Thesis

By

DOROTHY NGOZI
ONONOKPONO

THE FACULTY OF
HUMANITIES,
UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG

Determinants of Maternal Health-Seeking Behaviour in Nigeria: a multilevel approach

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DETERMINANTS OF MATERNAL HEALTH-SEEKING BEHAVIOUR IN NIGERIA: A MULTILEVEL APPROACH

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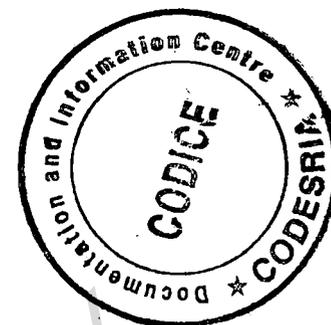
DOROTHY NGOZI ONONOKPONO

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DECLARATION

This thesis does not incorporate any previously published material except where

explicit references are given, and no portion of the work has been submitted for

any degree to this or any other University.

Dorothy Ngozi Ononokpono

June 27, 2013

DEDICATION

To

Almighty God for being my source of wisdom

and

my husband Eskor and my children Victory, Promise and Blossom for being a great inspiration in my life.

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ABSTRACT

Maternal health remains a major challenge in developing countries despite improvements in medical technology and several efforts to improve maternal health care services. The high maternal mortality ratio of 630 per 100, 000 live births in Nigeria suggests that the maternal health situation in the country is very poor. Attempts to explain this situation have focused on individual and household level determinants, but the role of community factors has not received much attention. Understanding community factors associated with maternal health-seeking behaviour is important. This is because individuals reside within communities and their health related behaviour can be influenced by the characteristics or conditions of the community in which they live. The purpose of this study is to understand how maternal health-seeking behaviour in Nigeria is influenced by a combination of individual, household and community conditions. Specifically, the objectives of the study are: (1) to examine the patterns of and differences in maternal health-seeking behaviour in Nigeria, (2) to examine the impact of community factors on maternal health-seeking behaviour, and (3) to investigate whether community factors moderate the association between individual/household factors and maternal health-seeking behaviour.

The study analyzes data from the 2008 Nigeria Demographic and Health Survey. The study population included women aged 15-49 years who had given birth to their last child in the five years preceding the survey. Four categories of maternal health-seeking behaviour indicators were used in the study, which include antenatal care visits, skilled antenatal care, place of delivery and skilled postnatal care. The sample size consisted of 16005 women for antenatal care visits, 17560 for skilled antenatal care, 17542 for place of delivery and 17437 women for postnatal care. The study employed bivariate statistics, and multilevel logistic regression models. Bivariate analysis was utilized to examine the patterns of and differences in maternal health-seeking behaviour (antenatal care visits, skilled antenatal care, place of

delivery and skilled postnatal care). Multilevel logistic regression was used to examine the independent effects of community characteristics on maternal health-seeking outcomes/behaviour; and the moderating effects of community factors on the association between individual/household factors and maternal health-seeking behaviour. Results showed that the level of maternal health-seeking behaviour among women in the sample population is low. For example, fewer than half (46.1%) of the women had had four or more antenatal care visits, 54% had received skilled antenatal care, about 34.4% had had a health facility delivery, and only 30.1% received skilled postnatal care. The study also found that there were differentials in maternal health-seeking behaviour with respect to the individual and household and community characteristics of the women. In line with expectations, results showed a higher likelihood of seeking maternal health care among women with higher education and those from the richest households. Results also indicated that women from large households and those of higher parity (5 and above) were less likely to seek maternal health care than women from small households and those of lower parity (1-2) respectively.

Furthermore, women from Igbo, Yoruba and Northern/Southern minority ethnic groups were found to have higher odds of attending four or more antenatal care visits, receiving skilled antenatal care, having a health facility delivery and receiving skilled postnatal care than Hausa women. A higher likelihood of seeking maternal health care was observed among women who were in formal employment. Women who reported that money, transport and distance to health facility were problems in accessing health care were less likely to make four or more antenatal care visits, receive skilled antenatal and postnatal care and deliver in a health facility. The study found that women who resided in Northern regions had a lower likelihood of receiving maternal health care. This could be linked to strict cultural and Islamic religious practices being predominant in northern Nigeria. Generally, the results

indicated that women from the western region of Nigeria had a higher likelihood of seeking maternal health care; this could be related to a higher level of education among women in this region, hence greater awareness of maternal health care services and the need to seek care.

