

PRECEDING CHILD SURVIVAL AND UTILISATION OF MATERNAL  
HEALTHCARE SERVICES AMONG NIGERIAN WOMEN

BY

BOLAJOKO, IZZATULLAH

Matric No.: 195422

B. Sc. Microbiology (Abuja)

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## ABSTRACT

Maternal health care (MHC) service utilization in Nigeria has remained unacceptably low for ages. Numerous studies have been undertaken to understand this phenomenon. Some studies have assessed how preceding child survival predicts the death of a subsequent child and subsequent fertility behaviours and patterns but not a lot has examined the effect of preceding child survival on MHC service use. This work sought to examine the relationship between preceding child survival and antenatal care (ANC), skilled attendant at birth (SAB) and postnatal care (PNC) utilisation among Nigerian women.

The children recode dataset of the Nigeria Demographic and Health Survey (NDHS) 2013 was used with a sample size of 98335. The main objective of this work was to determine how preceding child survival influences MHC services utilisation for subsequent birth, therefore since the main interest in this work was preceding child survival, only women with second or higher order births were considered. This is because first-order birth women have no preceding child. The relationship between preceding child survival and MHC services utilisation was examined using descriptive statistics and four logistic regression models: the first three models considered the main predictor variables, bio-demographic and socio-economic variables respectively, while the fourth model combined all the predictor variables with preceding child survival. Thereafter, regional analyses were carried out to investigate the differences across regions. Association and statistical significance were expressed as odds ratio (OR) with 95% confidence interval (CI).

Descriptive analysis revealed that the North West (32%) region had the highest population while the South East (9.7%) region had the least population. Over 60% of Nigerians are in the poor and middle wealth quintile while the remaining are in the rich wealth quintile. More than half (52.8%) of respondents had no form of education and majority (60.6%) of respondents are into selling of goods. Bivariate analysis revealed that preceding child death increased the odds of ANC, SAB and PNC utilisation by 5.8%, 10% and 2.6% respectively and multivariate analysis revealed that preceding child death had the greatest influence on SAB as it had the highest level of association and significance (OR=1.71 CI= 1.57-1.87). For most of the regional analysis, only model I one MHC service revealed a statistically significant association: North central (PNC: OR=2.15, CI=1.17-3.96), North East (SAB: OR=1.88, CI= 1.39-2.54), North West (ANC: OR=1.23, CI=1.02-1.48, SAB: OR=1.31, CI= 1.02-1.69), South South (SAB: OR=1.41, CI=1.14-1.74), except for South West where both models of SAB were statistically significant. (SAB: model I: OR=1.44, CI=1.13-1.83, model II: OR=1.39, CI=1.07-1.80). On the other hand, South East revealed no statistically significant association for all MHC services studied.

It is surprising to observe that women who experience preceding child death seem not to learn from the experience and do not opt for MHC services. This makes one wonder if these women even appreciate that the occurrence may have been because of their non-use of MHC services. It is therefore necessary that other studies are carried out to understand women's perception about child mortality and MHC services utilisation.

**Keywords:** preceding child survival, child mortality, maternal health care, antenatal care, skilled attendant at birth, postnatal care, Nigeria.

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## CERTIFICATION

We certify that this work was carried out by Bolajoko Izzatullah in the Department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine, University of Ibadan

 20/02/18

.....  
Supervisor  
Dr. J.O. Akinyemi  
B. Tech (Akure) M.Sc. (Ibadan), Ph.D. (Ibadan)  
Department of Epidemiology and Medical Statistics  
University of Ibadan, Nigeria.



.....  
Supervisor  
Dr. B. M. Gbadebo  
B.Sc. (Ife) M. Sc. (Ife), Ph.D. (Ife)  
Department of Epidemiology and Medical Statistics  
University of Ibadan, Nigeria

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## LIST OF ABBREVIATIONS

ANC	Antenatal Care
CI	Confidence Interval
EA	Enumeration Area
HMO	Health Maintenance Organization
MDG	Millennium Development Goal
MHC	Maternal Health Care
NDHS	Nigeria Demographic and Health Survey
NHIS	National Health Insurance Scheme
OR	Odds Ratio
PSU	Primary Sampling Unit
PNC	Postnatal Care
SAB	Skilled Attendant at Birth
SDG	Sustainable Development Goal
UHC	Universal Health Coverage

# CHAPTER ONE

## 1.0 INTRODUCTION

### 1.1 Background to The Study

Maternal and child health is a major indicator of the health and well-being of a nation. Irrespective of all the efforts that were put in place to achieve the millennium development goal (MDG) 4 target as well some declines that were recorded all over the world. Maternal and child death is still high in many countries particularly resources poor countries in sub-Saharan Africa, Central Asia, Oceania Caucasus and Southern Asia. To this end, there is now a renewed focus in sustainable development goal (SDG) 3 target to end maternal death as well as preventable infant and child death by 2030 with all countries aspiring to reduce infant and child death to a minimum of 12 deaths per 100 live births, as well as to reduce maternal death to less than 70 per 100,000 live births (AbouZahr 2003; Aigbe, Gladys and Zannu, 2012; Centers for Diseases Control and Prevention, 2016; The DHS Program, 2009; UNICEF and WHO, 2015; World Health Organization, 2016a; World Health Organization, 2016b).

According to the World Health Organization (2016b) around 830 women of reproductive age die every day because of complications associated with pregnancy and developing countries account for 99% of these deaths. Improper and insufficient utilisation of MHC services in Africa is the most reasonable explanation for poor health outcomes among women of childbearing age. Regular antenatal and postnatal visits during and after pregnancy is important to reduce the risk of illness and death for the mother and child. The Nigerian Sentinel Survey of the National Population programme carried out in 2007 suggests that approximately 48% of Nigerian women reported that they did not attend antenatal clinics. The report also suggests that only 42% of women in the rural areas received antenatal care from doctors. The report generally indicates that utilisation of MHC services for both mother and child in Nigeria is unacceptably low (National Population Commission and ICF International, 2009). However, the most recent Nigeria Demographic and Health Survey (NDHS) report confirms that only 61% and 38% of women received antenatal care and had deliveries attended by skilled birth assistant (National Population Commission and ICF international, 2014). This shows some amount of improvement but MHC

service utilisation in Nigeria is still unacceptably poor and it has been confirmed to be as a result of a wide range of bio-demographic and socio-economic factors (Akinyemi *et al.*, 2016; Babalola and Fatusi, 2009; Fagbamigbe and Idemudia, 2015; Ononokpono, 2015). It is almost impossible to separate child death from maternal morbidity and mortality as maternal well-being to a large extent determines child wellbeing, this is because utilisation of MHC services has been observed to be inversely related to child death (Babalola and Fatusi, 2009). It has also been noted that about two-thirds of neonatal death can be averted if maternal healthcare services are judiciously utilised especially at birth and during the first seven days of life (Babalola and Fatusi 2009; Bosomprah *et al.*, 2014; World Health Organization, 2016a)

Child death undoubtedly takes a huge toll on families and the society at large. It is an experience that could affect both the behaviour of mothers and the society at large. This occurrence may present with either of two consequences: it could either seriously influence the risk of dying or surviving for the next child and/or go on to negatively impact the fertility and health-seeking behaviour of women while pregnant and afterward. Some studies have shown that the mortality risk for an index child whose mother had lost a previous child is higher than those who have not (Rahman *et al.*, 1996). Child mortality could also influence fertility patterns in the sense that when a child dies, the bereaved parent usually want to have another child to replace the dead one (Nobles *et al.*, 2015). It could also trigger more birth for women who have not completed their desired fertility goal (Kozuki and Walker, 2013; Nobles *et al.*, 2015). Now all these would then influence the birth interval and birth orders of such women which ultimately influences their utilisation of MHC services or otherwise for subsequent birth. This is because Makate (2016) suggested that the extent of health investment and use of MHC service tends to reduce with higher birth orders. Also if a child dies, the parents might want to replace the dead child early enough to help them overcome the pain of child loss (Nobles *et al.*, 2015) and it could result in short birth interval. It is therefore important to understand the effects of preceding survival on women's utilization or not of MHC services.

## 1.2 Problem statement

In the African region, countries in West and Central Africa generally have higher rates of maternal and child mortality than Eastern and Southern African countries. Nigeria which is the

most populous country in the region and the eighth most populous country in the world, accounts for a quarter of all maternal and infant deaths in sub-Saharan Africa ( UNICEF, 2010). The unacceptably low utilisation of MHC services continues to contribute largely to Nigeria's high maternal and infant mortality ratios. Although there is a considerable amount of knowledge about MHC services, they are still poorly utilised especially in the rural areas which makes it a complex situation to understand and tackle. (Yar'zever and Said, 2013) The wellbeing and survival of mothers and their children relies heavily on the availability, accessibility, and use of ANC, SAB and PNC and its components such as tetanus toxoid injections, iron supplementation, etc. (Uwakwe *et al.*, 2015). This continuum of care for mother and child not only begins during pregnancy but from the preconception stage to ANC, to SAB and PNC (which is the six weeks after birth), for wholesome care it is important that all these services are received (Center For Disease Control and Prevention, 2015; Akinyemi *et al.*, 2016). The well-being of mother and child is an important aspect of the effort towards achieving SDG 3 targets (ensure healthy lives and promote well-being for all at all ages). This explains that the poor MHC services utilisation is directly related to poor child health. As noted by Adepoju (2015), that child mortality is highest among women who did not receive antenatal care and who usually deliver their babies at home. Having said all that, the death of a child is a bitter experience which greatly affect mothers, therefore it is expected that such an experience would change women's' extent of utilization of MHC services. It is, however, surprising that the observed high child mortality rate in Nigeria is still attributed to low MHC service utilization, which negatively impacts on the overall development of the country.

### 1.3 Justification

Effective MHC service utilisation during pregnancy (such as antenatal care for mothers, obstetric care and the skilled attendant at birth to resuscitate new-borns if need be and postnatal care can reduce around three-quarter of child death. These MHC services and their components are the requirements to effectively achieve the SDG 3 targets on MHC (World Health Organization, 2011; Maternal Health Task Force, 2017). While a lot of research has identified maternal education, distance to healthcare facility, religious misconceptions, level of income, ethnicity, family size, cultural beliefs, etc. as the major factors affecting the utilisation of maternal

healthcare services (Babalola and Fatusi, 2009; Addai, 2000; Yar'zever and Said, 2013). Some have also assessed the odds of index child death if the preceding sibling died, as well as how it affects subsequent fertility behaviour and choices (Kozuki and Walker, 2013; Nobles *et al.*, 2015; ). Not a lot has been done on the effects of preceding child survival on utilization of MHC service for subsequent children. Since both maternal physical and psychological well-being is directly related to child wellbeing (Adebowale and Udjo, 2016). This study aimed to investigate whether women who have lost a preceding child respond to this bitter experience by properly utilizing MHC services for subsequent births or not.

#### 1.4 Research Question

Does the preceding child survival influence the utilisation of MHC services?

#### 1.5 Research Objectives

##### General Objectives

To investigate the relationship between the preceding child survival and utilisation of MHC services among Nigerian women

##### Specific Objectives

1. To assess the association between preceding child survival and utilisation of antenatal care service
2. To determine the association between preceding child survival and utilisation of skilled attendant at deliveries.
3. To investigate the association between preceding child survival and utilisation of postnatal care service
4. To determine if the relationship between preceding child survival and MHC services utilisation varies across geopolitical regions in Nigeria

# CHAPTER TWO

## 2.0 LITERATURE REVIEW

This chapter deals with the review of relevant literatures and theoretical framework on the determinants of utilisation of MHC services. Important literatures related to the study were collected through various sources: PubMed, Google scholar, Google search engine and reports. Keywords that were used for literature search includes child mortality, preceding child survival, maternal healthcare use, Nigeria, antenatal care, skilled delivery, postnatal care services and maternal mortality

A vast amount of demographic and public health literatures have studied the determinants of MHC services utilisation and a lot has been reported to influence MHC service utilisation. Maternal education has been consistently reported to be the major determinants of MHC services utilisation. Therefore, to guarantee lucidity and to properly summarise previous studies relevant to this study, this chapter is presented under four sub-headings: patterns, trends and global burden of child mortality, maternal mortality in Nigeria, theoretical framework, and national policy on MHC services.

### 2.1 Patterns, Trends and Global Burden of Child Mortality

Infant mortality is defined as the death of a child before his or her first birthday, that is death before 12 months. It is calculated as the number of infant deaths for every 1,000 live births (Centers for Diseases Control and Prevention, 2017). Infant and under-five mortality has been quite high globally until recently that there has been a significant reduction from around 12.7 million in 1990 to 5.9 million in 2015, even the sub-Saharan African countries which is the region with the greatest infant mortality rate globally have recorded a remarkable increase in its infant survival rate from 1.6 percent to 4.1 percent. At the country level, about 62 countries including Ethiopia, Uganda, Nepal, Cambodia, Liberia etc. have reduced infant and child mortality by two thirds or more, while an additional 74 countries have reduced infant and child mortality by at least half and another 41 countries by a minimum of 30%. Therefore accelerated

progress on infant and child mortality have led to the survival of around 18 million children worldwide (UNICEF and WHO, 2015). WHO noted that about a fifth of all children in sub-Saharan Africa dies before their fifth birthday as against less than a tenth in Asia and Latin America. (Gyimah, Takyi, and Addai, 2006).

### 2.1.1 Trends and patterns of child mortality in Nigeria

Between 1990 and 2003, Nigeria experienced an increase in infant mortality from 87 per 1000 live births to 100 per 1000 live births this is chiefly because over half of births do not occur in the health facility nor by trained healthcare service providers (World Health Organization, 2003). Anyamale *et al.*, (2015) who carried out a study using the NDHS data of 2003 and 2008 to analyse the trend in infant and under-five mortality found out that 25 states out of the 36 states of the federation experienced decrease in infant mortality. Nasarawa state recorded the highest decrease of 64% while the remaining 11 states saw no decline in infant mortality and Oyo states recorded the highest infant mortality rate at 118%. Generally infant mortality in the country has experienced about 18.97% decrease. Nigeria recorded reductions in neonatal mortality rate from 42 to 38 per 1000 live births between 1990 and 2013. Although these reductions were not exactly consistent from 1990 to 2013, it appears that efforts to reduce infant and child mortality are now having a significant impact and yielding good results. This is because the rate of decline was fastest in the North East and North West which used to top the list of infant and child mortality in Nigeria. (Akinyemi *et al.*, 2015).

