dependent variable is type of antenatal care. This has a way of affecting non-utilisation of antenatal care among premenopausal.



# CHAPTER THREE

## METHODS

### 3.1 Research design

This study will be using a secondary data set. The data was obtained from the 2013 Nigeria Demographic and Health Survey (NDHS). This is the most recent survey carried out in Nigeria. This is a cross-sectional study with data on various subjects such as household population, fertility levels, family planning, infant and mortality, maternal health etc.

### 3.2 Study population

The 2013 Nigeria Demographic Health Survey (NDHS) consist of a nationally representative sample of 31, 482 women between the ages of 15-49 years were individually interviewed. All women were from selected households or women who spent the night before the survey in the selected households were eligible for individual interviews.

### 3.3 Sample design

The 2013 NDHS is the fifth Demographic and health survey in Nigeria following the implementation of the earlier surveys in 1990, 1999, 2003 and 2008. A national representative sample of 40,320 households were selected from 904 primary sampling units. All women age 15-49 who were either permanent resident of the household or visitors present in the household at the night before the survey were eligible to be interviewed. All men age 15-49 that were either permanent residents of the households in the sample or visitors present in the households on the night before the survey were eligible to be interviewed.

Nigeria is divided into states in which each state is subdivided into Local Government Areas (LGA) and each Local Government Area is further divided into smaller localities. Nigeria has 36 states and a Federal Capital Territory (FCT). These states are subdivided into 774 LGAs.

### **3.4 Explanatory variables**

The explanatory variables used in the study are: Age, Region, Place of residence, Level of education, Religion, Ethnicity, Marital status and Wealth index.

### **3.5 Variable Recoding**

Wealth index was recorded into another variable as wealth index 3 with 3 categories which are Poor, Middle Class and Rich. Age was recoded into Young mothers (15-29 years), Middle aged mothers (30-39) and Older mothers (40-49). Marital Status was also recoded as Never Married, Married, Once Married (Widowed and Divorced). Parity was recoded as Uni-parity, Multi-Parity, Grand Multi-Parity, Great Grand Multi-Parity. Religion was recoded as Christians, Islam and others (traditional and other religious beliefs). Categorized health associate professionals were community extension health worker, traditional birth attendant, community / village health worker. Categorized hospital category were doctors, nurse / midwife and auxiliary midwife.

### **3.6 Sample weighting**

The dataset was weighted before it was analyzed to make the sample data a true representation of the entire population. For the individual dataset, the sample weight variable was V005. This was computed by dividing by 1,000,000. The description for weighting was properly discussed in the Guide to DHS Statistics. States were grouped into geographic locations to form six zones; North central which contains the Federal Capital Territory (Abuja), North East, North West, South East, South South and South West.

### **3.7 Statistical analysis**

The dependent variable is the type of antenatal care given, will be in 3 categories according to WHO, which are:

- Category 1: Health Professionals: Medical doctors, nurse / midwives and auxiliary nurses.
- Category 2: Health Associate Professionals: Community extension health worker and traditional birth attendants.
- Category 3: Antenatal care from other ways and those that didn't use ANC.

### 3.8 Data management

Individual data was extracted from the NDHS 2013 dataset. The data was directly extracted from 2 files, that is, the children file and couples file. The children file is a subdivision of the data set dedicated to children's data and all that affects them, while, the couples file is also a subdivision of the dataset which contains all the needed information on husbands and wives. These files were labeled NGKR6ASV.sav and NGCR6AFL, they are SPSS files containing various documents concerning children and antenatal care.

#### 3.8.1 Variable identification and definition

These are the dependent and independent variables extracted from the computed dataset and will be used in this study as shown in table 3.1 below.

**Table 3.1: Variables for analysis extracted from the computed children dataset.**

VARIABLE NAME	VARIABLE LABEL
V005	Women's individual sample weight
V013	Age in 5-year group
V101	Region
V102	Place of residence
V106	Highest educational level

V130	Religion
V131	Ethnicity
V190	Wealth index
V501	Marital status
M2A	Prenatal : Doctor
M2B	Prenatal : Nurse / midwife
M2C	Prenatal : Auxiliary nurse
M2D	Prenatal : Community extension health worker
M2G	Prenatal : Traditional birth attendant
M2H	Prenatal: Community / Village health worker
M2K	Prenatal : others
M2N	Prenatal : none
MV248	Antenatal care utilization

**Chi-square analysis:** This will be used to know if there is an association between the factors and antenatal care utilisation.

### 3.8.2 Logistic regression analysis

Logistic regression analysis is used to investigate association between selected socio demographic factors and Antenatal care utilisation. Our dependent variable is utilisation of antenatal care, and our independent variables are the selected socio-demographic factors.

$P$  = Probability of utilising antenatal care

$1 - P$  = Probability of non-utilising antenatal care.

$\frac{P}{1-P}$  = The odds ratio of utilisation of antenatal care

The outcome variable  $Y = \ln \left[ \frac{P}{1-P} \right]$

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_p x_p$$

The outcome variable  $Y$  is a dichotomous variable, telling us whether a particular factor affects the utilisation of antenatal care or not. All the  $\beta$  are the selected socio demographic factors:

Therefore, we say

$$\text{Let } F = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_p x_p$$

$$F = \beta_0 + \sum \beta_i x_i$$

We recall that  $Y = \ln \left[ \frac{P}{1-P} \right]$

$$\text{Therefore, } \ln \left[ \frac{P}{1-P} \right] = F$$

$$\ln \left[ \frac{P}{1-P} \right] = e^F$$

$$P = (1-P) e^F$$

$$P = e^F - P e^F$$

$$P + P e^F = e^F$$

Divide both sides by  $e^F$

$$\frac{P + P e^F}{e^F} = 1$$

$$\text{Therefore, } P = \frac{1}{1 + e^F / e^F} P = \frac{1}{1 + e^F}$$

This is a simple form of a logistic model. For this study, the model that satisfies the third objective on how the selected socio demographic factors affect utilisation of antenatal care, we will use;

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_p x_p$$

Where  $Y$  = this is the outcome variable of whether antenatal care was used or not. This variable is dichotomous.