The study indicated an appreciable, significant variation in maternal health-seeking behaviour across communities. This significant variation was attributed to both the characteristics of the individuals residing within communities and the characteristics of the communities of residence. The study found that community factors were significantly associated with maternal health-seeking behaviour. Specifically, women from communities with a high proportion of educated women, high proportion of those that delivered in a health facility, and high proportion of women exposed to mass media were more likely to seek maternal health care than those from disadvantaged communities. Residing in communities with a high level of poverty was associated with lower odds of seeking maternal health care.

An interesting finding of the study is that women living in communities with a high proportion of women from different ethnic groups had significantly lower odds of having a health facility delivery, suggesting the possible effect of heterogeneity and the associated formal relationships which do not encourage shared health practices. More importantly, the findings of the study indicated that community factors acted as moderators on the association between individual/household factors and maternal health-seeking behaviour. After controlling for individual/household and community variables, the significance of some of the individual/household factors disappeared (for example, maternal age at last birth).

The significant variations in maternal health-seeking behaviour indicate that factors other than those included in the analysis are causing the clustering or variations in the outcome variables observed across communities. The result suggests the need for future studies to

investigate other factors that may account for the unexplained community variations in maternal health-seeking behaviour. The regional differences in maternal health-seeking behaviour can be changed through region specific policy and reforms that ensure equitable distribution of need-based resources. The findings of the study also underscore the need to implement maternal health care service interventions not only at the individual level, but also at the community level. Such interventions should take into consideration the characteristics of the community in which women reside. Furthermore, interventions aimed at encouraging maternal health-seeking behaviour in Nigeria should focus on poverty reduction programmes, increasing women's education and health facility delivery in disadvantaged communities. The community variations in maternal health-seeking behaviour are modifiable and can be altered through coherent policy at the community level.

CHAPTER 1

INTRODUCTION

1.0   Background to the study

Maternal health is a global concern. The growing interest in maternal health is reflected in the Millennium Development Goals (MDG) and consensus reached at different international conferences such as the Safe motherhood conference in 1987, the International Conference on Population and Development (ICPD) in 1994, Beijing in 1995, among others, to improve access to maternal and reproductive health services. The increasing attention given to maternal health globally has been concentrated on the reduction of maternal mortality. In developed countries, where women have access to basic health care, childbirth is a positive and fulfilling experience, whereas in developing countries the reverse is the case (Kistiana, 2009). For most women in low resource countries, delivering a child is associated with suffering, morbidity and in most cases maternal mortality (Kistiana, 2009). Despite the call to improve access to maternal health services universally and reduce maternal mortality, there has been no significant decline in maternal mortality levels, especially in developing countries.

Globally, more than half a million women die of complications due to pregnancy, child birth and postpartum period annually (Glasier et al. 2006). Kistiana (2009) noted that about 99 percent (533,000) of these deaths occur in developing regions, with sub-Saharan Africa and Southern Asia accounting for 86 percent of maternal deaths. In sub-Saharan Africa, it is estimated that 30 women die from complications of pregnancy and childbirth every hour of each day (Smith et al., 2009). In other words, about 270,000 maternal deaths occur every year.