The NDHS 2013 report also suggests that infant mortality rates have undergone a steady decrease from 93% to 69% deaths per 1000 live births for the 15 years preceding the survey (National Population Commission and ICF International, 2014). The NDHS reports have usually revealed a wide disparity in infant mortality rate between the North East and South West. As a result, a study was carried out in Nigeria to understand the disparities and similarities among the factors influencing infant mortality in the North East and South West zones of Nigeria. The study revealed that although there exists difference in the factors influencing infant mortality, parental education, and type of residence were consistent factors for both regions. (Fagbamigbe and Alabi, 2014)



## 2.1.2 Factors influencing child mortality

In 2012, around 6.6 million children who died before their fifth birthday across developing countries died as a result of vaccine-preventable infectious disease (United Nations Children's Fund, 2014). Distance to healthcare facility is a major determinant of the extent and type of health care facility that can be utilized, transportation and getting money to go to the hospital are also related problems that have contributed to infant mortality (Adepoju, 2015). Maternal education, family resources or household status and region of residence, cultural and gender bias, access to media, health insurance and availability of MHC services have all been identified to impact on both infant and childhood mortality (Adedokun *et al.*, 2017; Anyamele *et al.*, 2015; Iyewumi and Donald, 2013; National Population Commission and ICF International, 2014). Contrariwise Akinyemi *et al.*, (2015) revealed that the effects of maternal education wanes over time particularly for the first month of life such that the odds of an infant surviving beyond the first month are not necessarily hinged on the maternal educational attainment, they, however, noted that it could exert more influence after the infant's first month of life.

Types of toilet facility, access to television, father's educational attainment, maternal age, birth interval, birth order and child sex have also been noted to be major contributory factors to infant mortality (Adeolu *et al.*, 2016; Okposio *et al.*, 2012; Ayotunde *et al.*, 2009; Kembo and Van Ginneken, 2009; National Population Commission and ICF International, 2014; Islam *et al.*, 2013). This is because mothers below age 20 experience infant mortality more than older mothers, first and seventh birth order mothers have a greater risk of mortality than the rest. Children born to mothers with less than two years birth interval are more likely to die than mothers who have at least two or more years birth interval (Kembo and Van Ginneken, 2009). Birth order is the direct opposite of birth interval because the higher the birth order the higher the risk of maternal and infant mortality and the more the birth interval the higher the survival of both mother and infant. Infant mortality is more among males than females with the exception of mothers between ages 40-49. Home deliveries without skilled assistance which result in complications and late presentation in the hospital is also a major contributory factor to the alarming rate of maternal mortality. (Adeolu *et al.*, 2016; Okposio *et al.*, 2012; Ayotunde *et al.*, 2009; Kembo and Van Ginneken, 2009; National Population Commission and ICF International, 2014; Islam *et al.*, 2013) A study carried out in rural Nigeria using the Nigeria Demographic and

Health Survey suggested that children who are not exclusively breastfed as well as children who do not receive complete immunization are more likely to die than those who are exclusively breastfed or those who receive complete immunization (Adepoju, 2015).

Adedokun *et al.*, (2017) carried out a study in Nigeria on the autonomous involvement of individual, society and state level factors in utilisation of health care service for acute childhood illnesses and suggested that childhood morbidity or mortality is influenced by a combination of maternal and societal factors which makes it a complex issue to tackle. Akinyemi *et al.*, (2015) who studied the effects of bio-demographic and maternal characteristics in Nigeria using the NDHS, 1990, 2003, 2008 and 2013 dataset suggested that marital status, availability of potable drinking water source and size of the child at birth are also important determinants of neonatal mortality. They noted that infant of mothers who were in a marital union, or who had access to potable drinking water or who were above 2.5 kg at birth had a greater chance of surviving than their counterparts that do not have those advantages.

## 2.2 Maternal Mortality in Nigeria

Maternal mortality is the “death of a woman while pregnant or within 42 days of termination of the pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes” (World Health Organization, 2017). For better understanding of the term “maternal mortality”, pregnancy-related death was coined which is defined as the deaths while pregnant or within 42 days of the termination of pregnancy irrespective of the causes. Although maternal mortality is divided into two groups: the direct obstetrics death, and indirect obstetrics death, majority of maternal mortality results from direct obstetrics care such as complications in pregnancy, labour, incorrect treatment after birth etc. All these account for around 19% of global maternal death and an estimated 58,000 deaths annually (Afulukwe-Eruchalu, 2017; USAID, 2006; World Health Organization, 2017)

For over ten years now, Nigeria has been continuously rated among the top five nations with the highest maternal mortality ratio globally. According to world bank maternal mortality ratio in Nigeria declined from 1350 per 100,000 live birth in 1990 to 800 per 100,000 live births in 2000 (World Health Organization, 2003) and recently to 546 per 1000 live birth (Maternal Health

Task Force 2017). Although it appears that maternal mortality is starting to decline a lot still has to be done to further reduce it. Nigeria and sub-Saharan African countries contribute greatly to maternal mortality as a result of poverty, cultural practices, lack of awareness and insufficient access to MHC services (World Health Organization, 2016b). This, therefore, emphasizes that more needs to be done to improve socio-economic standards and maternal healthcare awareness in these countries to attain the SDG goal 3 by 2030

### 2.3 Theoretical Framework

Andersen and Newman (1973) aimed to discern the determinants that encourage or deter health services utilisation. Findings from their study brought about the health seeking behavioural model which is observed to be a function of three factors. (1) predisposing factors; education, ethnicity, occupation, social network and interaction, age, gender, attitudes, values, culture etc. (2) enabling factors; health insurance, incomes, genetic factors, waiting time, distance, source and availability of care (3) Needs factors; this deals with illness or health conditions which necessitates health care. The last factor of Andersen and Newman's model is further consolidated by the theory of illness behaviour and sick role (Suchman, 1965).

Illness behaviour is defined as the way symptoms are understood, examined and acted upon by individuals who feels some pain, discomfort and/or unhealthiness. Individual differences in response to these symptoms of unhealthiness suggest that illness behaviour is determined by social and cultural values and/or physiological conditions. Suchman provided a sequential approach for examining illness behaviour with five stages of illness experience. They are (1) Symptom experience; physical pain and discomfort, concerns about social implications of illness or disruption of functional ability. (2) Assumptions of sick roles: when an individual becomes sufficiently worried and admits the presence of an illness. (3) Medical/self care: decision to seek healthcare either professionally or through self care. (4) Dependent patient role: here the ill individual depends on care givers, (5) recovery or rehabilitation; this usually have one of two outcomes. its either it was an acute illness and the individual gets well and returns to being functional or it was a chronic illness and they only continue to manage the health condition. Suchman's approach is one that follows a sequence and decision made in each stage determines

if the individual will proceed to the next stage or not. This study was therefore based on Andersen and Newman (1973) behavioural model of health utilisation.

### 2.3.1 Factors Influencing Utilization of Maternal Health Care Services

According to World Health Organization (2004) over half a million women die as a result of insufficient healthcare during childbirth. Studies have shown that the levels of utilisation of MHC services in Nigeria are below acceptable standards and this level is even lower than what obtains in other sub-Saharan African countries (Yar'zever and Said, 2013; Babalola and Fatusi, 2009). A study carried out to assess MHC service utilisation in Bangladesh revealed that records of third antenatal care visits are lesser than first and second antenatal care visits, same also applies to place of delivery as first time mothers are more likely to receive skilled delivery than non-first time mothers (Das Chandra, 2015). Another study was carried out in Bangladesh using the Bangladesh Maternal Mortality and HealthCare Survey to observe the pattern of maternal health care received from medically trained health providers between the rural and urban areas from 2001-2010. Result from the study revealed that there has been 12 percent and 8 percent increase in antenatal care respectively. The amount of women who delivered at institutional delivery homes raised from 6 to 19 percent and 22 to 38 percent for the rural and urban setting respectively and it was observed that wealth index was a major determinant of the difference observed in the MHC use inequality (Kamal *et al.*, 2016). According to the Nigeria Demographic and Health Survey 2013 about 61% of women received antenatal care from a skilled provider (that is a doctor, nurse or midwife, or auxiliary nurse or midwife) in the five years preceding the survey and only 51% of them attended at least four antenatal visits (National Population Commission and ICF International, 2014). In Nigeria over 75% of women do not attend antenatal care clinics while pregnant especially women who are married, less educated, poor and women who reside in rural areas (Fagbamighe and Idemudia, 2015).

In order to effectively control infant, child and maternal mortality as well as improve women's reproductive health it is important to ensure that required and appropriate MHC services (such as antenatal care service, postnatal care service, skilled attendant at birth, necessary vaccine for expectant mothers etc.) are put in place particularly in developing countries (Magadi, Madise and Rodriguez, 2000; Paul and Rumsey 2002). Over the years studies have been carried out to

understand the factors that have impacted the utilisation or non-utilisation of MHC services. Maternal education have been noted to be the major determinant that positively influences proper utilisation of MHC service, because it has enabled women to make the right decision regarding accessing proper healthcare services, it has equipped women with better knowledge with which to disregard tradition while protecting both their health and their children's health and they have a better tendency to utilise available MHC services as a result of their education and exposure. (Greenaway *et al.*, 2012; Srivastava *et al.*, 2014; Ghose *et al.*, 2017; Mehta *et al.*, 2014; Agbede *et al.*, 2015; Celik & Hotchkiss 2000; Magadi, Madise and Rodriguez 2000)

The enormous amounts of studies that have been done on utilisation of MHC services has shown that it is inappropriate to make general assumptions across various countries, and settings particularly across different socio-economic groups, because even maternal education that has had the greatest positive influence on utilization of MHC services is not a consistent factor all over the world. This therefore shows that utilisation of MHC services is indeed a complex behavioural phenomenon (Navaneetham and Dharmalingam, 2002; Chakraborty, 2003). It has been observed that most women patronize the traditional birth attendant in rural areas, but the incidence of birth complications and prenatal care provided by health personnel has encouraged the use of MHC services. It was also noted that there is no difference in the amount of utilization of MHC services between the rural and urban women. (Paul and Rumsey, 2002)

The major factors that have been documented to influence utilization of MHC services are maternal education, household, maternal influence and others (Greenaway *et al.*, 2012; Srivastava *et al.*, 2014; Ghose *et al.*, 2017; Mehta *et al.*, 2014; Agbede *et al.*, 2015) Below is a brief description of the different classification of factors that influence MHC service utilisation.

### 2.3.1.1 Predisposing factors

#### Households

Socio-economic background (basically level of education and income) of households is a major determinant of the type and extent of healthcare facility that will be utilized by a household. When parents are well educated they are better exposed and aware of necessary and available healthcare services. In the same vein, higher educational level tends to attract more pay, which

allows the utilization of appropriate health care services while being able to pay for the necessary cost (Srivastava *et al.*, 2014; Agbede *et al.*, 2015; Paul, B.K. and Rumsey, 2002; Celik & Hotchkiss, 2000) Researches has also shown that those living in poorer households utilize MHC services lesser than households with higher socio-economic status and vice versa (Stephenson *et al.*, 2006).

### **Place of residence and geographic region**

While some studies (Paul and Rumsey 2002) have shown that residence may not be a major determinants of MHC service utilization (Celik and Hotchkiss, 2000) from their study in Turkey suggested that ethnicity, residence, and geographic regions are major determinants of utilisation of MHC services.

### **Maternal status and influence**

The mothers' age, birth order or previous maternal reproductive histories are major factors that influence the decision about utilization of MHC services (Ghose *et al.*, 2017; Srivastava *et al.*, 2014). Maternal socioeconomic status, particularly education has been identified as a major determinants of utilization of MHCs services as women of higher socio-economic status tends to utilise appropriate MHC services than women of lower socio-economic status (Stephenson *et al.*, 2006; Chakraborty *et al.*, 2003)

### **Birth order**

Women with less order of births are more likely to utilise MHC services than women with higher order of birth and this is usually related to family income and cost of healthcare services as families usually have to forgo utilising MHC services for other family needs. Another explanation is that first time mothers are usually excited, more cautious and more likely to utilise MHC services than older women with higher order of birth who tend to think they already have all the knowledge and experience and therefore need not enrol for MHC services, (Ghose *et al.*, 2017; Srivastava *et al.*, 2014; Agbede *et al.*, 2015; Celik & Hotchkiss 2000)

### 2.3.1.2 Enabling factors

#### Distance and transportation to health facilities

The long distance and lack of good road networks to health facilities is a major hindrance to the assessment and utilisation of MHC services, therefore women would prefer to patronize the traditional birth attendant who is usually readily available and whose service charges are inexpensive compared to the perceived expensive health facility service (Babalola and Fatusi, 2009).

#### Health insurance policy and coverage

Celik and Hotchkiss (2000) suggested in their work that availability of health insurance increases the tendency to utilise MHC service as their finding correlated with a study that was carried out in 1994 also in Turkey. Arthur (2012) and Gomez et al., (2015) also reported similar findings. Other factors that can be considered enabling factors for maternal health care service utilisation includes delayed administrative processes and treatment, Shortages of qualified staff, previous bad experience at a healthcare facilities, lack of essential drugs and supplies, quality and cost of care, inadequate care, ideal family size and clinical mismanagement. (Chakraborty et al., 2003; Babalola and Fatusi, 2009). Stephenson et al., (2006) carried out a study on the utilisation of healthcare facilities for childbirth in 6 African countries (Malawi, Kenya, Ghana, Tanzania, Burkina Faso and Ivory Coast) using the Demographic and Health Survey data and found out that receiving prenatal care and delivering a previous child in a health facility were consistently related to the decision to deliver subsequent child in a health facility. These two variables show that women who have delivered a child in a health facility are more likely to continue to utilise MHC services for future children irrespective of other factors.

### 2.3.1.3 Need factors

Type/characteristic of diseases and delivery complications can be considered a needs factor for utilising maternal health care services (Chakraborty et al., 2003; Paul and Rumsey, 2002)

El Sheikh and van der Kwaak (2015) carried out a study on factors influencing the utilisation of MHC services by nomads (group of people who usually have no fixed homes and usually move around seasonally in search of food, water, and grazing for their animals) in Sudan and suggested that their mobile lifestyle, low level of education, limited availability of health facilities and health staff at the community level, beliefs, values, gender norms and geographic location has contributed to their particularly low level of maternal health care service utilization. It was also noted that the nomads can afford to pay for the health service but their willingness to pay could not be determined.