$\beta_{ixi}$  = these are the socio-demographic factors associated with utilisation of antenatal care.

### 3.8.3 Multinomial logistic regression

Multinomial logistic regression (often just called 'multinomial regression') is used to predict a nominal dependent variable given one or more independent variables. It is sometimes considered an extension of binomial logistic regression to allow for a dependent variable with more than two categories. As with other types of regression, multinomial logistic regression can have nominal and/or continuous independent variables and can have interactions between independent variables to predict the dependent variable.

Multinomial logistic regression can also be used for ordinal variables, we can also consider running an ordinal logistic regression instead.

Multinomial regression is a multi-equation model, similar to multiple linear regression. Multinomial regression analysis uses the concept of probabilities and  $k-1$  log odds equations that assume a cut-off probability 0.5 for a category to happen. The practical difference is in the assumptions of both tests.

The assumptions are:

1. The dependent variable should be measured at the nominal level.
2. There are one or more independent variables that are continuous, ordinal or nominal (including dichotomous variables). However, the ordinal independent variables must be treated as being either continuous or categorical.
3. The independence of observations and the dependent variable should have mutually exclusive and exhaustive categories.
4. There should be no multi-collinearity. Multi-collinearity occurs when you have two or more independent variables that are highly correlated with each other. This leads to problems with understanding which variable contributes to the explanation of the dependent

variable and technical issues in calculating a multinomial logistic regression. Determining whether there is multi-collinearity is an important step in multinomial logistic regression.

5. There needs to be a linear relationship between any continuous independent variables and the logit transformation of the dependent variable.
6. There should be no outliers, high leverage values or highly influential points.

In Multinomial logistic regression,  $K$  possible outcomes, running  $K-1$  independent binary logistic regression models, in which one outcome is chosen as a “pivot” and then the other  $K-1$  outcomes are separately regressed against the pivot outcome.

$$\ln \frac{\Pr(Y_i = 1)}{\Pr(Y_i = K)} = \beta_1 \cdot X_i$$

$$\ln \frac{\Pr(Y_i = 2)}{\Pr(Y_i = K)} = \beta_2 \cdot X_i$$

.....

$$\ln \frac{\Pr(Y_i = k-1)}{\Pr(Y_i = K)} = \beta_{k-1} \cdot X_i$$

We exponentiate both sides and solve for the probabilities:

$$\Pr(Y_i = 1) = \Pr(Y_i = K) e^{\beta_1 \cdot X_i}$$

$$\Pr(Y_i = 2) = \Pr(Y_i = K) e^{\beta_2 \cdot X_i}$$

.....

$$\Pr(Y_i = K-1) = \Pr(Y_i = K) e^{\beta_{k-1} \cdot X_i}$$

Considering the fact that the sum of the probabilities of all  $K$  is one;

$$\Pr(Y_i = K) = \frac{1}{1 + \sum_{k=1}^{k-1} e^{\beta_k \cdot X_i}}$$

Therefore, for other probabilities;

$$\Pr(Y_i = 1) = \frac{e^{\beta_1 \cdot X_i}}{1 + \sum_{k=1}^{k-1} e^{\beta_k \cdot X_i}}$$

$$\Pr(Y_i = K-1) = \frac{e^{\beta_{k-1} \cdot x_i}}{1 + \sum_{k=2}^{K-1} e^{\beta_k \cdot x_i}}$$

For this study, this model will be used. For the dependent variables,  $Y$ , it is in 3 categories, that is, Health Professionals, Health Associate Professionals and non-use category.

$\beta_i$  = the independent variables (age, region, place of residence, level of education, religion, ethnicity, marital status and wealth index).

$Y_1$  = Health Professionals (women who got antenatal care from either a doctor or a nurse/midwife or an auxiliary nurse). This is the reference category.

$Y_2$  = Health Associate Professionals (women who got antenatal care from community extension health workers or traditional birth attendants or village health workers).

$Y_3$  = Non-utilisation category.



## CHAPTER FOUR RESULTS

### 4.1 Socio demographic characteristics of respondents

A total number of 31482 women of pre-menopausal age were interviewed at the survey. Table 4.1 shows the distribution of some selected socio-demographic characteristics. Young mothers were the highest (52%) out of the respondent interviewed while the older mothers were the least interviewed (10.3%). The geopolitical zone (region) with the largest respondents was 9,906 women from North West and the smallest was from the South East region. Over 67% of the respondents were from rural areas.

Furthermore, the level of Education of the respondents showed that 47% had little education (primary and secondary), 46.9% had no education while 6.1% had higher education. Almost all the respondents were married (95.3%), a few were never married (1.9%) and 2.8% were once married. Wealth index varied greatly amongst the respondents, out of which poor women were 45.9% and rich women were 34.1%. Over half of the respondents of other category (traditional worshippers and other religions), Muslims were 32.3% and Christians were 8.1%. Looking at parity, women with children with 2-4 children were 47.5% and 20.2% of the respondents more than 6 children.