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Further, the lifetime risk of maternal mortality in Africa is 1 in 26 (Barate & Temmerman, 2009). About 125,000 women and 870,000 newborn babies on the continent die annually in the first week after delivery (Warren *et al.* 2009), and more than two thirds of maternal deaths occur after delivery (Dhaher *et al.*, 2008). Safe motherhood initiative (2003) estimated that 30 to 50 maternal morbidities occur for each maternal death. The World Bank's estimate of 630 per 100,000 maternal mortality ratio suggests that the maternal health situation for women in Nigeria is quite poor (World Bank, 2013). With an estimated 59,000 maternal deaths annually, Nigeria contributes 10 percent of the world's maternal deaths (FMOH, 2005). Metiboba (2009) noted that 1 in 80 women in Nigeria die as a result of pregnancy-related complications. Some hospital based studies in Nigeria revealed disparities in maternal mortality rates across the country. Among 2,728 deliveries in a teaching hospital, in Sagamu, Southwest Nigeria 75 maternal deaths occurred between 2000 and 2005 (Oladapo *et al.*, 2006); 267 maternal deaths occurred among 38,768 deliveries in the Jos teaching hospital (North central), between 1985 and 2001 (Ujah *et al.* 2005) and 60 maternal deaths occurred between 2004 and 2008 in Enugu state teaching hospital, South east Nigeria (Ezugwu *et al.* 2009).

The situation is even more critical in Northern Nigeria, where strong cultural and religious beliefs and practices involving childbirth contribute significantly to maternal morbidity and mortality (Doctor, 2011). The poor maternal health situation in Nigeria and other developing countries suggests that the achievement of Millennium Development Goal 5, which seeks to reduce maternal mortality by three quarters by 2015, is far from becoming a reality. However, some researchers have linked the high maternal mortality ratios to the inaccessibility of health services, lack of functional and effective health care systems and,

more importantly, the non-use of modern maternal health care services, such as antenatal care, delivery care and postnatal care (Kistiana, 2009; Onah, 2006; Midhet *et al.* 1998).

1.1   Research Problem Statement

Antenatal, delivery and postnatal care services are among the major interventions recommended to reduce maternal and newborn deaths globally (Titaley *et al.* 2010). The World Health Organization recommended four antenatal care visits during pregnancy, and that maternal health care should be provided at 6 hours, 6 days, 6 weeks, and 6 months after child birth to ensure women's physical and mental well-being (WHO, 1998). These recommendations notwithstanding, data from developing countries indicate that maternal health-seeking behaviour is still poor and most women do not have access to maternal health care services. According to a United Nations report, about 74 percent of pregnant women received antenatal care at least once in 2005 (UN, 2008); 40 percent of deliveries take place in health facilities (UNFPA, 2004).

Antenatal care ensures the most desirable outcome for both mother and baby and is important in monitoring pregnancy and the reduction of complications and mortality (NPC & ICF Macro, 2009). The World Health Organization (WHO) recommended antenatal care from a skilled health worker (for example a midwife, doctor or nurse) during pregnancy. The antenatal care policy in Nigeria also follows the latest WHO approach (Focused Antenatal Care) which seeks to promote safe pregnancies. The new approach recommends at least four antenatal care visits for women who do not have complications and emphasises the quality of care received during each ANC visit (NPC & ICF Macro, 2009). Antenatal care provides an opportunity for pregnant women to identify complications associated with pregnancy and

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benefit from other interventions including counselling on healthy living and how to manage complications (Kistiana, 2009).

The number of antenatal care visits a woman attends during pregnancy is equally important in preventing complications and adverse maternal health outcomes (Ikamiri, 2004). Health facility delivery is an important factor that can influence maternal and neonatal outcomes. For instance, health facility delivery attended by trained medical personnel has been shown to be associated with maternal and newborn mortality and morbidity rates lower than those found in home delivery (Stephenson *et al.*, 2006). For both mothers and newborns, the period after delivery is also very critical; hence postnatal care services enable skilled health professionals to detect postpartum problems and potential complications and provide prompt treatment (Titaley *et al.*, 2010).

Despite the importance of these interventions, the 2008 Nigeria Demographic and Health Survey (NDHS) report showed that about 62 percent of women who had had their last delivery in the five years preceding the survey had delivered at home, fewer than two thirds (58%) received antenatal care, 55% had fewer than the four recommended antenatal care visits and more than half (56%) did not receive postnatal care. In Bauchi state, Nigeria, women on the average bear about eight children throughout their lifetime, yet only 45% receive antenatal care (Snow, 2011). Among eighty-one (81) women who delivered within a one-year period in Edo state, Nigeria, only 9.9% received antenatal care, while 4. 9% went for postnatal checks (Osubor *et al.*, 2006).