Alam *et al.*, (2015) studied six African countries namely Ethiopia, Madagascar, Uganda, Cameroon, Zambia and Zimbabwe to assess the factors responsible for the social inequalities in utilisation of MHC service in these countries using the Demographic and Health Survey data and discovered that governance, socioeconomic, infrastructural and environmental conditions all play important roles in the disparities observed in these countries. This consequently pointing out that the governmental involvement in improving MHC service utilisation cannot be overemphasized. Afulukwe-Eruchalu (2017) tried to explain the unacceptably low level of utilisation of MHC service and the consistently high maternal mortality ratio in Nigeria by carrying out a study to assess the extent of accountability for MHC services in Nigeria and suggested that it is because those responsible to oversee the safeguarding of maternal health in Nigeria have not been held accountable enough and this has inevitably led to the serious infrastructural, financial and institutional barriers that have sustained the high levels of maternal morbidity and mortality in Nigeria. It was also noted that the internal crises that have been ongoing in the country have demoralized the health sectors, subsequently adding up to the high maternal morbidity and mortality trends.

#### **2.4 National Policy on Maternal Healthcare Services**

Nigeria has a National Reproductive Health Working Group that devices, coordinates and facilitates the implementations of reproductive health interventions in the country. The government also has a reproductive health policy carrying out a coordinated maternal, newborn and child health strategy to ensure a continuum of care. It holds a biannual maternal, newborn and child health week in May and November of every year to signify the importance of maternal



and child health at all levels of the healthcare system. The government has recruited midwives and community health extension workers and have trained them on live-saving skilled birth attendant care (National Population Commission and ICF International, 2014). The Nigerian government has also developed some policies to promote maternal and child health. Some of those policies include Maternal and Child Health Policy of 1994, Breastfeeding policy of 1999, National Immunization Policy and Standards Practice of 1996 (USAID, 2002). The existence of these policies shows that there have been steps in the right courses but implementation and sustainability is the greatest challenge facing maternal and child health in Nigeria.

In the light of the above literatures, it is evident that there are abundant studies that have confirmed the influence of factors like maternal education, region, residence, wealth index etc. on MHC services use. Surprisingly not a lot of studies have investigated the influence of preceding child survival on MHC service use. This study therefore intended to fill that gap in knowledge by investigating the influence of preceding child survival on MHC services utilisation.

## CHAPTER THREE

### 3.0 METHODOLOGY

#### 3.1 Study Area

Nigeria lies on the west coast of Africa between latitudes 4° and 14° north and longitude 4° and 14° east. It occupies approximately 923,768 square kilometres of land stretching from the Gulf of Guinea on the Atlantic coast in the south to the fringes of the Sahara Desert in the north. It is bounded in the South by the Atlantic Ocean, in the west by Benin republic in the North by Niger and in the east by Cameroun. Nigeria is the most populous country in Africa and the 14th largest in land mass. The country's current population has been estimated to be 183, 234, 791 (National Population Commission, 2017). Nigeria came into existence as a nation-state in 1914 through the merger of the northern and southern protectorates. Prior to this, there existed various cultures, ethnic groups (such as Oyo empire, Benin, Nupe, Jukun, Kanem-Bornu, and Hausa-Fulani empires and languages such as the (Yorubas, Hausa, etc) These groups lived in kingdoms and emirates with sophisticated systems of government of their own. There were also other strong ethnic groups such as the Igbos, Ibibios, Ijaws, and Tivs. Nigeria became a republic on October 1, 1963, with different administrative structures. Within the boundaries of Nigeria are many social groups with distinct cultural traits; there are about 374 identifiable ethnic groups, with the Hausa, Yoruba, and Igbo as the major groups. Presently, Nigeria is made up of 36 states and a Federal Capital Territory, grouped into six geopolitical zones: North Central, North East, North West, South East, South-South, and South West (National Population Commission and ICF International, 2014).

In Nigeria healthcare provision is the simultaneous responsibility of the three tiers of government which are the federal, state and local governments. The federal government's role is basically to coordinate the affairs of the tertiary healthcare system (comprising of the university teaching hospitals and the federal medical centres). The state's government manages the secondary healthcare system (general hospitals) and the local government manages the primary healthcare systems (which are the dispensaries and health centres) which are still answerable to the federal

government. Although these tiers of government provides health care, the private healthcare providers also play a part because Nigeria operates a mixed economy (Rais, 1991). The country has an healthcare scheme; the Nigerian National Health Insurance Scheme (NHIS) which is a modification of the social health insurance in France and other countries with the same core principles (National Health Insurance Scheme, 2017) . Health care is provided by government through a special health insurance scheme for its employers as well as private firms entering contracts with private health care providers (Ronald, 1993). As far as the government is concerned the scheme also covers children below five years of age, incapacitated persons and prison inmates. This scheme is supposed to ensure easy access to health care for the working population. To gain access to this scheme individuals have to register with NHIS approved Health Maintenance Organization (HMO) which are limited liability companies which may be formed by private or public establishments which have been registered by the NHIS to facilitate the provision of health care benefits to the contributors. Subsequently, the contributors are required to register with a primary health care provider of their choice (private or public) that has been approved by NHIS. In the NHIS scheme 15% (10% from employer and 5% from employee) of the basic salaries of contributors are deducted from which are set aside for unforeseen health needs. These covers only patients registered under the NHIS (Federal Ministry of Health [Nigeria] 2017; National Health Insurance Scheme, 2017)

### 3.2 Data Description

The data for this study were derived from the Nigeria Demographic and Health Survey (NDHS) which was conducted by the National population Commission between February and May 2013. It is the fifth in the series of Demographic and Health Surveys conducted so far in Nigeria: previous surveys were conducted in 1990, 1999, 2003, and 2008. The 2013 NDHS was designed to provide data to monitor the population and health situation in Nigeria with an explicit goal of providing reliable information about maternal, child health and family planning services. The survey provides current information on fertility, marriage, family planning uptake methods, child and maternal health, infant feeding practices, nutritional status of women and children, adult and childhood mortality, issues regarding HIV/ AIDS and domestic violence. The sample for 2013 NDHS was nationally representative and covered the entire population residing in non-institutional dwelling units in the country. The survey used the list of enumeration areas (EAs)

prepared for the 2006 population census of the Federal Republic of Nigeria, provided by the National Population Commission as sampling frame. The sample was designed to provide population and health indicators estimated at the national, zonal, and state levels. The sample design allowed for specific indicators to be calculated for each of the six zone's 36 states and the Federal Capital Territory in Abuja. (National Population Commission and ICF International, 2014).

### 3.3 Data Collection Procedure

Nigeria is divided into states. Each state is subdivided into local government areas (LGAs), and each LGA is divided into localities. In addition to these administrative units, during the 2006 population census, each locality was subdivided into census enumeration areas (EAs). The primary sampling unit (PSU) referred to as cluster in the 2013 NDHS, is defined based on EAs from the 2006 EA census frame. The 2013 NDHS sample was collected using a stratified three-stage cluster design consisting of 904 clusters with a fixed sample take of 45 households selected per cluster, 372 in urban areas and 532 in rural areas. A representative sample of 40,680 households was selected for the survey, with a minimum target of 943 completed interviews per state. All women age 15-49 who were either permanent residents of the households in the 2013 NDHS sample or visitors present in the households on the night before the survey were interviewed (National Population Commission and ICF International, 2014).

### 3.4 Variable Description

Children recode data of the NDHS 2013 was analysed in this study. The outcome variable for this study is utilisation of MHC services (majorly antenatal visits (ANC), postnatal visits (PNC) and the skilled attendant at birth (SAB). All three variables were recoded from existing variables, they were recoded into a yes (1) and no (0) variables, that is yes for having attended or used ANC, SAB or PNC and no for non-use of ANC, SAB or PNC. Antenatal care use variable was derived from the response to questions 408 and 409 on the questionnaire. The questions were "[408] did you see anyone for antenatal care for this pregnancy?" [yes/no], those whose response was yes were then asked "[409] whom did you see" those who confirmed seeing a doctor, nurse or midwife were considered to have received antenatal care. Skilled delivery was obtained from the response to the question [433] which was "who assisted with the delivery of

(NAME)". Those who were assisted by a doctor, nurse or midwife were considered to have had a skilled delivery. Postnatal care was obtained from question [442] which was "*in the two months after (NAME) was born, did any healthcare provider check on his/her health*" women who gave yes response were regarded as having received postnatal care. The independent variables are survival of preceding child as well as other bio-demographic and socioeconomic variables (wealth index, type of residence, level of maternal education, maternal occupation, maternal age at interview, region, partner's level of education, maternal authority on health decisions, health insurance coverage, current marital status, birth order and birth interval. Table 1 shows the variable and how they were recoded.

Table 1: List of variables and their categories.

Variables names	Variables labels	Categories
V012	Current age of respondents	15-19=1, 20-34=2, 35-49=3
V024	Region	NC=1, NE=2, NW=3, SE=4, SS=5, SW=6
V025	Residence	Urban=1, Rural =2
V106	Maternal education	None=0, Primary=1, Secondary=2, Higher=3
V190	Wealth index	Poorest=1, Poorer=2, Middle=3, Richer=4, Richest=5
V481	Health insurance	No=0, Yes=1
V502	Marital status	Currently married=1, Formerly married=2
V701	Partner's education	None=0, Primary=1, Secondary=2, Higher=3
V717	Maternal occupation	None=0, Professional=1, Sales/business=2, Manual=3
V743a	Decision on own health	No=0, Yes=1
Bord	Birth order	1-2=1, 3-4=2, 5+=3
B5	Survival of preceding child	Alive=0, Dead=1
B11	Birth interval	1-23=1, 24+=2
M2b	Antenatal care	No=0, Yes=1
M3b	Skilled delivery	No=0, Yes=1
M70	Postnatal care	No=0, Yes=1

\*NC=North Central, NE=North East, NW=North West, SE= South East, SS=South South, SW=South West,

## 3.5 Method of Analysis

### 3.5.1 Descriptive analysis

Analysis for this study was carried out using the Statistical Package for Social Science (SPSS) software, version 20 and all analyses were carried out at 5% level of significance. The data was weighted before use, the weighted variable was created from v005 (sample weight). The dependent variables were recoded into dichotomous variables having a "Yes" and "No" response. Descriptive analysis was first carried out to observe the association between the predictor variables (preceding child death, bio-demographic and socio-demographic variables) and the outcome variables (ANC, SAB and PNC). As this study focused on survival of preceding child, analysis was restricted to women with second or higher order births because women with first order births do not have preceding child

### 3.5.2 Modelling procedure

Logistic regression models were fitted for this study and four models were considered. Model 1 considered the effect of preceding child death on ANC, SAB and PNC utilisation, model 2 considered the effect of bio-demographic variables on utilisation of ANC, SAB and PNC, model 3 looked at the influence of socio-economic variables on utilisation of ANC, SAB and PNC, model 4 studied the combined effect of all three above on ANC, SAB and PNC utilisation, thereafter regional analyses were carried out for model 1 and 4. The models were mathematically expressed as  $Y = \alpha + \beta X + e$

Where

$Y$  = is a binary variable that takes the values 1 or 0

$\alpha$  = is the intercept

$\beta$  = is the vector of the coefficient to be estimated

$X$  = is a vector of independent variables

$e$  = is the error term

Logistic regression is an analytical method where the dependent variable is a binary variable, because the dependent variable is not a continuous one, the goal of logistic regression is a bit different from linear probability model. It predicts the likelihood that  $Y$  is equal to 1 (rather than

0) given certain values of  $X$ , that is, if  $X$  and  $Y$  have a positive linear relationship, the probability that a person will have a score of  $Y = 1$  will increase as values of  $X$  increases. So, logistic regression predicts probabilities rather than the scores of the dependent variables. To analyze the relationship between a binary outcome and a set of explanatory variables when  $Y$  is binary, assumptions of linear models do not hold. Therefore, the logit model [ $\log\{p/(1-p)\} = \alpha + \beta X + e$ ] solves the problem

Where  $p$  is the probability that the event  $Y$  occurs,  $p(Y=1)$

$p/(1-p)$  is the "odds ratio"

$\ln\{p/(1-p)\}$  is the log odds ratio, or "logit"

Model 1 =  $\ln\{p/(1-p)\} = \alpha + \beta_1 X_1 + e$

Model 2 =  $\ln\{p/(1-p)\} = \alpha + \beta_1 X_1 + \beta_2 X_2 + e$

Model 3 =  $\ln\{p/(1-p)\} = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$

Model 4 =  $\ln\{p/(1-p)\} = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$

Where  $\beta_1 X_1 =$  preceding child death

$\beta_2 X_2 =$  Bio-demographic variables

$\beta_3 X_3 =$  Socio-economic variables

$\beta_4 X_4 =$  Combination of all above

Logistic regression is appropriate for this study because the outcome variables are dichotomous, (Hosmer and Lemeshow, 2013). Odds ratio (OR) and confidence interval (CI) were then interpreted to determine the levels of significance and how the predictor variables explain the outcome variables. (Navaneetham and Dharmalingam, 2002; Paul and Rumsey, 2002)



### 3.6 Ethical Consideration

Nigeria Demographic and Health Survey data 2013 was obtained from demographic and Health Survey (DHS) program website. Formal approval to use the data was obtained from the DHS program. The data was approved by the Nigerian National Health Research Ethics Committee with the references number NHREC 01/01/2007. Also, all the personal identifiers have been removed from the data, therefore, the confidentiality and anonymity of respondents are guaranteed. See appendix 1

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## CHAPTER FOUR

### 4.0 RESULTS

#### 4.1 Summary of Respondent's Background Characteristics

Over half (59.7%) of respondents were between ages 35-49 years. Only 3.4% of the respondents were professional while over 50% were into sales or business. Over 90% of respondents were married as at the time of the survey. Quite a number (67.2%) of the respondent had a birth interval of 24+ months in their last birth in the five years preceding the survey. Most (40.2%) of the respondents had had at least one or two births. The North-West region had the highest number of respondents with 32% while South East had the least with just 9.7% respondents. Almost three quarters (71.9) of the respondents resided in rural areas. Regarding maternal education, over half (52.8%) of the respondents had no formal education while less than 5% (4.6%) had attained a higher degree of education. Respondents' partner's educational attainment was similar to that of the respondents with majority having no formal education. The number of respondents decreased with better wealth quintile. Only 39.8% of respondents confirmed they had a say in issues concerning their health. And finally, a very minute (1.3%) amounts of the respondent confirmed they had health insurance coverage. These results are presented in Table 2.