**Table 4.1: Socio-demographic characteristics of respondents**

<b>Variable</b>	<b>Frequency (n=31482)</b>	<b>Percentage (%)</b>
<b>Age</b>		
<i>Young mothers (15-29)</i>	16376	52.0
<i>Middle age mothers (30-39)</i>	11859	37.7
<i>Older mothers (40-49)</i>	3247	10.3
<b>Level of Education</b>		
<i>No Education</i>	14762	46.9
<i>Little Education</i>	14797	47.0
<i>Higher Education</i>	1923	6.1
<b>Marital Status</b>		
<i>Never Married</i>	604	1.9
<i>Married</i>	29990	95.3
<i>Once Married</i>	888	2.8
<b>Parity</b>		
<i>Uniparity</i>	3624	11.5
<i>Multiparity</i>	14966	47.5
<i>Grand Multiparity</i>	6535	20.8
<i>Great Grand Multiparity</i>	6357	20.2
<b>Region</b>		
<i>North Central</i>	4614	14.7
<i>North East</i>	6517	20.7
<i>North West</i>	9906	31.5
<i>South East</i>	2816	8.9
<i>South South</i>	3747	11.9
<i>South West</i>	3882	12.3
<b>Religion</b>		
<i>Christian</i>	2540	8.1
<i>Islam</i>	10114	32.1
<i>Others</i>	18656	59.6
<b>Type of Residence</b>		
<i>Urban</i>	10351	32.9
<i>Rural</i>	21131	67.1
<b>Wealth Index</b>		

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	<i>Poor</i>	14462	
	<i>Middle Class</i>	6272	45.9
	<i>Rich</i>	10748	19.9
ANC: Antenatal Care			34.1

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#### 4.2 Association of the Socio demographic factors with antenatal care utilisation

Table 4.2 shows the association of the socio demographic characteristics with antenatal care utilisation and of the respondents. In this study, 72.8% utilised antenatal care, while 27.2% did not utilise ANC. Out of these respondents, 84.5% were Christians who utilised ANC, Muslims also utilised ANC (76.7%) while 70.1% of women with other religions also utilised ANC. This shows that there is a significant association between religion and ANC utilisation ( $X^2 = 53.105$ ,  $p < 0.001$ ). Looking at the level of Education and utilisation, 70.6% of the respondents had no formal education utilised ANC, almost three quarter of women with little education utilised ANC and 80.2% of women with higher education utilised ANC. There is a significant association between Education and ANC utilisation ( $X^2 = 19.764$ ,  $p < 0.001$ ). The proportion of utilisation varied across the regions, the highest was from the South East geopolitical zone (region) with 94.8% utilisation. Least utilisation was from the North West (59.2%), 86.8% of the respondents from the North Central utilised ANC, 66.4% of the respondents from the North East utilised ANC, 75.5% of respondents from the South West utilised ANC and 92.3% of respondents from South West utilised ANC. This shows that there is a significant association between region and ANC utilisation ( $X^2 = 510.872$ ,  $p < 0.001$ ). These are the significant factors associated with ANC utilisation.

**Table 4.2: Bivariate analysis of ANC utilisation cross tabulated against socio demographic characteristics**

Variables	ANC Utilisation		Total	X <sup>2</sup>	Pvalue
	Yes (%)	No (%)			
<b>Age</b>					
<i>Young women</i>	2293 (72.7)	861 (23.7)	3154	1.642	0.440
<i>Middle aged women</i>	1442 (72.4)	550 (27.6)	1992		
<i>Older women</i>	413 (75.1)	137 (24.9)	550		
<b>Level of Education</b>					
<i>No Education</i>	1974 (70.6)	822 (29.4)	2796	19.764	<0.001
<i>Little Education</i>	1870 (74.2)	651 (25.8)	2521		
<i>Higher Education</i>	304 (80.2)	75 (19.8)	379		
<b>Marital Status</b>					
<i>Never Married</i>	45 (76.3)	14 (23.7)	59	0.365	0.833
<i>Married</i>	3995 (72.8)	1493 (27.2)	5488		
<i>Once Married</i>	108 (72.5)	41 (27.5)	149		
<b>Parity</b>					
<i>Uniparity</i>	502 (74.7)	170 (25.3)	672	2.922	0.404
<i>Multiparity</i>	2008 (73.0)	743 (27.0)	2751		
<i>Grand Multiparity</i>	969 (72.9)	361 (27.1)	1330		
<i>Great Grand Multiparity</i>	669 (70.9)	274 (29.1)	943		
<b>Region</b>					
<i>North Central</i>	791 (86.8)	120 (13.2)	911	510.872	<0.001
<i>North East</i>	801 (66.4)	406 (33.6)	1207		
<i>North West</i>	1197 (59.2)	826 (40.8)	2023		
<i>South East</i>	312 (94.8)	17 (5.2)	329		
<i>South South</i>	448 (75.5)	145 (24.5)	593		
<i>South West</i>	599 (92.3)	50 (7.7)	649		
<b>Religion</b>					
<i>Christian</i>	337 (84.5)	62 (15.5)	399	53.105	<0.001
<i>Islam</i>	1115 (76.7)	338 (25.3)	1453		
<i>Others</i>	2659 (70.1)	1136 (29.9)	3795		
<b>Type of Residence</b>					
<i>Urban</i>	1072 (71.9)	419 (28.1)	1491	0.873	0.350
<i>Rural</i>	3076 (73.2)	1129 (26.8)	4205		
<b>Wealth Index</b>					
<i>Poor</i>	1950 (73.3)	709 (26.7)	2659	0.685	0.710
<i>Middle Class</i>	1036 (72.2)	398 (27.8)	1434		
<i>Rich</i>	1162 (72.5)	441 (27.5)	1603		

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### 4.3 Association of the Socio demographic factors with sources of antenatal care

Table 4.3 shows that among the Young mothers, more than half utilised Health Professionals ANC, 34.4% did not utilise ANC at all while others utilised ANC from Health Associate Professionals. However, amongst middle aged mothers, 63.3% utilised Health Professionals ANC, 6.9% utilised Health Associate Professionals' ANC and over 30% did not use ANC. Older women had the highest respondents who did not use ANC (36.1%), 56.7% utilised ANC from Health Professionals and 7.2% of them utilised ANC from Health Associate Professionals. This shows that there is a significant association between age and sources of ANC ( $\chi^2=58.284$ ,  $p<0.001$ ).