Considering the ICPD (1994) programme of action call to promote the increased use of reproductive health services, it is important to understand the factors influencing decisions to seek maternal health care. In view of the poor maternal health situation in Nigeria and the need for realistic and effective policy formation in the health care system in the country,

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information relating to maternal health care-seeking behaviour and the factors influencing such behaviour is crucial. Poor maternal health-seeking behaviour is a major public health challenge in developing countries, particularly Nigeria. Thus concerted efforts have been made by researchers to understand the factors driving the phenomenon. Women's health care-seeking behaviour, however, is complex, but to a large extent it may be associated with the ways women are treated in the society and the status accorded to them. In addition, the social inequalities in the society and gendered norms constrain women from having access to and control over health resources within families and the society as a whole (WHO, 2009).

An overview of studies in some developing countries and in sub-Saharan Africa has shown that individual and family factors were strongly associated with maternal health-seeking behaviour. Gender inequality has been identified as an important determinant of maternal health-seeking behaviour. Arguably, gender equality and women's empowerment can lead to a greater demand for family planning services, antenatal care and safe delivery, and consequently reduce maternal mortality (Hunt and Mesquita, 2010). In Pakistan, women's status was found to be an important predictor of health-seeking behaviour, hence cultural and ideological norms imposed on women greatly impact their health-seeking behaviour (Shaikh *et al.*, 2008). Similarly, Furuta and Salway (2006) found that employment, household economic status, cost of accessing health care and urban-rural residence were strongly associated with skilled antenatal and delivery care. Socio-economic factors including the husband's occupation, distance to health facilities and financial difficulty were found to be strong determinants of maternal health care behaviour in Indonesia and Nepal (Titaley *et al.* 2010; Dhakal *et al.*, 2007). Other studies noted that maternal health care-seeking behaviour was associated with demographic factors such as parity, maternal age and marital status in sub-Saharan Africa (Stekelenburg *et al.*, 2004; Magadi *et al.* 2000).

In Nigeria, the region of residence and wealth quintile were documented as the most important factors associated with maternal healthcare service utilization (Rai *et al.*, 2012; Adamu, 2011). Moore *et al.* (2011) found that maternal health-seeking behaviour was associated with a lack of means of transport and the unfriendly attitude of staff at a health facility. A study by Nwakoby (1994) in a rural Nigerian community established that factors most consistently associated with health facility delivery were maternal education, occupation and religion.

Existing studies have established various factors associated with maternal health-seeking behaviour, but their focus is mainly on individual demographic and household socio-economic determinants. However, little attention has been given to community characteristics that can influence women's decision to seek maternal health care. Understanding various community factors associated with maternal health-seeking behaviour will be relevant in identifying aspects of communities that are potential targets for policy manipulation.

Stephenson and Tsui (2002) confirmed that studies on health care-seeking behaviour have focused on the influence of individual and household characteristics and have largely ignored the influence of community attributes. This implies that "some determinants are inadvertently missed, leaving a serious research programmatic lacuna" (Babalola & Fatusi, 2009:3). Given that individuals live within families and families are embedded within communities, failure to consider factors operating beyond the household level may lead to a serious bias in result estimates (Babalola and Fatusi, 2009). Moreover, Mackian (2003) has argued that individual decisions can also be influenced by community characteristics; therefore, providing knowledge at the individual level is not sufficient to promote change in health behaviour, as all behaviours occur within the family and community. In addition, Mackian noted that health seeking behaviour is not simply an isolated event, but part of an individual's or a

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community's identity, which is the result of social, personal, cultural and experiential factors. Similarly, Williamson (2000) argued that while health promotion places the emphasis on individual behaviour, broadening the scope to other determinants of health, including contextual determinants is necessary. Writing on the utilization of primary health care services, Rahman (2000) demonstrated that a woman's decision to use health care service is not only the result of personal need, but also social factors and the location of health care services. Furthermore, ecological perspectives emphasized multiple levels of influence, of personal, physical and social environmental conditions, on an individual's health care behaviour (Stokols, 1996).