**Table 2: Summary of respondents' background characteristics, Nigeria. 2013**

Variables	No of women	% of women
<b>Region</b>		
North Central	13643	13.9
North East	16320	16.6
North West	31476	32.0
South East	9552	9.7
South South	12733	12.9
South West	14610	14.9
<b>Type of residence</b>		
Urban	27674	28.1
Rural	70660	71.9
<b>Maternal education</b>		
No education	51944	52.8
Primary	24371	24.8
Secondary	17531	17.8
Higher	4188	4.6
<b>Wealth index</b>		
Poorest	23845	24.2
Poorer	23143	23.5
Middle	19857	20.2
Richer	16913	17.2
Richest	14576	14.8
<b>Decision on own health</b>		
Yes	39155	39.8
<b>Maternal age</b>		
15 to 19	655	0.7
20 to 34	38986	39.6
35 to 49	58694	59.7
<b>Partner's education</b>		
None	43281	44.0
Primary	22676	23.5
Secondary	21031	21.8
Higher	9476	9.8
<b>Maternal occupation</b>		
Not working	23063	23.6
Professional	3300	3.4
Sales/business	59275	60.6

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Manual	12170	12.4
<b>Marital status</b>		
Currently married	92158	94
Formerly married	5839	6
<b>Birth interval</b>		
1 to 23	25710	32.8
24+	52592	67.2
<b>Birth order</b>		
1 to 2	39523	40.2
3 to 4	29025	29.5
5+	29786	30.3
<b>Health insurance</b>		
Yes	1306	1.3

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## 4.2 Pattern of Utilization of ANC, SAB and PNC

As shown in Table 3, the South West region had the highest level of utilization of all three MHC services considered with (ANC=63.5%, SAB=61.7% and PNC= 31%). North West on the other hand had the least of all three MHC services considered (ANC=22.8%, SAB=6.5% and PNC= 5.6%). Urban dwellers utilized the MHC services than the rural dwellers with 57.9%, 50.2% and 21.1% for ANC, SAB and PNC services respectively. Mothers who had attained a higher level of education had the highest utilisation of ANC, SAB and PNC services with 61.3%, 69.3% and 52.0% respectively, while mother who had no formal education had less than 50% utilisation for all MHC services considered. The extent of use of the MHC services increased with better wealth quintile, with those in the richest wealth quintile having the highest utilisation (ANC=60.6%, SAB=66% and PNC=34.9%). 50.2%, 42.4% and 20.5% of women who confirmed they had a say in decisions concerning their health utilized ANC, SAB and PNC services respectively. Mothers in the 20-34 age ranges utilized ANC (40.1%), SAB (29.5%) and PNC (13.1%) services better than the rest. Respondents who had health insurance coverage had a considerable utilisation of all three MHC services (ANC=59.7%, SAB=71.9% and PNC=17.9%). Women whose partners have attained a better level of education utilised ANC, SAB and PNC services more than others with 57.2%, 51.9% and 29.9% respectively. Women who were not into any form of employment had the least utilisation of ANC =32.3%, SAB=19.8% and PNC 10% while their counterpart who are professional workers had the highest extent of use with 62.4%, 66.1% and 28.2% ANC, SAB and PNC respectively. Surprisingly, those who were formerly married utilised ANC (40.7%), SAB (31.5%) and PNC (13.7%) services better than those who were currently married as at the time of the survey. Mothers with over 24 months of birth interval for their last birth in the five years preceding the survey utilised ANC, SAB and PNC more than those with less than 24 months birth interval with 40.2%, 28.8% and 12.4% respectively. And those with lesser birth orders use the MHC (ANC=43%, SAB=35.6% and PNC= 13.5%) services better than those with more birth orders.

**Table 3: Pattern of utilisation of ANC, SAB and PNC, Nigeria, 2013**

Background characteristics	ANC	SAB	PNC
Categories	N (%)	N (%)	N (%)
<b>Region</b>			
North Central	824(39.3)	987(29.4)	169(13.9)
North East	798(33.8)	471(11.4)	257(12.5)
North West	1042(22.8)	513(6.5)	233(5.6)
South East	706(55.1)	1387(58.3)	24(7.2)
South-South	892(49.2)	1442(45.7)	273(30.4)
South West	1518(63.5)	2353(61.7)	203(31.0)
<b>Residence</b>			
Urban	2476(57.9)	3627(50.2)	353(21.1)
Rural	3304(32.3)	3526(20.2)	807(10.6)
<b>Maternal education</b>			
No education	1558(22.4)	971(8.2)	399(6.5)
Primary	1761(50.3)	2021(34.0)	407(19.9)
Secondary	2010(60.4)	3331(58.5)	315(30.9)
Higher	451(61.3)	830(69.3)	39(52.0)
<b>Wealth index</b>			
Poorest	559(16.3)	341(5.9)	190(6.0)
Poorer	945(28.4)	742(13.0)	262(9.6)
Middle	1293(45.9)	1339(27.9)	311(16.9)
Richer	1518(60.3)	2060(48.2)	244(22.8)
Richest	1465(60.6)	2671(66.0)	153(34.9)
<b>Decision on own health</b>			
Yes	2922(50.2)	4098(42.4)	577(20.5)
<b>Maternal age</b>			
15 to 19	74(24.7)	62(10.2)	18(6.9)
20 to 34	3827(40.1)	5044(29.5)	803(13.1)
35 to 49	1879(40.3)	2047(29.3)	339(11.6)
<b>Health insurance</b>			
Yes	111(59.7)	202(71.9)	5(17.9)
<b>Partner's education</b>			
None	1180(21.0)	772(8.2)	270(5.4)
Primary	1492(46.8)	1826(33.0)	305(16.1)
Secondary	2100(54.8)	3117(47.0)	388(23.2)
Higher	888(57.2)	1334(51.9)	156(29.9)
<b>Maternal occupation</b>			
Not working	1293(32.2)	1397(19.8)	306(10.0)
Professional	275(62.4)	468(66.1)	24(28.2)

<b>Sales/business</b>	3248(41.2)	4087(31.1)	658(13.6)
Manual	934(44.6)	1170(32.3)	165(12.7)
<b>Marital status</b>			
Currently married	5571(39.8)	6918(29.0)	1112(12.4)
Formerly married	177(40.7)	202(31.5)	35(13.7)
<b>Birth interval</b>			
1 to 23	1141(38.4)	1419(26.8)	248(12.6)
24+	4627(40.2)	4919(28.8)	910(12.4)
<b>Birth order</b>			
1 to 2	1253(43.0)	2552(35.6)	220(13.5)
3 to 4	2156(42.8)	2570(32.6)	413(14.0)
5+	2372(36.2)	2032(21.2)	527(11.2)



### 4.3 Relationship Between Survival of Preceding Child and ANC, SAB and PNC Utilization

When survival of preceding child was cross-tabulated with ANC, SAB and PNC use. It revealed that mothers who have suffered the death of a previous child utilised MHC services than those who have not. Table 4 shows that mothers with preceding child death utilised 5.8% ANC, 10% SAB, and 2.6% PNC than mothers whose preceding child survived.

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Table 4: Relationship between preceding child status and ANC, SAB and PNC. Nigeria, 2013

		Survival status of the previous child		X <sup>2</sup>	P value
		No	Yes		
ANC	No	1420(65.1)	7311(59.3)	26.1	0.000
	Yes	761(34.9)	501(40.7)		
SAB	No	2907(80.0)	13129(70.0)	148.99	0.000
	Yes	729(20.0)	5633(30.0)		
PNC	No	1426(89.7)	6727(87.1)	8.06	0.005
	Yes	164(10.3)	996(12.9)		

X<sup>2</sup>=chi square. P value < 0.05

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#### 4.4 Regression Results of ANC, SAB, and PNC Utilisation

As seen in Table 5 model I (OR = 1.28, CI = 1.17-1.41) and model II (OR = 1.26, CI = 1.10-1.34) showed that there is a positive association between preceding child death and ANC use for subsequent children, however, model III (OR = 0.96, CI = 0.86-1.06) and IV (OR = 0.94, CI = 0.85-1.05) revealed a negative association between preceding child and ANC use after controlling for socio-economic and bio-demographic variables.

Table 6 shows that the observed association between preceding child death and skilled delivery is positive for all four models. Model I (OR = 1.71, CI = 1.57-1.87) model II (OR = 1.58, CI = 1.48-1.74) model III (OR = 1.09, CI = 0.98-1.22) and model IV (OR = 1.07, CI = 0.96-1.19) after having controlled for socio-economic and bio-demographic variables.

Death of preceding child had positive influence on use of postnatal care for three models; model I (OR = 1.28, CI = 1.08-1.53), model II (OR = 1.26, CI = 1.06-1.51), and model III (OR = 1.06, CI = 0.87-1.24) after controlling for other socio-economic and bio-demographic variables as shown in Table 7.

When all other variables were controlled for, maternal age, region, residence, maternal education, wealth index, the decision on own health, partner's education and maternal occupation were observed to be statistically significant predictors of ANC utilisation. For SAB utilisation, maternal age, birth order, region, residence, maternal education, wealth index, health insurance, the decision on own health, partner's education and maternal occupation were significant explanatory variables. And for PNC utilisation just a few variables including region, residence, maternal education, health index, the decision on own health and partner's education were statistically significant.

Table 5: Regression results of ANC, utilisation, Nigeria, 2013.

ANC	Model I			Model II			Model III			Model IV		
	OR	95% C.I.		OR	95% C.I.		OR	95% C.I.		OR	95% C.I.	
		Lower	Upper		Lower	Upper		Lower	Upper		Lower	Upper
<b>Survival of preceding child</b>												
No	1.28	1.17	1.41*	1.22	1.10	1.34*	.96	.86	1.06	.94	.85	1.05
<b>Bio-demographic variables</b>												
<b>Maternal age</b>												
15-19 (ref)	-	-	-	-	-	-	-	-	-	-	-	-
20-34				2.32	1.77	3.05*				1.07	.79	1.44
35-49				2.88	2.17	3.82*				1.12	.82	1.54
<b>Birth interval (months)</b>												
1-23 (ref)	-	-	-	-	-	-	-	-	-	-	-	-
24+				1.02	.94	1.12				1.08	.98	1.19
<b>Birth order</b>												
1-2 (ref)	-	-	-	-	-	-	-	-	-	-	-	-
3-4				.92	.84	1.01				1.02	.92	1.14
5+				.64	.58	.71*				1.07	.95	1.20
<b>Socio-economic variables</b>												
<b>Region</b>												
North Central (ref)	-	-	-	-	-	-	-	-	-	-	-	-
North East							1.41	1.23	1.62*	1.40	1.22	1.61*
North West							.72	.63	.82*	.71	.63	.81*
South East							1.02	.87	1.19	1.01	.86	1.18
South-South							.85	.74	.98*	.84	.73	.96*
South West							1.57	1.37	1.80*	1.57	1.37	1.80*
<b>Residence</b>												
Urban (ref)	-	-	-	-	-	-	-	-	-	-	-	-
Rural							.71	.65	.78*	.71	.64	.78*
<b>Maternal education</b>												
None (ref)	-	-	-	-	-	-	-	-	-	-	-	-
Primary							1.87	1.67	2.09*	1.87	1.67	2.09*
Secondary							2.07	1.82	2.37*	2.12	1.86	2.42*
Higher							1.92	1.51	2.43*	1.96	1.51	2.48*
<b>Wealth index</b>												
Poorest							.42	.35	.51*	.43	.36	.51*
Poorer							.74	.63	.87*	.75	.64	.88*
Middle							1.19	1.03	1.38*	1.19	1.04	1.39*
Richer							1.46	1.28	1.67*	1.47	1.28	1.67*
Richest (ref)	-	-	-	-	-	-	-	-	-	-	-	-
<b>Decision on own health</b>												
Yes							1.15	1.06	1.25*	1.15	1.06	1.25*

<b>Health insurance</b>												
Yes												
<b>Partner's education</b>												
None (ref)												
Primary												
Secondary												
Higher												
<b>Maternal occupation</b>												
None (ref)												
Professional												
Sales/business												
Manual												
<b>Marital status</b>												
Currently married												

\*=statistically significant (p <0.05)

Table 6: Regression results of SAB utilisation, Nigeria, 2013.

SAB	Model I			Model II			Model III			Model IV		
	OR	95% C.I.		OR	95% C.I.		OR	95% C.I.		OR	95% C.I.	
		Lower	Upper		Lower	Upper		Lower	Upper		Lower	Upper
Survival of preceding child	1.71	1.57	1.87*	1.58	1.44	1.73*	1.09	.98	1.22	1.07	.96	1.19
<b>Bio-demographic variables</b>												
<b>Maternal age</b>												
15-19 (ref)												
20-34				4.71	3.29	6.71*				1.23	.83	1.83
35-49				7.97	5.55	11.45*				1.39	.93	2.09
<b>Birth interval (months)</b>												
1-23 (ref)												
24+				.99	.93	1.07				1.08	.99	1.18
<b>Birth order</b>												
1-2												
3-4				.78	.72	.84*				.94	.85	1.03
5+				.35	.31	.38*				.85	.76	.95*
<b>Socio-economic variables</b>												
<b>Region</b>												

North Central (ref)	-	-	-	-	-	-
North East	.52	.45	.60*	.53	.46	.61*
North West	.24	.21	.28*	.25	.22	.28*
South East	1.69	1.48	1.94*	1.70	1.49	1.95*
South-South	1.07	.94	1.21	1.07	.94	1.21
South West	1.92	1.69	2.16*	1.87	1.66	2.12*
<b>Residence</b>						
Urban(ref)	-	-	-	-	-	-
Rural	.69	.64	.76*	.69	.64	.76*
<b>Maternal education</b>						
None (ref)	-	-	-	-	-	-
Primary	1.76	1.57	1.97*	1.75	1.56	1.96*
Secondary	2.69	2.37	3.05*	2.65	2.34	3.01*
Higher	2.95	2.36	3.68*	2.87	2.29	3.59*
<b>Wealth index</b>						
Poorest	-	-	-	-	-	-
Poorer	.22	.18	.26*	.21	.18	.26*
Middle	.36	.31	.42*	.37	.32	.43*
Richer	.57	.50	.65*	.58	.51	.66*
Richest(ref)	.87	.78	.97*	.86	.78	.98*
<b>Decision on own health</b>						
Yes	1.09	1.01	1.19*	1.09	1.01	1.18*
<b>Health insurance</b>						
Yes	1.65	1.21	2.25*	1.61	1.18	2.19*
<b>Partner's education</b>						
None (ref)	-	-	-	-	-	-
Primary	1.30	1.15	1.47*	1.31	1.15	1.48*
Secondary	1.38	1.22	1.57*	1.38	1.22	1.57*
Higher	1.59	1.36	1.86*	1.60	1.37	1.88*
<b>Maternal occupation</b>						
None (ref)	-	-	-	-	-	-
Professional	.56	.29	1.08	1.09	.86	1.38
Sales/business	.93	.79	1.09	1.17	1.06	1.29*
Manual	1.01	.80	1.26	1.12	.98	1.26
<b>Marital status</b>						
Currently married	1.18	.79	1.75	.84	1.68	1.04

\*=statistically significant ( $p < 0.05$ )

Table 7: Regression results of PNC utilisation, Nigeria, 2013.