Based on the level of Education, over half of respondents with no formal education did not utilise ANC, 36.4% utilised ANC from Health Professionals and others utilised ANC from Health Associate Professionals. However, 77.2% of women with Little Education utilised ANC from Health Professionals, over 15% of them did not utilise ANC at all while 7.7% utilized ANC from Health Associate Professionals. Almost all the women with higher education utilised ANC from Health Professionals (96.3%), 1.3% did not utilised ANC while others utilised ANC from Health Associate Professionals. There is a significant association between level of Education and sources of C ( $\chi^2=4524.834$ ,  $p<0,001$ ).

Amongst women who were never married, 71.5% utilised ANC from Health Professionals, 20.9% did not utilise ANC while others used ANC from Health Associate Professionals. About 59.3 % of married women also utilised Health Professionals' ANC, 33.6% of them did not utilise ANC while women who were once married had 67.6 % Health Professionals' utilisation and amongst women who were once married, 25.7% did not utilise ANC. This also shows a significant association between marital status and sources of ANC ( $\chi^2=56.903$ ,  $p<0.001$ ).

Considering wealth index, more than half of poor respondents did not utilise ANC, 35.5% of them utilised ANC from Health Professionals. About 66.3% of women in the middle class utilised Health Professionals' ANC, 24.7% did not utilise ANC and 9.0% utilised ANC from Health Associate Professionals. About 86.9% of the rich women utilised Health Professionals' ANC, 8.1% did not utilise ANC and 4.9% utilised ANC from Health Associate Professionals. There is also a significant association between wealth Index and sources of ANC ( $\chi^2=4758.996$ ,  $p<0.001$ ).

Almost all the women from the South East utilised Health Professionals' ANC (90.6%), women from North West had the highest respondents who did not utilised ANC (58.2%), also 38.7% of respondents from North West utilised Health Professionals' ANC and 3.1% of them utilised ANC from Health Associate Professionals. Women from the North East were the highest respondents who used ANC from Health Associate Professionals (13%). This also shows that there is an association between geopolitical zones (regions) and sources of ANC ( $\chi^2=3832.725$ ,  $p<0.001$ ).

Most of the women who live in urban areas used Health Professionals' ANC (84.5%), over 10% did not utilise ANC, while 5% utilised ANC from Health Associate Professionals. Furthermore, about 44.4% of the women who live in rural areas did not utilise ANC, 47.5% used ANC from Health Professionals and 8.2% used community-based. There is a significant association between place of residence and sources of antenatal care ( $X^2=2641.782$ ,  $p<0.001$ ).

Over three quarter of Christian women utilised Health Professionals' ANC with the least utilisation of ANC from Health Associate Professionals (5.5%) and 15.1% did not utilise ANC. Muslims had 75.3% utilisation of ANC from Health Professionals, 16.5% did not utilise ANC and 8.2% used ANC from Health Associate Professionals. Amongst women of other religions, 44.9% did not utilise ANC, 48.5% use ANC from Health Professionals and 6.6% utilised Health Associate Professionals' ANC. This shows a significant association between religion and sources of ANC ( $X^2=1847.564$ ,  $p<0.001$ ).

Based on parity, uniparous women had the highest respondents (66.8%) who utilised ANC from Health Professionals, great grand multiparous women had the highest respondents (45.6%) who did not utilise ANC. Among grand multiparous women, about 7.5% respondents used ANC from Health Associate Professionals. About 26.4% of uniparous respondents did not utilise ANC, also 29.7% of multiparous women did not utilise ANC. There is a significant association between parity and sources of ANC ( $X^2=400.262$ ,  $p<0.001$ ).

Therefore, age, level of education, marital status, wealth index, region, place of residence, religion and parity are factors associated with sources of ANC.

**Table 4.3 Bivariate analysis of factors associated with sources of ANC**

Variable	No use (%)	Hospital category (%)	Health associate professionals (%)	Total	$\chi^2$	P value
<b>Age</b>						
<i>Young women</i>	3578 (34.4)	6058 (58.3)	752 (7.2)	1038	58.284	<0.001
<i>Middle aged women</i>	2179 (29.9)	4617 (63.3)	501 (6.9)	7297		
<i>Older women</i>	845 (36.1)	1327 (56.7)	169 (7.2)	2341		
<b>Level of Education</b>						
<i>No Education</i>	5134 (56.5)	3302 (36.4)	647 (7.1)	9083	4524.834	<0.001
<i>Little Education</i>	1451 (15.1)	7413 (77.2)	742 (7.7)	9606		
<i>Higher Education</i>	17 (1.3)	1287 (96.3)	33 (2.5)	1337		
<b>Marital Status</b>						
<i>Never Married</i>	111 (20.7)	384 (71.5)	42 (7.8)	537	56.903	<0.001
<i>Married</i>	6326 (33.6)	11184 (59.3)	1337 (7.1)	1884		
<i>Once Married</i>	165 (25.7)	434 (67.6)	43 (6.7)	642		
<b>Parity</b>						
<i>Uniparity</i>	954 (26.4)	2411 (66.8)	243 (6.7)	3608	400.262	<0.001
<i>Multiparity</i>	2628 (29.7)	5590 (63.2)	633 (7.2)	8851		
<i>Grand Multiparity</i>	1328 (34.5)	2237 (58.1)	288 (7.5)	3853		
<i>Great Grand Multiparity</i>	1692 (45.6)	1794 (47.5)	258 (6.9)	3714		
<b>Region</b>						
<i>North Central</i>	648 (21.1)	2168 (70.6)	253 (8.2)	3069	38332.725	<0.001
<i>North East</i>	1443 (36.4)	2007 (50.6)	514 (13.0)	3964		
<i>North West</i>	3573 (58.2)	2377 (38.7)	191 (3.1)	6141		
<i>South East</i>	74 (4.3)	1552 (90.6)	87 (5.1)	1713		
<i>South South</i>	685 (27.7)	1616 (65.2)	176 (7.1)	2477		
<i>South West</i>	179 (6.7)	2282 (85.7)	201 (7.6)	2662		
<b>Religion</b>						
<i>Christian</i>	245 (15.1)	1290 (79.4)	90 (5.5)	1625	1847.564	<0.001
<i>Islam</i>	1098 (16.5)	5022 (75.3)	547 (8.2)	6667		
<i>Others</i>	5217 (44.9)	5642 (48.5)	772 (6.6)	1163		
<b>Type of Residence</b>						
<i>Urban</i>	708 (10.5)	5698 (84.5)	339 (5.0)	6745	2641.782	<0.001
<i>Rural</i>	5894	6304 (47.5)	1083 (8.2)	1328		
<b>Wealth Index</b>						
<i>Poor</i>	5031 (56.5)	3165 (35.5)	708 (8.0)	8904	4758.996	<0.001