However, most theoretical and empirical work that examined the association between community conditions and individual health care behaviour has been developed with reference to conditions in the United States and some developing countries (Burgard & Lee-Rife, 2009). Further, Burgard and Lee-Rife argued that it is unclear whether the empirical evidence applies to other social contexts including Nigeria. In as much as maternal health-seeking behaviour is not only associated with individual and household characteristics, there is a need to examine other community conditions such as the level of poverty, education and ethnic concentration in the community, among others, which may influence maternal health care-seeking behaviour.

Some studies have established the association between several individual and household factors and maternal health-seeking behaviour, but little is known about the mechanisms through which these factors influence women's decision to seek maternal health care. Observably, most studies that have examined the predictors of maternal health-seeking behaviour are context specific and were carried out mainly in Asia. The body of knowledge on maternal health is largely built on evidence from south Asia with very little empirical

evidence from sub-Saharan Africa (Fotso *et al.* 2009), where culture and patriarchy influence all aspects of social life and relationships, and give men the authority and control over women's sexual and reproductive health (Odimegwu *et al.* 2005; Isiugo-Abanihe, 2003).

Furthermore, evidence from empirical literature shows that there is a dearth of studies on contextual determinants of maternal health-seeking behaviour in Nigeria. Most studies on maternal health-seeking behaviour were constrained by limited coverage. They were small scale research carried out in small rural communities (for instance Osubor *et al.* 2006; Iyaniwura *et al.*, 2009; Moore *et al.* 2011). The scope of these studies is limited and their results cannot be generalized to a large population, considering the population size and composition of Nigeria.

Despite the limitations of previous studies, they nonetheless offer relevant insight into the predictors of maternal health-seeking behaviour. The present study, however, builds on the multi-factor determinants to seek an advancement of our understanding of the determinants of maternal health-seeking behaviour beyond the limitations of previous studies. Thus the purpose of this study is specifically to understand how maternal health-seeking behaviour in Nigeria is influenced by a combination of individual/household and community conditions.

1.2   Research Questions

Drawing from theoretical and empirical research on the determinants of maternal health-seeking behaviour, this study seeks to answer the following basic questions:

What are the patterns of and differences in maternal health-seeking behaviour in Nigeria?

Do community factors have a significant impact on maternal health-seeking behaviour in Nigeria?

Do community characteristics moderate the association between individual/household factors and maternal health-seeking behaviour?

Is there any evidence for policy intervention at the community level instead of at individual level?

1.3   Research Objectives:

1.3.1   General Objective

The overall objective of the study is to examine the determinants of maternal health-seeking behaviour in Nigeria.

1.3.2   Specific Objectives

- To examine the patterns of and differences in maternal health-seeking behaviour (antenatal care visits, skilled antenatal care, place of delivery and postnatal care) in Nigeria.
- To examine the impact of community factors on maternal health-seeking behaviour.
- To investigate whether community factors moderate the association between individual/ household factors and maternal health-seeking behaviour.

1.4   Justification of the Study

Maternal health is a major challenge in most developing countries, including Nigeria. Despite the call to improve access to maternal health care services and reduce maternal mortality, maternal health-seeking behaviour in Nigeria has remained poor. Though some women have been found to receive antenatal care during pregnancy, most of them lack supervised delivery (Doctor, 2010). The poor maternal health situation in the country generally underscores the importance of this study.

Efforts to enhance women's health are hampered by insufficient local information on which to base policies and programmes. Few studies on maternal health care in Nigeria have examined the interaction of key determinants of maternal health-seeking behaviour at various levels (individual/household and community-level). Therefore, there is a need for a better understanding of how various characteristics of the community and individual/household level factors interact to influence maternal health care behaviour. In addition, the problem of poor maternal health-seeking behaviour must be understood as a whole; hence this study provides a broader framework that includes individual, household, enabling and community contextual factors to enhance our understanding of a range of factors influencing maternal health-seeking behaviour at various levels.