PNC	Model I		Model II		Model III		Model IV					
	OR	95% C.I.		OR	95% C.I.		OR	95% C.I.				
		Lower	Upper		Lower	Upper		Lower	Upper			
<b>Survival of preceding child</b>												
No	1.28	1.08	1.53*	1.26	1.06	1.51*	1.06	.87	1.29	.95	.78	1.15
<b>Bio-demographic variables</b>												
<b>Maternal age</b>												
15-19(ref)	-	-	-	-	-	-	-	-	-	-	-	-
20-34				2.43	1.45	4.06*				.71	.39	1.27
35-49				2.48	1.45	4.24*				1.04	.88	1.24
<b>Birth interval</b>												
1-23 (ref)	-	-	-	-	-	-	-	-	-	-	-	-
24+				.93	.79	1.08				1.03	.87	1.22
<b>Birth order</b>												
1-2 (ref)	-	-	-	-	-	-	-	-	-	-	-	-
3-4				.97	.81	1.16				.98	.79	1.21
5+				.74	.61	.89*				1.00	.84	1.19
<b>Socio-economic variables</b>												
<b>Region</b>												
North central (ref)	-	-	-	-	-	-	-	-	-	-	-	-
North East							1.49	1.17	1.89*	1.44	1.15	1.82*
North West							1.69	1.30	2.20*	.52	.41	.66*
South East							.82	.68	.99*	.31	.19	.49*
South West							1.68	1.39	2.02*	1.48	1.17	1.89*
South-South							2.12	1.69	2.66*	1.71	1.32	2.23*
<b>Residence</b>												
Urban (ref)	-	-	-	-	-	-	-	-	-	-	-	-
Rural							5.18	2.76	9.72*	.82	.68	.99*
<b>Maternal education</b>												
None (ref)	-	-	-	-	-	-	-	-	-	-	-	-
Primary							.48	.34	.68*	1.68	1.39	2.03*
Secondary							.64	.47	.88*	2.13	1.70	2.68*
Higher							.91	.68	1.22	5.20	2.77	9.76*
<b>Wealth index</b>												
Poorest							.88	.67	1.17	.48	.35	.69*
Poorer							1.62	1.30	1.87*	.64	.47	.88*
Middle							.50	.22	1.63	.93	.60	1.24

Richer									
Richest (ref)									
Decision on own health									
Yes									
Health insurance									
Yes									
Partners education									
None (ref)									
Primary									
Secondary									
Higher									
Maternal occupation									
None (ref)									
Professional									
Sales/ business									
Manual									
Marital status									
Currently married									

\*=statistically significant (p <0.05)



## 4.5 Regression Results of Regional Analyses

### North Central

Model I and model IV of the North Central zone revealed that the odd of utilization of ANC was higher among women who have suffered the loss of a previous child with OR = 1.03, CI = .80-1.34 and OR = 1.16, CI = .87-1.54 for model I and model IV respectively. Maternal education, wealth index, marital status, partner's education also had a positive influence in the association between preceding child death and ANC use. In the case of skilled delivery only model I showed a positive association. (OR = 1.17, CI = .93-1.48). After controlling for other bio-demographic and socio-economic variables, some variables also had a positive influence on utilization of skilled delivery including maternal age, birth order, maternal education, wealth index, decision on own health, health insurance, partner's education, maternal occupation. Regarding PNC the odd of use was greater for women who had experienced a previous child death for both models. (model I: OR = 2.15, CI = 1.17-3.96. model IV: OR = 1.74, CI = 0.89-3.39). Maternal age, birth interval, birth order, maternal education and other factors also influenced the association positively. Tables 8 to 10 show the results for the North Central regional analysis.

**Table 8: Regression results of ANC utilisation in North Central, Nigeria, 2013.**

North Central ANC	Model I			Model IV		
	OR	95% C.I.		OR	95% C.I.	
		Lower	Upper		Lower	Upper
<b>Survival of preceding child</b>						
No	1.03	.79	1.34	1.16	.87	1.54
<b>Bio-demographic variables</b>						
<b>Maternal age</b>						
15-19 (ref)						
20-34				.66	.31	1.41
35-49				.97	.77	1.24
<b>Birth interval (months)</b>						
1-23 (ref)						
24+				.98	.76	1.26
<b>Birth order</b>						
1-2 (ref)						
3-4				.93	.70	1.25
5+				.79	.62	1.00
<b>Socio-economic variables</b>						
<b>Residence</b>						
Urban (ref)						
Rural				.71	.55	.92*
<b>Maternal education</b>						
None (ref)						
Primary				2.29	1.78	2.95*
Secondary				2.55	1.86	3.49*
Higher				2.05	1.11	3.78*
<b>Wealth index</b>						
Poorest (ref)				.61	.39	.95*
Poorer				.85	.56	1.29
Middle				.91	.62	1.36
Richer				1.8	.80	1.73
Richest						
<b>Decision on own health</b>				.90	.75	1.09
Yes						
<b>Health insurance</b>				.82	.44	1.56
Yes						
<b>Partner's education</b>						
None (ref)						
Primary				1.41	1.06	1.87*
Secondary				1.26	.94	1.68
Higher				1.39	.95	2.04
<b>Maternal occupation</b>						
None (ref)						
Professional				.60	.32	1.13
Sales/business				.73	.58	.92*
Manual				.96	.65	1.43
<b>Marital status</b>						

Currently married

1.75 1.05 2.92\*

\*=statistically significant (p < 0.05)

Table 9: Regression results of SAB utilisation in North Central, Nigeria, 2013

North Central SAB	Model I			Model IV		
	OR	95% C.I.		OR	95% C.I.	
		Lower	Upper		Lower	Upper
<b>Survival of preceding child</b>						
No	1.17	.93	1.48	.86	.66	1.12
<b>Bio-demographic variables</b>						
<b>Maternal age</b>						
15-19 (ref)	-	-	-	-	-	-
20-34				1.54	.75	3.17
35-49				1.66	.78	3.52
<b>Birth interval</b>						
1-23 (ref)						
24+				.92	.73	1.16
<b>Birth order</b>						
1-2 (ref)						
3-4				.92	.72	1.16
5+				1.06	.81	1.39
<b>Socio-economic variables</b>						
<b>Residence</b>						
Urban (ref)						
Rural				.57	.46	.72*
<b>Maternal education</b>						
None (ref)						
Primary				2.32	1.82	2.96*
Secondary				3.29	2.45	4.42*
Higher				4.81	2.72	8.53*
<b>Wealth index</b>						
Poorest				.32	.21	.48*
Poorer				.42	.29	.61*
Middle				.59	.42	.83*
Richer				1.09	.78	1.54
Richest (ref)						
<b>Decision on own health</b>						
Yes				1.12	.93	1.35
<b>Health insurance</b>						
Yes				1.61	.88	2.97
<b>Partner's education</b>						
None (ref)						
Primary				.84	.63	1.11
Secondary				1.37	1.05	1.80
Higher				1.11	.78	1.57
<b>Maternal occupation</b>						
None (ref)						

Currently married

1.75 1.05 2.92\*

\*=statistically significant (p < 0.05)

Table 9: Regression results of SAB utilisation in North Central, Nigeria, 2013

North Central SAB	Model I			Model IV		
	OR	95% C.I.		OR	95% C.I.	
		Lower	Upper		Lower	Upper
<b>Survival of preceding child</b>						
No	1.17	.93	1.48	.86	.66	1.12
<b>Bio-demographic variables</b>						
<b>Maternal age</b>						
15-19 (ref)	-	-	-	-	-	-
20-34				1.54	.75	3.17
35-49				1.66	.78	3.52
<b>Birth interval</b>						
1-23 (ref)						
24+				.92	.73	1.16
<b>Birth order</b>						
1-2 (ref)						
3-4				.92	.72	1.16
5+				1.06	.81	1.39
<b>Socio-economic variables</b>						
<b>Residence</b>						
Urban (ref)						
Rural				.57	.46	.72*
<b>Maternal education</b>						
None (ref)						
Primary				2.32	1.82	2.96*
Secondary				3.29	2.45	4.42*
Higher				4.81	2.72	8.53*
<b>Wealth index</b>						
Poorest				.32	.21	.48*
Poorer				.42	.29	.61*
Middle				.59	.42	.83*
Richer				1.09	.78	1.54
Richest (ref)						
<b>Decision on own health</b>						
Yes				1.12	.93	1.35
<b>Health insurance</b>						
Yes				1.61	.88	2.97
<b>Partner's education</b>						
None (ref)						
Primary				.84	.63	1.11
Secondary				1.37	1.05	1.80
Higher				1.31	.78	1.57
<b>Maternal occupation</b>						
None (ref)						

Professional	1.26	.70	2.25
Sales/business	1.99	1.59	2.50*
Manual	1.52	1.06	2.19*
<b>Marital status</b>			
Currently married	.72	.45	1.15

\*=statistically significant ( $p < 0.05$ )

Table 10: Regression results of PNC utilisation in North Central, Nigeria, 2013

North Central PNC	Model I			Model IV		
	OR	95% C.I.		OR	95% C.I.	
		Lower	Upper		Lower	Upper
<b>Survival of preceding child</b>						
No	2.15	1.17	3.96*	1.74	.89	3.39
<b>Bio-demographic variables</b>						
<b>Maternal age</b>						
15-19 (ref)	-	-	-	-	-	-
20-34				.97	.26	3.60
35-49				1.12	.28	4.48
<b>Birth interval (months)</b>						
1-23(ref)	-	-	-	-	-	-
24+				1.232	.723	2.098
<b>Birth order</b>						
1-2(ref)	-	-	-	-	-	-
3-4				1.02	.61	1.71
5+				1.00	.57	1.76
<b>Socio-economic variables</b>						
<b>Residence</b>						
Urban (ref)	-	-	-	-	-	-
Rural				.68	.41	1.12
<b>Maternal education</b>						
None (ref)	-	-	-	-	-	-
Primary				2.77	1.75	4.39*
Secondary				2.92	1.58	5.39*
Higher				3.38	.73	15.66
<b>Wealth index</b>						
Poorest				.85	.30	2.46
Poorer				1.15	.42	3.20
Middle				.98	.37	2.65
Richer				.97	.36	2.61
Richest (ref)	-	-	-	-	-	-
<b>Decision on own health</b>						
Yes				1.76	1.21	2.58*
<b>Health insurance</b>						
Yes				.89	.05	5.12
<b>Partner's education</b>						
None (ref)	-	-	-	-	-	-
Primary				2.60	1.53	4.40*

Secondary	1.69	.95	3.00
Higher	2.92	1.38	6.19*
<b>Maternal occupation</b>			
None (ref)			
Professional	.38	.07	2.14
Sales/business	.37	.25	.54*
Manual	.71	.34	1.48
<b>Marital status</b>			
Currently married	.48	.20	1.19

\*=statistically significant ( $p < 0.05$ )

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## North East

These results are presented in Tables 11 to 13. It is only model I that revealed a positive association (OR=1.07, CI. 0.86-1.33) between ANC and preceding child death. On the other hand, both models showed positive association (model I: OR=1.88, CI=1.39-2.54, model IV: OR=1.26, CI= 0.89-1.76) between SAB and preceding child death. Similarly, both models showed that preceding child death increased the odds of utilization of PNC in the North-East region (model I:OR= 1.01, CI= 0.72-1.40 and model IV: OR= 1.00, CI= 0.70-1.44). Maternal education, birth order, partner's education and decision on own health among others were also positively associated with preceding child death and PNC.

Table 11: Regression results of ANC utilisation in North East, Nigeria, 2013.

North East ANC	Model I			Model IV		
	OR	95% C.I.		OR	95% C.I.	
		Lower	Upper		Lower	Upper
<b>Survival of preceding child</b>						
No	1.07	.86	1.33	.94	.73	1.21
<b>Bio-demographic variables</b>						
<b>Maternal age</b>						
15-19 (ref)	-	-	-	-	-	-
20-34	-	-	-	.867	.49	1.52
35-49	-	-	-	.74	.40	1.37
<b>Birth interval (months)</b>						
1-23 (ref)	-	-	-	-	-	-
24+	-	-	-	.93	.73	1.18
<b>Birth order</b>						
1-2 (ref)	-	-	-	-	-	-
3-4	-	-	-	1.05	.77	1.43
5+	-	-	-	1.17	.86	1.61
<b>Socio-economic variables</b>						
<b>Residence</b>						
Urban (ref)	-	-	-	-	-	-
Rural	-	-	-	.53	.41	.68*
<b>Maternal education</b>						
None (ref)	-	-	-	-	-	-
Primary	-	-	-	1.74	1.34	2.27*
Secondary	-	-	-	2.52	1.72	3.71*
Higher	-	-	-	3.78	1.36	10.48*
<b>Wealth index</b>						
Poorest	-	-	-	.15	.07	.29*
Poorest	-	-	-	.33	.17	.67*
Middle	-	-	-	.45	.23	.89*
Richer	-	-	-	.68	.34	1.37
Richest (ref)	-	-	-	-	-	-
<b>Decision on own health</b>						
Yes	-	-	-	1.18	.95	1.46
<b>Health insurance</b>						
Yes	-	-	-	2.42	.14	42.14
<b>Partner's education</b>						



None (ref)			
Primary	1.62	1.24	2.12*
Secondary	1.59	1.19	2.16*
Higher	.94	.60	1.47
<b>Maternal occupation</b>			
None (ref)			
Professional	1.44	.49	4.27
Sales/business	1.18	.94	1.47
Manual	1.55	1.15	2.09
<b>Marital status</b>			
Currently married	1.27	.68	2.38

\*=statistically significant (P < 0.05)

Table 12: Regression results of SAB utilisation in North East, Nigeria, 2013.