<i>Middle Class</i>	995 (24.7)	2667 (66.3)	363 (9.0)	4025
<i>Rich</i>	576 (8.1)	6170 (86.9)	351 (4.9)	7097
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#### 4.4 Binary Logistic Regression of selected socio demographic factors affecting the utilisation of ANC

Table 4.4 shows the results of the Binary Logistic Regression analysis of selected factors affecting the utilisation of ANC.

Christians were over 2 times more likely to utilise antenatal care compare to women of other religions, furthermore, muslims were over 1.3 times more likely to utilise compared to other religions ( $P < 0.001$ ).

Women from the North Central are 55% less likely to utilise antenatal care compared to women from the South West ( $P < 0.001$ ), also women from the North East are less likely to utilise ANC compare to women from the South West ( $OR = 0.165$ ,  $P < 0.001$ ), furthermore, women from North West are also less likely to utilise ANC compared to women from the South West ( $OR = 0.121$ ,  $P < 0.001$ ). Women from the South South are 25% less likely to utilise women from South West. This further shows that women from the South West are more likely to utilise ANC more than women from other geopolitical zones.

Therefore, there is a strong significance between religion, region and utilisation of Antenatal care.

**Table 4.4 Binary logistic regression of selected socio demographic factors associated with Antenatal care utilisation**

Variable	B	S.E	DF	Sig	Exp ( $\beta$ )	95% C.I of Exp ( $\beta$ )	
						Lower	Upper
<b>Religion</b>							
<i>Christian</i>	0.772	0.149	1	<0.001	2.163	1.614	2.899
<i>Islam</i>	0.288	0.080	1	<0.001	1.334	1.139	1.562
<i>Others (ref)</i>							
<b>Level of Education</b>							
<i>No Education</i>	-0.298	0.141	1	0.035	0.742	0.563	0.979
<i>Little Education</i>	-0.308	0.138	1	0.025	0.735	0.561	0.963
<i>Higher Education (ref)</i>							
<b>Region</b>							
<i>North Central</i>	-0.597	0.177	1	0.001	0.550	0.389	0.778
<i>North East</i>	-1.804	0.159	1	<0.001	0.165	0.121	0.225
<i>North West</i>	-2.112	0.154	1	<0.001	0.121	0.089	0.164
<i>South East</i>	0.427	0.289	1	0.140	1.532	0.869	2.701
<i>South South</i>	-1.355	0.175	1	<0.001	0.258	0.183	0.364
<i>South West (ref)</i>							

ANC: Antenatal Care

#### 4.5 Multinomial Logistic Regression of selected socio demographic factors and sources of Antenatal care used

Furthermore, in Table 4, the results of the Multinomial Logistic Regression analyses are presented. The odds of non-utilisation of ANC is significantly higher for women with no education (OR=18.528:95%CI=11.267-30.468) relative to higher educated women. However, uniparous women are less likely to not utilise ANC (OR=0.686:95%CI=0.583-0.806) relative to great grand multiparous women. The odds of non-utilisation of ANC is significantly higher for women from South South (OR=5.690:95%CI=4.648-6.965) relative to women from South West, however, women from South East are less likely not to utilise ANC (OR=0.534:95%CI=0.394-0.724) relative to women from South West. Furthermore, the odds of non-utilisation of ANC is significantly high for women who live in rural areas (OR=1.871:95%CI=1.674-2.090) relative to women who live in urban areas. The odds of non-utilisation of ANC is significantly higher for poor women (OR=5.306:95%CI=4.651-6.053) relative to rich women.

However, the odds of utilising ANC from Health Associate Professionals is significantly higher for women with no formal education (OR=3.617:95%CI=2.448-5.345) relative to higher educated women. Women from the North West are less likely to utilise ANC from Health Associate Professionals (OR=0.556:95%CI=0.421-0.735) relative to women from South West. The odds of utilising ANC from Health Associate Professionals is significantly higher for women who live in rural areas (OR=1.564:95%CI=1.339-1.828) relative to women who live in urban areas. The odds of ANC Health Associate Professionals is significantly higher for poor women (OR=2.506:95%CI=2.079-3.022) relative to rich women.