North East SAB	Model I			Model IV		
	OR	95% C.I.		OR	95% C.I.	
		Lower	Upper		Lower	Upper
<b>Survival of preceding child</b>						
No	1.88	1.39	2.54*	1.26	.89	1.76
<b>Bio-demographic variables</b>						
<b>Maternal age</b>						
15-19 (ref)						
20-34				.91	.38	2.21
35-49				.96	.38	2.43
<b>Birth interval (months)</b>						
1-23 (ref)						
24+				1.31	.98	1.75
<b>Birth order</b>						
1-2 (ref)						
3-4				1.09	.77	1.54
5+				.94	.65	1.35
<b>Socio-economic variables</b>						
<b>Residence</b>						
Urban (ref)						
Rural				.57	.42	.77*
<b>Maternal education</b>						
None (ref)						
Primary				1.83	1.36	2.48*

Secondary	2.51	1.73	3.64*
Higher	5.78	2.48	13.47*
<b>Wealth index</b>			
Poorest	.05	.03	.09*
Poorer	.13	.07	.22*
Middle	.20	.12	.34*
Richer	.47	.29	.78*
Richest(ref)	-	-	-
<b>Decision on own health</b>			
Yes	1.61	1.25	2.08*
<b>Health insurance</b>			
Yes	1.39	.26	7.42
<b>Partner's education</b>			
None (ref)	-	-	-
Primary	1.45	1.03	2.04*
Secondary	1.51	1.08	2.11*
Higher	1.51	.99	2.30*
<b>Maternal occupation</b>			
None (ref)	-	-	-
Professional	1.76	.74	4.20
Sales/business	1.17	.89	1.55
Manual	.75	.53	1.09
<b>Marital status</b>			
Currently married	.68	.34	1.35

\*=statistically significant ( $p < 0.05$ )

Table 13: Regression results of PNC utilisation in North East, Nigeria, 2013.

North East PNC	Model I		Model IV			
	OR	95% C.I.	OR	95% C.I.		
		Lower		Upper	Lower	Upper
Survival of preceding child						
No	1.01	.72	1.40	1.00	.70	1.44
<b>Bio-demographic variables</b>						
<b>Maternal age</b>						
15-19 (ref)						
20-34			1.40	.54		3.64
35-49			1.38	.43		3.26
<b>Birth interval</b>						

Secondary	2.51	1.73	3.64*
Higher	5.78	2.48	13.47*
<b>Wealth index</b>			
Poorest	.05	.03	.09*
Poorer	.13	.07	.22*
Middle	.20	.12	.34*
Richer	.47	.29	.78*
Richest(ref)	-	-	-
<b>Decision on own health</b>			
Yes	1.61	1.25	2.08*
<b>Health insurance</b>			
Yes	1.39	.26	7.42
<b>Partner's education</b>			
None (ref)	-	-	-
Primary	1.45	1.03	2.04*
Secondary	1.51	1.08	2.11*
Higher	1.51	.99	2.30*
<b>Maternal occupation</b>			
None (ref)	-	-	-
Professional	1.76	.74	4.20
Sales/business	1.17	.89	1.55
Manual	.75	.53	1.09
<b>Marital status</b>			
Currently married	.68	.34	1.35

\*=statistically significant ( $p < 0.05$ )

Table 13: Regression results of PNC utilisation in North East, Nigeria, 2013.

North East PNC	Model I		OR	Model IV		
	OR	95% C.I.		95% C.I.	Upper	
		Lower				Lower
Survival of preceding child						
No	1.01	.72	1.40	1.00	.70	1.44
<b>Bio-demographic variables</b>						
<b>Maternal age</b>						
15-19 (ref)						
20-34			1.40	.54		3.61
35-49			1.18	.43		3.26
<b>Birth interval</b>						

Secondary	2.51	1.73	3.64*
Higher	5.78	2.48	13.47*
<b>Wealth index</b>			
Poorest	.05	.03	.09*
Poorer	.13	.07	.22*
Middle	.20	.12	.34*
Richer	.47	.29	.78*
Richest(ref)	-	-	-
<b>Decision on own health</b>			
Yes	1.61	1.25	2.08*
<b>Health insurance</b>			
Yes	1.39	.26	7.42
<b>Partner's education</b>			
None (ref)	-	-	-
Primary	1.45	1.03	2.04*
Secondary	1.51	1.08	2.11*
Higher	1.51	.99	2.30*
<b>Maternal occupation</b>			
None (ref)	-	-	-
Professional	1.76	.74	4.20
Sales/business	1.17	.89	1.55
Manual	.75	.53	1.09
<b>Marital status</b>			
Currently married	.68	.34	1.35

\*=statistically significant ( $p < 0.05$ )

Table 13: Regression results of PNC utilisation in North East, Nigeria, 2013.

North East PNC	Model I		OR	Model IV		
	OR	95% C.I.		95% C.I.	Upper	
		Lower				Upper
Survival of preceding child	1.01	.72	1.40	1.00	.70	1.44
<b>Bio-demographic variables</b>						
<b>Maternal age</b>						
15-19 (ref)	-	-	-	-	-	-
20-34	1.40	.54	3.64			
35-49	1.18	.43	3.26			
<b>Birth interval</b>						

<b>(months)</b>					
1-23 (ref)	-	-	-	-	-
24+		.86	.61		1.19
<b>Birth order</b>					
1-2 (ref)	-	-	-	-	-
3-4		1.05	.67		1.65
5+		1.14	.73		1.79
<b>Socio-economic variables</b>					
<b>Residence</b>					
Urban (ref)	-	-	-	-	-
Rural		.73	.50		1.06
<b>Maternal education</b>					
None (ref)	-	-	-	-	-
Primary		1.60	1.11		2.30*
Secondary		1.78	1.06		3.01*
Higher		1.86	.16		22.16
<b>Wealth index</b>					
Poorest		.34	.11		1.07
Poorer		.55	.18		1.70
Middle		.65	.21		1.95
Richer		.69	.22		2.14
Richest (ref)	-	-	-	-	-
<b>Decision on own health</b>					
Yes		1.79	1.32		2.42*
<b>Health insurance</b>					
Yes		.66	.09		6.12
<b>Partner's education</b>					
None (ref)	-	-	-	-	-
Primary		1.36	.92		1.99
Secondary		1.55	1.02		2.36*
Higher		1.76	.96		3.25
<b>Maternal occupation</b>					
None (ref)	-	-	-	-	-
Professional		2.56	.18		36.30
Sales/business		1.51	1.07		2.12*
Manual		1.69	1.09		2.62*
<b>Marital status</b>					
Currently married		.59	.27		1.31

\*=statistically significant ( $p < 0.05$ )

## North West

As observed in Tables 14 to 15, there was a positive association between preceding child death and ANC for both models (model I:OR = 1.23, CI = 1.02-1.48, and model IV: OR = 1.14, CI= 0.92-1.42) as well as SAB (model I: OR= 1.33, CI = 0.93-1.77 and model IV: OR.1.3, CI= 0.99-1.77). Analysis however, showed that there is no positive association between preceding child death and PNC utilisation.

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Table 14: Regression results of ANC utilisation in North West, Nigeria, 2013.

North West ANC	Model I			Model IV		
	OR	95% C.I.		OR	95% C.I.	
		Lower	Upper		Lower	Upper
<b>Survival of preceding child</b>						
No	1.23	1.02	1.48*	1.14	.92	1.41
<b>Bio-demographic variables</b>						
<b>Maternal age</b>						
15-19 (ref)	-	-	-	-	-	-
20-34				.91	.55	1.52
35-49				1.05	.60	1.82
<b>Birth interval (months)</b>						
1-23 (ref)	-	-	-	-	-	-
24+				1.32	1.08	1.61*
<b>Birth order</b>						
1-2 (ref)	-	-	-	-	-	-
3-4				1.21	.94	1.56
5+				1.08	.83	1.41
<b>Socio-economic variables</b>						
<b>Residence</b>						
Urban (ref)	-	-	-	-	-	-
Rural				.46	.37	.58*
<b>Maternal education</b>						
None (ref)	-	-	-	-	-	-
Primary				2.06	1.66	2.56*
Secondary				2.27	1.67	3.09*
Higher				4.02	2.03	7.96*
<b>Wealth index</b>						
Poorest				.30	.19	.47*
Poorer				.58	.39	.85*
Middle				1.24	.85	1.79
Richer				1.36	.95	1.95
Richest (ref)	-	-	-	-	-	-
<b>Decision on own health</b>						
Yes				1.14	.93	1.40

<b>Health insurance</b>				
Yes		.94	.33	2.69
<b>Partner's education</b>				
None (ref)	-	-	-	-
Primary		1.72	1.37	2.15*
Secondary		2.33	1.83	2.97*
Higher		1.73	1.27	2.36*
<b>Maternal occupation</b>				
None (ref)	-	-	-	-
Professional		.59	.29	1.19
Sales/business		1.16	.96	1.39
Manual		1.09	.87	1.38
<b>Marital status</b>				
Currently married		.70	.42	1.19

\*=statistically significant ( $p < 0.05$ )

Table 15: Regression results of SAB utilisation in North West, Nigeria, 2013.

North West SAB	Model I		Model IV			
	OR	95% C.I.		OR	95% C.I.	
		Lower	Upper		Lower	Upper
<b>Survival of preceding child</b>						
No	1.31	1.02	1.69*	1.33	.99	1.77
<b>Bio-demographic variables</b>						
<b>Maternal age</b>						
15-19 (ref)	-	-	-	-	-	-
20-34				1.51	.61	3.78
35-49				1.88	.73	4.88
<b>Birth interval (months)</b>						
1-23 (ref)	-	-	-	-	-	-
24+				1.38	1.06	1.79*
<b>Birth order</b>						
1-2 (ref)	-	-	-	-	-	-
4-Mar				.81	.59	1.11
5+				.91	.66	1.27



Socio-economic variables					
<b>Residence</b>					
Urban (ref)	-	-	-	-	-
Rural		.61	.47	.79*	
<b>Maternal education</b>					
None (ref)	-	-	-	-	-
Primary		.85	.62	1.17	
Secondary		1.90	1.37	2.65*	
Higher		2.64	1.47	4.73*	
<b>Wealth index</b>					
Poorest		.07	.04	.13*	
Poorer		.15	.09	.23*	
Middle		.31	.21	.45*	
Richer		.55	.39	.76*	
Richest (ref)	-	-	-	-	-
<b>Decision on own health</b>					
Yes		1.25	.96	1.62	
<b>Health insurance</b>					
Yes		.62	.24	1.58	
<b>Partner's education</b>					
None (ref)	-	-	-	-	-
Primary		1.17	.83	1.67	
Secondary		1.65	1.19	2.29*	
Higher		2.09	1.48	2.98*	
<b>Maternal occupation</b>					
None (ref)	-	-	-	-	-
Professional		1.83	.99	3.38	
Sales/business		1.06	.83	1.35	
Manual		.82	.60	1.12	
<b>Marital status</b>					
Currently married		.91	.48	1.75	

\* =statistically significant (p < 0.05)

Table 16: Regression results of PNC utilisation in North West, Nigeria, 2013.

North West PNC	Model I			Model IV		
	OR	95% C.I.		OR	95% C.I.	
		Lower	Upper		Lower	Upper
Survival of preceding child						
No	.98	.70	1.37	.75	.51	1.11
<b>Bio-demographic variables</b>						
<b>Maternal age</b>						
15-19 (ref)	-	-	-	-	-	-
20-34				.92	.38	2.24
35-49				.82	.31	2.16
<b>Birth interval (months)</b>						
1-23 (ref)	-	-	-	-	-	-
24+				.77	.55	1.09
<b>Birth order</b>						
1-2 (ref)	-	-	-	-	-	-
3-4				1.22	.77	1.95
5+				1.21	.75	1.96
<b>Socio-economic variables</b>						
<b>Residence</b>						
Urban (ref)	-	-	-	-	-	-
Rural				1.05	.69	1.59
<b>Maternal education</b>						
None (ref)	-	-	-	-	-	-
Primary				2.04	1.39	2.97*
Secondary				3.67	2.26	5.96*
Higher				19.38	5.31	70.74*
<b>Wealth index</b>						
Poorest				.49	.22	1.10
Poorer				.75	.36	1.56
Middle				1.67	.86	3.27
Richer				.99	.52	1.92
Richest (ref)	-	-	-	-	-	-
<b>Decision on own health</b>						
Yes				2.09	1.49	2.92*

<b>Health insurance</b>			
Yes	.68	.08	6.14
<b>Partner's education</b>			
None (ref)	-	-	-
Primary	1.29	.82	2.06
Secondary	2.98	1.96	4.54*
Higher	4.47	2.71	7.37*
<b>Maternal occupation</b>			
None (ref)	-	-	-
Professional	.13	.02	.79*
Sales/business	1.49	1.06	2.09*
Manual	.91	.58	1.43
<b>Marital status</b>			
Currently married	2.33	.60	8.97

\*=statistically significant (p < 0.05)

## South East

Here only model IV showed a positive association (OR= 1.12, CI = 0.23-5.37) between ANC and preceding child death, However, both models of SAB (model I: OR=1.13, CI = 0.89-1.44 and model IV OR= 1.12, CI= 0.23-5.37). and PNC (model I:OR = 1.86, CI = 0.46-7.45, model IV: OR= 1.09, CI= 0.81-1.49)revealed a positive association with preceding child death.. Other variables including maternal education, wealth, decision on own health, partner's education and maternal occupation also influenced MHC service utilization. Tables 17 to 19 show the results for the South East regional analysis.

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Table 17: Regression results of ANC utilisation in South East, Nigeria, 2013.

South East ANC	Model I			Model IV		
	OR	95% C.I.		OR	95% C.I.	
		Lower	Upper		Lower	Upper
Survival of preceding child						
No	.95	.69	1.29	1.12	.23	5.37
<b>Bio-demographic variables</b>						
<b>Maternal age</b>						
15-19(ref)	-	-	-	-	-	-
20-34				5.28	.59	47.21
35-49				5.06	.56	45.97
<b>Birth interval (months)</b>						
1-23 (ref)	-	-	-	-	-	-
24+				.83	.27	2.53
<b>Birth order</b>						
1-2 (ref)				.82	.21	3.19
4-Mar				.82	.18	3.82
5+						
<b>Socio-economic variables</b>						
<b>Residence</b>						
Urban (ref)				.33	.11	.94*
Rural						
<b>Maternal education</b>						
None (ref)				1.40	.31	6.38
Primary				.76	.12	4.89
Secondary				2.14	.09	52.18
Higher						
<b>Wealth index</b>						
Poorest				.16	.01	3.03
Poorer				.78	.11	5.38
Middle				1.20	.22	6.59
Richer				.24	.04	1.61
Richest (ref)						
<b>Decision on own health</b>						
Yes				1.40	.40	3.03
<b>Health insurance</b>						
Yes				.54	.28	.91

<b>Partner's education</b>				
None (ref)	-	-	-	-
Primary	3.09	.379	25.33	
Secondary	5.559	.55	55.863	
Higher	5.57	.23	137.79	
<b>Maternal occupation</b>				
None (ref)	-	-	-	-
Professional	1.99	.19	21.49	
Sales/business	.18	.06	.59*	
Manual	.26	.05	1.45	
<b>Marital status</b>				
Currently married	.75	.09	5.83	

\*=statistically significant (p < 0.05)

Table 18: Regression results of SAB utilisation in South East, Nigeria, 2013.

South East SAB	Model I			Model IV		
	OR	95% C.I.		OR	95% C.I.	
		Lower	Upper		Lower	Upper
<b>Survival of preceding child</b>						
No	1.13	.89	1.44	1.12	.23	5.37
<b>Bio-demographic variables</b>						
<b>Maternal age</b>						
15-19 (ref)	-	-	-	-	-	-
20-34				.31	.05	1.86
35-49				.38	.06	2.29
<b>Birth interval (months)</b>						
1-23 (ref)	-	-	-	-	-	-
24+				.83	.27	2.53
<b>Birth order</b>						
1-2 (ref)	-	-	-	-	-	-
3-4				.82	.21	3.19
5+				.82	.18	3.82
<b>Socio-economic variables</b>						
<b>Residence</b>						

Urban (ref)	-	-	-
Rural	.33	.12	.94*
<b>Maternal education</b>			
None (ref)	-	-	-
Primary	1.40	.31	6.38
Secondary	.76	.12	4.89
Higher	2.14	.09	52.18
<b>Wealth index</b>			
Poorest	.16	.01	3.03
Poorer	.78	.11	5.38
Middle	1.20	.22	6.59
Richer	.24	.04	1.61
Richest (ref)	-	-	-
<b>Decision on own health</b>			
Yes	1.40	.49	3.93
<b>Health insurance</b>			
Yes	1.27	.72	2.21
<b>Partner's education</b>			
None (ref)	-	-	-
Primary	3.09	.38	25.33
Secondary	5.56	.55	55.86
Higher	5.57	.23	137.79
<b>Maternal occupation</b>			
None (ref)	-	-	-
Professional	1.99	.19	21.49
Sales/business	.18	.06	.59*
Manual	.26	.05	1.45
<b>Marital status</b>			
Currently married	.75	.09	5.83

\*statistically significant ( $p < 0.05$ )

Table 19: Regression results PNC utilisation in South East, Nigeria, 2013.

South East PNC	Model I			Model IV		
	OR	95% C.I.		OR	95% C.I.	
		Lower	Upper		Lower	Upper
Survival of preceding child	1.86	.46	7.45	1.12	.23	5.37
No						
<b>Bio-demographic variables</b>						
<b>Maternal age</b>						
15-19 (ref)						
20-34				.33	.06	1.87
35-49				.39	.07	2.29
<b>Birth interval</b>						
1-23 (ref)						
24+				.83	.27	2.53
<b>Birth order</b>						
1-2 (ref)						
3-4				.82	.21	3.19
5+				.82	.18	3.82
<b>Socio-economic variables</b>						
<b>Residence</b>						
Urban (ref)						
Rural				.33	.12	.94
<b>Maternal education</b>						
None (ref)						
Primary				1.40	.31	6.38
Secondary				.76	.12	4.89
Higher				2.14	.09	52.18
<b>Wealth index</b>						
Poorest				.16	.01	3.03
Poorer				.78	.11	5.38
Middle				1.20	.22	6.59
Richer				.24	.04	1.61
Richest (ref)						
<b>Decision on own health</b>						
Yes				1.40	.40	3.93
<b>Health insurance</b>						
Yes				1.01	.23	5.34



**Partner's education**

None (ref)	-	-	-
Primary	3.09	.38	25.33
Secondary	5.56	.55	55.86
Higher	5.57	.23	137.79
<b>Maternal occupation</b>			
None (ref)	-	-	-
Professional	1.99	.19	21.47
Sales/business	.18	.06	.59*
Manual	.26	.05	1.45
<b>Marital status</b>			
Currently married	.75	.09	5.83

\*=statistically significant (p < 0.05)

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**Partner's education**

None (ref)			
Primary	3.09	.38	25.33
Secondary	5.56	.55	55.86
Higher	5.57	.23	137.79
<b>Maternal occupation</b>			
None (ref)			
Professional	1.99	.19	21.47
Sales/business	.18	.06	.59*
Manual	.26	.05	1.45
<b>Marital status</b>			
Currently married	.75	.09	5.83

\*=statistically significant (p < 0.05)

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## South-South

Both models revealed positive association between preceding child death and ANC (model I: OR= 1.23, CI = 0.93-1.63, model IV: OR= 1.09, CI = 0.81-1.49), SAB (model I: OR= 1.41, CI= 1.38-1.74, model IV (OR= 1.18, CI= 0.92-1.50) and PNC (model I: OR= 1.38, CI= 0.91-2.12, model IV: OR= 1.22, CI= 0.77-1.94) utilisation. Table 20 to 22 show the results for the South-South regional analysis.

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## Regression results of ANC utilisation in South-South, Nigeria, 2013.

South-South ANC	Model I			Model IV		
	OR	95% C.I.		OR	95% C.I.	
		Lower	Upper		Lower	Upper
Survival of preceding child	1.23	.93	1.63	1.09	.81	1.49
No						
Maternal age						
15-19 (ref)						
20-34				3.47	.69	17.48
35-49				3.31	.65	16.95
Birth interval (month)						
1-23 (ref)						
24+				1.12	.87	1.43
Birth order						
1-2 (ref)						
3-4				.83	.63	1.08
5+				.99	.73	1.35
Residence						
Urban (ref)						
Rural				.78	.60	1.01
Maternal education						
None (ref)				1.86	1.20	2.88*
Primary*				2.89	1.84	4.54*
Secondary*				1.19	.62	2.29
Higher						
Wealth index				1.06	.66	1.70
Poorest				1.68	1.07	2.63*
Poorer				2.21	1.40	3.48*
Middle				1.85	1.12	3.06*
Richer						
Richest (ref)						
Decision on own health				1.55	1.25	1.92*
Yes						
Health insurance				.53	.29	.98*
Yes						
Partner's education						
None (ref)				1.04	.65	1.66
Primary				1.02	.64	1.64
Secondary				1.27	.74	2.18
Higher						
Maternal occupation						

None (ref)	-	-	-
Professional	1.75	.92	3.32
Sales/business	.92	.69	1.22
Manual	1.41	.96	2.06
Marital status			
Currently married	1.31	.78	2.20

\*=statistically significant (p < 0.05)

Table 21: Regression results of SAB utilisation in South-South, Nigeria, 2013.

South-South SAB	OR	Model I		OR	Model IV	
		95% C.I.			95% C.I.	
		Lower	Upper		Lower	Upper
Survival of preceding child						
No	1.41	1.14	1.74*	1.18	.92	1.50
<b>Bio-demographic variables</b>						
<b>Maternal age</b>						
15-19 (ref)	-	-	-	-	-	-
20-34				6.33	.88	45.76
35-49				6.48	.89	47.28
<b>Birth interval (months)</b>						
1-23(ref)	-	-	-	-	-	-
24+				1.16	.95	1.41
<b>Birth order</b>						
1-2 (ref)	-	-	-	-	-	-
3-4				.83	.67	1.04
5+				.69	.54	.89*
<b>Socio-economic variables</b>						
<b>Residence</b>						
Urban (ref)	-	-	-	-	-	-
Rural				.65	.52	.79*
<b>Maternal education</b>						
None (ref)	-	-	-	-	-	-
Primary				1.67	1.14	2.45*
Secondary				2.91	1.97	4.29*
Higher				3.03	1.69	5.40*
<b>Wealth index</b>						
Poorest				1.22	.81	1.83

Poorer	1.54	1.05	2.28*
Middle	2.33	1.58	3.43*
Richer	3.91	2.55	5.99*
Richest (ref)	-	-	-
<b>Decision on own health</b>			
Yes	.93	.78	1.12
<b>Health insurance</b>			
Yes	1.25	.71	2.21
<b>Partner's education</b>			
None (ref)	-	-	-
Primary	.61	.41	.90*
Secondary	.68	.46	.99*
Higher	.75	.48	1.19
<b>Maternal occupation</b>			
None (ref)	-	-	-
Professional	1.03	.59	1.82
Sales/ business	1.17	.93	1.48
Manual	1.94	1.40	2.67*
<b>Marital status</b>			
Currently married	1.14	.71	1.81

\*=statistically significant (p < 0.05)

Table 22: Regression results of PNC utilisation in South-South, Nigeria, 2013.

South-South PNC	Model I		Model IV			
	OR	95% C.I.		OR	95% C.I.	
		Lower	Upper		Lower	Upper
Survival of preceding child						
No	1.39	.91	2.18	1.22	.77	1.94
<b>Bio-demographic variables</b>						
<b>Maternal age</b>						
15-19 (ref)	-	-	-	-	-	-
20-34				6.44	.89	45.89
35-49				6.49	.89	47.29
<b>Birth interval</b>						
1-23 (ref)	-	-	-	-	-	-
24+				1.23	.84	1.81
<b>Birth order</b>						
1-2 (ref)	-	-	-	-	-	-

3-4			.68	.44	1.05
5+			.59	.37	.97*
<b>Socio-economic variables</b>					
<b>Residence</b>					
Urban (ref)	-	-	-	-	-
Rural			.93	.58	1.51
<b>Maternal education</b>					
None (ref)	-	-	-	-	-
Primary			.99	.56	1.73
Secondary			1.12	.61	2.06
Higher			1.19	.23	5.25
<b>Wealth index</b>					
Poorest			.74	.34	1.60
Poorer			.40	.21	.78*
Middle			.95	.53	1.70
Richer			1.06	1.61	1.87*
Richest(ref)	-	-	-	-	-
<b>Decision on own health</b>					
Yes			1.35	.96	1.88
<b>Health insurance</b>					
Yes			1.04	.21	5.33
<b>Partner's education</b>					
None (ref)	-	-	-	-	-
Primary			4.13	1.69	10.06*
Secondary			4.01	1.64	9.79*
Higher			6.83	2.51	18.58*
<b>Maternal occupation</b>					
None (ref)			1.466	.318	6.755
Professional			1.077	.696	1.667
Sales/business			1.171	.608	2.257
Manual					
<b>Marital status</b>					
Currently married			.678	.320	1.439

\*=statistically significant ( $p < 0.05$ )

## South West

Surprisingly, the analysis revealed that only SAB had a positive association with previous child death (model: OR= 1.39, CI = 0.91-2.12, model IV: OR= 1.22, CI= 0.77-1.94). Other socioeconomic and bio-demographic variables such as maternal education, partner's education, wealth index, maternal occupation and also had a positive association with MHC services utilization. Tables 23 to 25 shows the results for the South West regional analysis.

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Table 23: Regression results of ANC utilisation in South West, Nigeria, 2013.

South West ANC	Model I			Model IV		
	OR	95% C.I.		OR	95% C.I.	
		Lower	Upper		Lower	Upper
Survival of preceding child						
No	.91	.67	1.22	.96	.69	1.32
<b>Bio-demographic variables</b>						
<b>Maternal age</b>						
15-19 (ref)	-	-	-	-	-	-
20-34				.29	.05	1.77
35-49				.38	.06	2.29
<b>Birth interval</b>						
1-23 (ref)	-	-	-	-	-	-
24+				1.02	.79	1.31
<b>Birth order</b>						
1-2 (ref)	-	-	-	-	-	-
3-4				1.08	.87	1.35
5+				.99	.75	1.30
<b>Socio-economic variables</b>						
<b>Residence</b>						
Urban (ref)	-	-	-	-	-	-
Rural				1.10	.88	1.39
<b>Maternal education</b>						
None (ref)	-	-	-	-	-	-
Primary				1.40	1.03	1.90*
Secondary				1.44	1.05	1.99*
Higher				2.43	1.44	4.09*
<b>Wealth index</b>						
Poorest				.76	.48	1.22
Poorer				.89	.63	1.29
Middle				1.26	.91	1.73
Richer				1.36	1.07	1.73*
Richest (ref)	-	-	-	-	-	-
<b>Decision on own health</b>						
Yes				1.24	1.02	1.50*
<b>Health insurance</b>						
Yes				1.47	.72	3.00
<b>Partner's education</b>						
None (ref)	-	-	-	-	-	-
Primary				1.59	1.15	2.20*
Secondary				1.68	1.21	2.33*

Table 23: Regression results of ANC utilisation in South West, Nigeria, 2013.