**Table 4.5 Multinomial Logistic Regression of selected socio demographic factors and sources of Antenatal care used**

Variable	$\beta$	S.E	DF	Sig	Exp ( $\beta$ )	95% C.I of Exp ( $\beta$ )	
						Lower	Upper
<b>NON-UTILISATION category</b>							
<b>Age</b>							
<i>Young women</i>	0.183	0.078	1	0.019	1.201	1.031	1.339
<i>Middle aged women</i>	-0.005	0.066	1	0.934	0.995	0.873	1.132
<i>Older women (ref)</i>							
<b>Level of Education</b>							
<i>No Education</i>	2.919	0.254	1	<0.001	18.528	11.267	30.468
<i>Little Education</i>	1.705	0.250	1	<0.001	5.499	3.367	8.981
<i>Higher Education (ref)</i>							
<b>Marital Status</b>							
<i>Never Married</i>	0.170	0.166	1	0.305	1.186	0.856	1.642
<i>Married</i>	0.033	0.110	1	0.762	1.034	0.834	1.282
<i>Once Married (ref)</i>							
<b>Parity</b>							
<i>Uniparity</i>	-0.377	0.083	1	<0.001	0.686	0.583	0.806
<i>Multiparity</i>	-0.226	0.066	1	0.001	0.798	0.701	0.908
<i>Grand Multiparity</i>	-0.174	0.062	1	0.005	0.841	0.744	0.950
<i>Great Grand Multiparity (ref)</i>							
<b>Region</b>							
<i>North Central</i>	0.385	0.102	1	<0.001	1.470	1.204	1.794
<i>North East</i>	0.329	0.101	1	0.001	1.390	1.140	1.694
<i>North West</i>	1.011	0.100	1	<0.001	2.749	2.259	3.345
<i>South East</i>	-0.627	0.155	1	<0.001	0.534	0.394	0.724
<i>South South</i>	1.739	0.103	1	<0.001	5.690	4.648	6.965
<i>South West (ref)</i>							
<b>Religion</b>							
<i>Christian</i>	-0.097	0.097	1	0.317	0.908	0.751	1.097
<i>Islam</i>	-0.162	0.068	1	0.018	0.850	0.744	0.972
<i>Others (ref)</i>							
<b>Type of Residence</b>							
<i>Urban (ref)</i>							
<i>Rural</i>	0.626	0.057	1	<0.001	1.871	1.674	2.090
<b>Wealth Index</b>							
<i>Poor</i>	1.669	0.067	1	<0.001	5.306	4.651	6.053
<i>Middle Class</i>	0.707	0.065	1	0.934	0.995	0.873	1.132
<i>Rich (ref)</i>							

ANC: Antenatal Care

Reference Category: Health Professionals

Variable	$\beta$	S.E	DF	Sig	Exp ( $\beta$ )	95% C.I of Exp ( $\beta$ )	
						Lower	Upper
<b>HEALTH ASSOCIATE PROFESSIONAL</b>							
<b>Age</b>							
<i>Young women</i>	-0.035	0.118	1	0.767	0.966	0.767	1.216
<i>Middle aged women</i>	-0.058	0.102	1	0.570	0.944	0.772	1.153
<i>Older women (ref)</i>							
<b>Level of Education</b>							
<i>No Education</i>	1.286	0.199	1	<0.001	3.617	2.448	5.345
<i>Little Education</i>	0.938	0.186	1	<0.001	2.556	1.775	3.681
<i>Higher Education (ref)</i>							
<b>Marital Status</b>							
<i>Never Married</i>	0.176	0.238	1	0.459	1.193	0.748	1.904
<i>Married</i>	0.197	0.167	1	0.236	1.218	0.879	1.688
<i>Once Married (ref)</i>							
<b>Parity</b>							
<i>Uniparity</i>	-0.060	0.128	1	0.642	0.942	0.733	1.211
<i>Multiparity</i>	0.037	0.103	1	0.721	1.038	0.848	1.270
<i>Grand Multiparity</i>	0.014	0.100	1	0.887	1.014	0.834	1.234
<i>Great Grand Multiparity (ref)</i>							
<b>Region</b>							
<i>North Central</i>	-0.230	0.108	1	0.033	0.795	0.643	0.981
<i>North East</i>	0.184	0.108	1	0.090	1.202	0.972	1.487
<i>North West</i>	-0.939	0.127	1	<0.001	0.391	0.305	0.501
<i>South East</i>	-0.586	0.142	1	<0.001	0.556	0.421	0.735
<i>South South</i>	-0.023	0.115	1	0.839	0.977	0.780	1.224
<i>South West (ref)</i>							
<b>Religion</b>							
<i>Christian</i>	-0.183	0.136	1	0.178	0.833	0.638	1.087
<i>Islam</i>	0.127	0.085	1	0.134	1.135	0.961	1.341
<i>Others (ref)</i>							
<b>Type of Residence</b>							
<i>Urban (ref)</i>							
<i>Rural</i>	0.447	0.079	1	<0.001	1.564	1.339	1.828
<b>Wealth Index</b>							
<i>Poor</i>	0.919	0.095	1	<0.001	2.506	2.079	3.022
<i>Middle Class</i>	0.577	0.088	1	<0.001	1.780	1.497	2.118
<i>Rich (ref)</i>							

ANC: Antenatal Care

Reference Category: Health Professionals

## CHAPTER FIVE

### DISCUSSION, CONCLUSION AND RECOMMENDATION

#### 5.1 Discussion

This chapter summarizes the study and discusses the findings and conclusions. It also discusses proper recommendations of these findings and the limitations of the study including suggestions on how to reduce these flaws in future researches.