South West ANC	Model I			Model IV		
	OR	95% C.I.		OR	95% C.I.	
		Lower	Upper		Lower	Upper
Survival of preceding child						
No	.91	.67	1.22	.96	.69	1.32
<b>Bio-demographic variables</b>						
<b>Maternal age</b>						
15-19 (ref)	-	-	-	-	-	-
20-34				.29	.05	1.77
35-49				.38	.06	2.29
<b>Birth interval</b>						
1-23 (ref)	-	-	-	-	-	-
24+				1.02	.79	1.31
<b>Birth order</b>						
1-2 (ref)	-	-	-	-	-	-
3-4				1.08	.87	1.35
5+				.99	.75	1.30
<b>Socio-economic variables</b>						
<b>Residence</b>						
Urban (ref)	-	-	-	-	-	-
Rural				1.10	.88	1.39
<b>Maternal education</b>						
None (ref)	-	-	-	-	-	-
Primary				1.40	1.03	1.90*
Secondary				1.44	1.05	1.99*
Higher				2.43	1.44	4.09*
<b>Wealth index</b>						
Poorest				.76	.48	1.22
Poorer				.89	.63	1.29
Middle				1.26	.91	1.73
Richer				1.36	1.07	1.73*
Richest (ref)	-	-	-	-	-	-
<b>Decision on own health</b>						
Yes				1.24	1.02	1.50*
<b>Health insurance</b>						
Yes				1.47	.72	3.00
<b>Partner's education</b>						
None (ref)	-	-	-	-	-	-
Primary				1.50	1.15	2.20*
Secondary				1.08	1.21	2.33*

Higher	1.40	.92	2.13
<b>Maternal occupation</b>			
None (ref)	-	-	-
Professional	1.39	.82	2.36
Sales/business	1.29	.96	1.74
Manual	1.38	.98	1.95
<b>Marital status</b>			
Currently married	1.66	.89	3.07

\*=statistically significant ( $p < 0.05$ )

**Table 24:** Regression results of SAB utilisation in South West, Nigeria, 2013.

South West SAB	Model I			Model IV		
	OR	95% C.I.		OR	95% C.I.	
		Lower	Upper		Lower	Upper
<b>Survival of preceding child</b>						
No	1.44	1.13	1.83*	1.39	1.07	1.80*
<b>Bio-demographic variables</b>						
<b>Maternal age</b>						
15-19 (ref)	-	-	-	-	-	-
20-34				.18	.03	1.10
35-49				.23	.04	1.40
<b>Birth interval</b>						
1-23 (ref)	-	-	-	-	-	-
24+				1.05	.85	1.29
<b>Birth order</b>						
1-2 (ref)	-	-	-	-	-	-
3-4				.95	.79	1.15
5+				.69	.55	.88*
<b>Socio-economic variables</b>						
<b>Residence</b>						
Urban (ref)	-	-	-	-	-	-
Rural				.91	.75	1.09
<b>Maternal education</b>						
None (ref)	-	-	-	-	-	-
Primary				1.69	1.31	2.17*
Secondary				2.28	1.74	2.99*
Higher				2.86	1.79	4.56*
<b>Wealth index</b>						

Poorest					
Poorer			1.22	.828	1.79
Middle			1.70	1.16	2.50*
Richer			1.96	1.34	2.89*
Richest(ref)			2.14	1.44	3.19*
<b>Decision on own health</b>					
Yes					
Health insurance			1.24	1.04	1.52*
Yes					
Partner's education			1.35	1.14	1.59*
None (ref)			2.89	1.20	6.98*
Primary					
Secondary					
Higher			1.49	1.13	1.96*
Maternal occupation			1.45	1.09	1.92*
None (ref)			1.29	.89	1.86
Professional					
Sales/ business			1.04	.63	1.71
Manual			.94	.73	1.22
Marital status			1.03	.76	1.38
Currently married			.57	.33	.99*

\*=statistically significant (p < 0.05)

Table 25: Regression results of PNC utilisation in South West, Nigeria, 2013.

South West PNC	Model I			Model IV		
	OR	95% C.I.		OR	95% C.I.	
		Lower	Upper		Lower	Upper
Survival of preceding child						
No	.82	.48	1.39	.88	.49	1.59
<b>Bio-demographic variables</b>						
Maternal age						
15-19 (ref)						
20-34				.18	.04	1.13
35-49				.24	.03	1.13
<b>Birth interval (months)</b>						
1-23 (ref)						
24+				1.12	.69	1.82

Birth order			
1-2 (ref)	-	-	-
3-4	1.27	.76	2.12
5+	1.16	.65	2.08
Residence			
Urban (ref)	-	-	-
Rural	.89	.54	1.49
Maternal education			
None (ref)	-	-	-
Primary	.78	.46	1.33
Secondary	1.57	.88	2.83
Higher	5.30	1.28	21.99*
Wealth index			
Poorest	.62	.27	1.45
Poorer	.49	.24	1.03
Middle	.52	.27	1.03
Richer	.76	.44	1.32
Richest (ref)	-	-	-
Decision on own health			
Yes	1.36	.91	2.02
Health insurance			
Yes	1.37	1.13	1.59*
Partner's education			
None (ref)	-	-	-
Primary	2.01	1.12	3.60*
Secondary	1.52	.84	2.78
Higher	1.19	.50	2.85
Maternal occupation			
None (ref)	-	-	-
Primary	.25	.06	1.05
Secondary	.57	.31	1.05
Higher	.71	.35	1.48
Marital status			
Currently married	4.53	.56	36.44

\* statistically significant ( $p < 0.05$ )

## CHAPTER FIVE

### 5.0 DISCUSSION, CONCLUSION AND RECOMMENDATIONS

#### 5.1 Discussion

This study sought to examine the effects of preceding child death on utilisation of ANC, SAB and PNC services using the Nigeria Demographic and Health Survey of 2013. Selected background variables known to be associated with utilisation of MHC services were first summarized. The North-West region had the highest population of women of reproductive age. The country seems to have more rural slums than the urban and developed areas as the rural dwellers constituted almost three-quarter of the respondent. Nigeria which is regarded as a low-middle income country has the majority of its population in the poor wealth quintile which probably also explain the low health insurance coverage and level of education of its populace.

For most of the variables considered in this study, the extent of utilisation decreased from ANC to SAB to PNC. This suggests that although quite a number of women attend ANC clinic, a huge number of them tend to drop out of the continuum of care which inevitably reduces the extent of care and well-being for both mother and child. Notwithstanding the observed poor utilisation of SAB, it is still the overall best-utilised service of the MHC services throughout the country, while PNC service is the least utilised especially for mothers who are more educated, have health insurance and who are employed. The PNC is very important because it helps the mother to regain herself as well as protect her from after birth complication such as depression etc. Vaccination programmes for babies as part of the PNC care also helps babies develop the proper immunity necessary throughout life. This dropout from health care service explains the stagnant and sadly overwhelming state of maternal and child health in Nigeria. This is consistent with the work of Akinyemi *et al.*, (2016). Cross-tabulation of preceding child death revealed that mothers who have experienced a preceding child death utilised, ANC SAB and PNC services than those who did not. This suggests that the grief and pain of losing a child makes a mother want to prevent such occurrence by utilising MHC services for subsequent birth.

Logistic regression models revealed that preceding child survival was statistically significant in model I and model II where bio-demographic variables were controlled for. When bio-demographic and socio-economic variables were controlled for in model IV, preceding child death was only positively associated with ANC, SAB and PNC but not statistically significant. This reveals that women who have lost a previous child tend to want to utilise MHC services especially skilled delivery for subsequent births. This can be because, mothers especially multiparous women perceive skilled delivery as the most important of the MHC services and as such miss out on ANC, PNC and their components. Model IV revealed that bio-demographic variables are not predictors of MHC service utilisation. This suggests that socio-economic variables, especially parental education, region, type of residence and wealth index are the key determinants of the MHC service utilisation and that individual or bio-demographic characteristics do not really shape people's attitudes towards seeking MHC services.

Regional analyses revealed slight difference across the region, in that, it showed that preceding child survival was only statistically significant in predicting MHC services utilisation when considered alone. It became only positively associated with MHC services in some regions when bio-demographic and socioeconomic variables were controlled for. This is the case for all regions except for the South West zone, where preceding child death was only positively associated with SAB. This suggests that women in this zone associate child mortality with delivery conditions and therefore understand the importance of utilising skilled assistance at delivery. Although that is good, there is still more to be done to encourage utilisation of ANC and PNC because safe delivery does not guarantee good health as it can only be properly achieved with the complete and wholesome utilisation of MHC services. In this study wealth index was observed to be statistically significant in determining utilisation of MHC services however, the association did not get stronger with better wealth quintile, this shows that poverty or affluence does not necessarily influence MHC service use but rather it is awareness and perception of child health, mortality and how MHC can reduce it that influence MHC service use.

This study revealed that states in the southern zones of the country appear to generally have a higher utilisation of all MHC services than states in the northern zone. This is consistent with statistics of the NDHS reports (National Population Commission and ICF International 2014).

These trends of the southern zones having better standards than the northern zones cut across almost all aspects of health concerns such that it has hindered efforts in tackling health issues. There is, therefore a pressing need to liaise with religious and community heads, deploy more health personnel to the northern zones as well continuously organize and concentrate enlightenment programmes in the northern zones so as to end this trend which will see to a wholesome development for not just some aspects of the country but the entire country.

As is consistent with numerous studies parental education, especially maternal education is the most consistent positive determinant of MHC services use (Adebowale & Udjo, 2016; Akinyemi *et al.*, 2016; Babalola and Fatusi, 2009; Ononokpono, 2015; Yar'zever and Said, 2013). It is therefore imperative that female education is vigorously emphasized and supported throughout the nation. This would lead to better exposure as well as better socio-economic standards for parents and therefore improve the demand, access, and utilisation of MHC services. Better maternal employment status and health insurance coverage was also observed to positively influence MHC services (Arthur, 2012; Celik and Hotchkiss, 2000; Stephenson *et al.*, 2006; Gomez *et al.*, 2015). It is necessary that the laws of the health insurance coverage be revised such that it includes provision for the unemployed. This is because the less privileged in the society are mostly unemployed and are unable to properly cater for health needs as a result of poor financial capacity. It is therefore not fair enough that only the employed that usually are already able to afford their health needs even without the health insurance are catered for by the health insurance scheme. Universal health coverage (UHC) is part of the SDG goals which was agreed upon by the United Nations member state in 2015. UHC simply means " *that all individuals and communities receive the health service they need without suffering financial hardships*". It is aimed at good health for all which will afford the children all the opportunity to learn adults the ability to generate wealth, avoid penury and lay down foundations to attain long-term economic and overall development (World Health Organization, 2017). A major element for the success of the UHC is the health insurance scheme because it would increase access and use of MHC services by reducing cost of health care services and out of pocket payment (Gustafsson-Wright and Schellekens, 2013)



The fact that employed mothers utilise MHC services than unemployed mothers suggest that maternal employment is not an hindrance in utilising MHC services. Analysis also revealed that being in a marital union does not necessarily guarantee utilisation of MHC services, because women who were not in marital unions utilised MHC services better than those in marital union (Fagbamigbe, 2015). This could be because single mothers most times do not have plenty kids or commitments and as such tends to be able to concentrate their efforts and finances on their kids.

These study revealed that wealth quintile, residence, birth order and birth interval are consistent predictors of MHC services utilisation which corroborates findings from other studies (Adebowale and Udjo, 2016; Akinyemi *et al.*, 2016; Babalola and Fatusi, 2009; Ononokpono, 2015; Yar'zever and Said, 2013).

## 5.2 Conclusion

Preceding child death was not statistically significant in predicting MHC services utilisation when bio-demographic and socio-economic variables were controlled for so, it is not considered a factor enough to predict MHC services use because its effect would always be narrowed by background characteristics. It is therefore surprising to observe that women who experience preceding child death do not learn from the experience and do almost nothing to avoid a repeat. This makes one wonder if these women even appreciate that the occurrence may have been because of their non-utilisation of MHC services. Now this means that they have not learnt from their mistakes and as such will still not seek for appropriate care in subsequent pregnancy and that means there is a problem with the demand for MHC services.

## 5.3 Limitation

The data used for this study was from a retrospective survey which might have been affected by memory recall and willingness to recount some experience. The information used included events that may be difficult and painful for the mothers to recount such as the death of their children. In this part of the world, mothers don't always list all their dead children and this may lead to underreporting of such events as well as confound results of analysis. Also the data used in this study is now four years old and a lot might have changed, so some results may not be consistent with what obtains now.

## 5.4 Recommendations

Support groups and enlightenment programmes should be actively organized to help parents especially mothers go through the painful loss of their children as well as educate them to continuously utilised MHC services for subsequent birth no matter the outcome, to avoid another child death.

Continuous efforts should be directed at wholesome improvement of socio-economic standards of the entire populace. These efforts should include job creation, free or subsidized sound education (at least to some level if not to tertiary education) as well as adequate health education and promotion to increase the extent of utilisation of MHC services especially in the North East and North-West zones of Nigeria.

Active and focused attention should be directed towards promoting maternal health service utilisation while emphasising accessing the full package rather than only specific components.

Efforts should also be directed towards community outreach focusing on maternal healthcare service utilisation especially in rural areas through novel advocacy strategies.

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## APPENDIX 1

You have been authorized to download data from the Demographic and Health Surveys (DHS) Program. This authorization is for unrestricted countries requested on your application, and the data should only be used for the registered research or study. To use the data for another purpose, a new research project should be submitted using the "Create a new Project" link in your user account.

All DHS data should be treated as confidential, and no effort should be made to identify any household or individual respondent interviewed in the survey. The data sets must not be passed on to other researchers without the written consent of DHS. Users are required to submit a copy of any reports/publications resulting from using the DHS data files to: <https://mg.mail.yahoo.com/compose?to=archive@dhsprogram.com>.

To begin downloading datasets, please login at: [http://www.dhsprogram.com/data/dataset\\_admin/login\\_main.cfm](http://www.dhsprogram.com/data/dataset_admin/login_main.cfm). Once you are logged in, you may also edit your contact information, change your email/password, request additional countries or Edit/Modify an existing Research Project.

The files you will download are in zipped format and must be unzipped before analysis. Following are some guidelines:

After unzipping, please print the file with the .DOC extension (found in the Individual/Male Recode Zips). This file contains useful information on country specific variables and differences in the Standard Recode definition. You will also need the DHS Recode Manual: <http://dhsprogram.com/publications/publication-dhsg4-dhs-questionnaires-and-manuals.cfm>. This manual contains a general description of the recode data file, including the rationale for recoding; a description of coding standards and recode variables, and a listing of the standard dictionary, with basic information relating to each variable.

It is essential that you consult the questionnaire for a country, when using the data files. Questionnaires are in the appendices of each survey's final report: <http://dhsprogram.com/publications/publications-by-type.cfm>. We also recommend that you make use of the Data Tools and Manuals at: [http://www.dhsprogram.com/accesssurveys/technical\\_assistance.cfm](http://www.dhsprogram.com/accesssurveys/technical_assistance.cfm).

For problems with your user account, please email <https://mg.mail.yahoo.com/>

[compose?to=archive@dhsprogram.com](mailto:compose?to=archive@dhsprogram.com). For data questions, please register to participate in the DHS Program User Forum at: <http://userforum.dhsprogram.com/>.

The Demographic and Health Surveys (DHS) Program

ICF

530 Gaither Road

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