This study was most populated by middle aged women, that is, women within the ages of 25-34 years and older women were the least (40-49). In this study, almost 73% utilised antenatal care which disagrees with Tukur D et al, who concluded that, In comparison with other countries in sub-Saharan Africa, Nigeria is behind seventeen other countries in terms of ANC coverage; these countries include Ghana (78.2%), Benin Republic (58.2%), Liberia (78.1%), Sierra Leone (76%), Lesotho (70.4%) and Zimbabwe (64.8%). Most respondents were from the North West, Nigeria, while there was poor representation from the South East region, also, these respondents were mostly rural dwellers in their various regions. I also found that most of these women had just primary education or secondary education at most, almost 50% of the respondent didn't have formal education. Considering their marital status, they were mostly married, a few were once married (divorced or widowed). The wealth index of these women also showed that most of these respondents were poor, that is, almost 50% were poor, the least amongst the wealth index fold are the middle classed, there were a few of them. The most populated religion was the other religions with almost 60% of the entire population, Christians were the least populous respondents in the study.

Antenatal care utilisation varied across the regions in Nigeria. Almost all the women from the South East as well as the South West utilised antenatal care compared to women from the North East and the North West. The percentage of non-utilisation was higher in the women from the North West region which happens to be most populated region in this study. This means that utilisation of antenatal care is low for women from the North West which also means that non-utilisation is high. This is a bit similar to what was reported in a reviewed paper by Simkhada B

et al (2008), who said that from the list of 16 reviewed journals, North East had the highest number of women not utilising ANC. Also in a result given by Adeniyi F.F et al (2015), he also corroborated that non-utilisation is highest in the North Eastern geographical zone with 51% but Blessing I.B (2014) reported that the least utilisers of ANC were from the North West with over 13% and the highest was from South West with almost 84%. All these show that there is an association between antenatal care utilisation and region.

Considering level of Education, women with higher education are more likely to utilise ANC. This might be due to the knowledge they are exposed to compare to women with little or no formal education. This means that level of education has a relationship with utilisation of ANC. This agrees with what Blessing I.B (2014) who reported that the higher the level of education, the more utilisation of ANC amongst women and illiterate women had the least ANC utilisation. Furthermore, Fagbamigbe A.F (2015) also agreed that education might be a factor affecting utilisation amongst women in Nigeria, but in a study done in the South Eastern part of Nigeria, Okoronkwo L.I, (2016) reported that women with just secondary education has the highest percentage of ANC utilisation and no formal education was the least percentage of utilisation of ANC. Iyaniwura, (2009) did a study in Sagamu, the suggestions were, more of the women with no formal education had at most four antenatal attendances compared to the women with tertiary education. This findings by Iyaniwura, et al and Okoronkwo, et al suggested that higher education level of education does not influence antenatal care which disagrees with findings from Adeniyi F.F and Blessing I.B, however, the findings in this study agrees with Adeniyi F.F and Blessing I.B.

Also considering religion, though the study was populated by women with other religions aside Christianity and Islam, Christian women are more likely to utilise ANC. Onah et al (2006) suggested that the quest for privacy of women of other religions and the fact that most of them are unskilled workers who may not be able to afford the cost of care may make them seek care at non-health care institutions.

More than half of Young mothers utilised Health Professionals ANC and older mothers were more than others in the category of those who did not utilise ANC. Tukur D et al, suggested that the influence of maternal age on the use of ANC is unclear and inconsistent; some researchers suggests that women in their thirties are more likely to use ANC services compared to those that



are younger women, this agrees with our findings, which shows that age can influence the source of Antenatal care. This shows that there is a relationship between age and sources of ANC.

Religion is another factor affecting Antenatal care utilisation. This study shows that Christian women will prefer to go to see either a doctor, nurse, midwife or an auxiliary midwife for Health Professionals ANC compared to women of other religions, this agrees with Tukur D who suggested that Christian women have higher utilisation rate of ANC than women of other religions. This is similar to the finding that revealed association between religion and antenatal care in Nigeria (Dairo and Owoyokun, 2010). According to Maryam A. et al, among the largely mixed groups of Muslim and Christian women, the preference across both Muslim and Christian women was to use healthcare facilities for maternal services. This therefore shows us that religion goes beyond just being a factor that affects ANC utilisation, it can also influence the type of ANC that a woman will choose. Which shows that a Muslim or Christian woman has a high possibility of going to a hospital for Antenatal care as against non-utilisation.

Over half of respondents with no formal education did not utilise ANC and almost all the women with higher education utilised Health Professionals ANC. Bergsjö (1997) strongly attests to the fact that educated women are more likely to utilise ANC. Ibor et al also suggested that the utilisation of ANC by childbearing women increases with increase in level of education which agrees with Iyaniwura and Yusuf (2009). This shows that level of education has an effect on which source of ANC to be used.

Women who are not married had a higher percentage of Health Professionals utilisation. This is a shocking result. The result further showed that they are less likely to not utilise ANC. This means that sources of ANC used varies based on marital status. This agrees with Idris U. T who suggested that marital status has a significant association on utilisation of ANC.

Considering wealth index, more than half of poor respondents did not utilise ANC which is expected. A large percentage of the rich utilised Health Professionals ANC. This means utilisation increases as wealth index increases. Women of the rich class are most likely to go to a hospital for their ANC rather than non-utilisation, compared to women of the middle class and the poor class. This agrees with a study done by Krishna K et al where women from higher wealth index has a higher chance of using ANC services compared to women who were from poor families.

This further shows that wealth index has an influence on the utilisation of ANC and also the source to use.

Women from the South East region of Nigeria are more likely to go to a hospital for ANC as against non-utilisation compared to women from the South West. The women from the South West are more likely to go to a hospital for ANC. This disagrees with Tukur D et al, who suggested that the women in North Central and North East were more likely than those of South West to utilise ANC. There is a slight similarity with Osubor et al (2005), the study affirms that the use of Traditional Birth Attendants (TBAs) is highest in the South-South geopolitical zone of the country. This means that region is a significant factor that does not only affect but also influences the choice of the source of ANC to use.

Urban dwelling women will also rather go to a hospital environment for their Antenatal care and women in rural did not utilise compared to women in urban areas. This agrees with Osubor K.M. et al (2006), who suggested that one in five women (20%) did not use ANC service at all or they used non-health institutions such as TBA or spiritual homes. Also, previous studies have shown that urban residence has some advantages on the use of ANC. This might be due to some factors as Khalid O et al suggested that, over half of the non-users in their study were having problem with getting money to go for the ANC services, some claimed that they did not go because transport facilities to the service providers were not available, some claimed that the providers were far from them. Also Duru C et al concluded that in the urban area, most of the respondents received ANC services in government hospitals and private hospitals while in the rural areas, most of the clients received theirs from the Primary health care service providers. This further agrees with the finding that urban women use antenatal care than rural women in Nigeria (Dairo M.D and Owoyokun et al., 2010). It thus disagrees with the finding that urban residents had no association with the use of antenatal care (Eggleston 2000).

Women with one child (uniparous) would most likely go to a hospital for Antenatal care compared to Great Grand Multiparous women, also multiparous women will rather go to a hospital for antenatal care compared to Great Grand Multiparous women. This shows that the number of lesser the number of children, the higher the tendency of ANC. That means there is no relationship between parity and antenatal care.

All these show that age, level of education, marital status, wealth index, region, place of residence, religion and parity are factors associated with sources of ANC.

Christians are more likely to utilise antenatal compared to other religions. This means for any unit increase in Christian women will result in an increase in utilisation of Antenatal care. Tukur D et al agrees by suggesting that women who are Christians have higher utilisation rate of ANC than women of other religions. This also agrees with Maryam A et al. This further shows that there is a strong relationship between religion and Antenatal care.

Women from the South West are mostly likely to utilise ANC compared to other geopolitical zones. This agrees with Hauwa et.al who suggests that women from the Southern region are more likely to utilise ANC services compared to those in those in the North. This further shows that there is a strong association between region and Antenatal care utilisation.

There is a strong relationship between education and sources of antenatal care used as women with no formal education are most likely not to utilise ANC and are likely to use ANC from Health Associate Professionals. Meanwhile, women with higher education are most likely to utilise Health Professionals ANC. This shows that an increase in women with no formal education will result into increase in non-utilisation and also utilising ANC from Health Associate Professionals. According to Becker et al. (2003) who said mother's education are most consistent and an important determinant for maternal health services. Several other studies also found a strong positive association between mother's education and utilisation of ANC (Costello et al., 1996; Fosu, 1994). Bergsjö (1997) also affirms strongly that educated women are more likely to report four, or more visits to ANC.

There is also a strong relationship between parity and sources of Antenatal care. Uniparous women are more likely to utilise Health Professionals' ANC. This also means that the more the children, the less the utilisation. This disagrees with Onasoga, Olayinka A. et al who suggested that parity is not a determining factor in the utilisation of ANC services which is in contrast with the findings of Simkhada, Teijlingen, Porter, and Simkhada, (2008) that Parity had a statistically significant negative effect on adequate attendance.

However, there is a strong relationship between place of residence and sources of antenatal care. Rural dwelling women are more likely not to utilise ANC and women who live in urban areas

are more likely to utilise Health Professionals ANC. This further proves the strength in the association, this agrees with the finding done by Dairo M.D, who reported that urban women utilise antenatal care more than rural women in Nigeria.

Furthermore, there is also a strong relationship between region and antenatal care as women from South West utilise Health Professionals ANC and women from the North East are more likely to utilise Health Associate Professionals' ANC. This shows the variation amongst the regions as regards the various sources of antenatal care. This agrees with Hauwa et.al.

## 5.2 Limitation of the study

There were a few of limitations to this study. The data set was insufficient with information, the total respondents at the initial stage were 31482, but at the level of antenatal care, only 5696 respondents interviewed which is not a good representation and in turn gave too many missing data. Some detailed questions were not asked such as, Distance to ANC center, preference of the care giver, and consent of husbands concerning ANC. Furthermore. ANC related questions were not properly asked, Respondents should be asked how much is paid for ANC if there is any levy, and how the care givers treat them, any outcome from non-utilisation and is there any benefit from the utilisation of Antenatal care.

## 5.3 Conclusion

The major factors that affect utilisation of Antenatal care as seen in this study are; religion, wealth index, level of education, region and type of residence. However, religion and region have a strong association with ANC utilisation. Urban dwelling women have better access to information and facilities which are in the rural settlements, this makes the rural dwelling women at a disadvantage. Furthermore, the rich and learned has a higher advantage over poor and the illiterate women. Looking at the sources of Antenatal care, some of these factors still influence the type of ANC to utilise. For instance, a women who is poor and lives in the rural area will not go for Antenatal care due to so many reasons, she would rather opt for the traditional way of giving birth. Therefore, education, parity, place of residence and region have a strong association

with sources of Antenatal care available and this association is statistically significant. Which means they can influence choice of Antenatal care to use.

#### 5.4 Recommendations

There might be a decrease in Antenatal care if proper awareness is not done for people with no formal education, adequate information in a language women who live in the rural areas will understand, free advice and check-ups for women who cannot afford it.

The questions that could be asked in future study on ANC utilisation should be well structured, detailed and centered on ANC and how to reduce the influence the effects of these factors. Government should build centers at strategic places in rural areas where women can have access to help. Governments and health bodies should organize programs that will educate and give detailed information to all women of premenopausal age.

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