As documented by empirical research, the role of community-level characteristics has been an under-researched area and very few previous studies have examined the independent effects of community factors (Vu, 2005). Besides, these studies have largely ignored the moderating effects of community factors on the association between individual/household factors and maternal health-seeking behaviour/outcomes. Examining the independent and moderating effects of community factors is important and would help to identify community level factors that might likely mitigate the effects of individual factors on health outcomes/behaviour (Vu, 2005). The present research seeks to redress these issues by employing a multilevel modelling technique to examine the independent and moderating effects of various community-level factors.

Moreover, Wang (2003) has suggested the need for analytical studies both at the sub-national and household levels in order to produce more reliable empirical evidence that would inform the design of policies and programmes to improve child health as well as maternal health outcomes in various countries. The need for reliable data to improve maternal health in

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Nigeria underscores the relevance of this study. Furthermore, the study generally finds relevance in enhancing our understanding of the conditions in which women are born, grow, live and age, as well as their neighbourhood and community characteristics. This will generate the knowledge to inform population and health professionals in designing appropriate community specific intervention programmes that will improve maternal health.

Evidence from studies indicates that there has been very little progress in maternal mortality reduction in Nigeria, and the safe motherhood initiatives do not seem to be yielding the desired results. Hence the study is necessary for understanding factors that can be manipulated to contribute to the promotion of health behaviour change, and the achievement of Millennium Development Goal 5 in Nigeria. Understanding the community contextual factors influencing the decisions to seek maternal health care has the potential to provide policy tools to strengthen the health care system and contribute to the development of rational and strategic policy to improve maternal health in developing countries generally, and Nigeria in particular. Overall, the study makes a contribution to the understanding of maternal health in developing countries and the implication of such arrangements for various aspects of population policy.

1.5   Definition of Key Words

Maternal health-seeking behaviour: Is defined in this study as the receipt of skilled antenatal care, antenatal care visits, having a health facility delivery and receiving skilled postnatal care.

Maternal health: Health of women during pregnancy, childbirth and postpartum period (http:\\www.who.int/maternal health/en/).

Maternal mortality: Maternal mortality is defined according to World Health Organisation's international classification of diseases. It is described as the death of a woman while pregnant or within 42 days of the termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes (WHO, 1993).

Newborn death: Death of a live born infant within the first 28 days of life

Reproductive health: The state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity, in all matters relating to the reproductive system and its functions and processes (ICPD, 1994). It implies that women are able to have a satisfying and safe sex life and have the capability to reproduce and the freedom to decide if, when and how often to do so. It also implies the right of women to have access to methods of family planning that are safe, effective, affordable and acceptable; and the right of access to appropriate health care.

Community: Refers to the primary sampling unit (PSU) or clusters which are administratively defined areas and are important in research that involves policies (Antia, 2009). Primary sampling units are fairly homogeneous with respect to population socio-demographic characteristics and economic status; and are made up of one or more Enumeration Areas (EAs).

1.6   Organization of the Thesis

The present research is organized into eight chapters. Chapter 1 presents the background of the study including the statement of the problem. The major issues of maternal health at the global level and in Nigeria in particular are highlighted and research questions, objectives of the study, justification of the research (expected contribution of the study to theoretical and

empirical knowledge), definition of key concepts and a brief background of the study area are presented. Chapter 2 reviews relevant theoretical and empirical literature that justifies and explains the factors influencing maternal health-seeking behaviour. The chapter also presents the conceptual framework that has guided the study as well as the study hypotheses.

Chapter 3 presents an overview of data sources used for the analyses, sampling design, definition of variables, methods adopted for statistical analyses and procedures utilized to achieve the research objectives and data management procedures. Limitations and strengths of the study were also presented. Chapters 4, 5 and 6 present the study's results. Chapter 4 presents the description of maternal health-seeking behaviour by the study population and background characteristics, results of the descriptive analysis of the association between maternal health-seeking behaviour indicators and selected background characteristics, as well as the distribution of community characteristics. Chapter 5 presents the multilevel results relating to the independent effects of individual/household factors on maternal health-seeking behaviour. Chapter 6 presents the multilevel results of the independent effects of community factors on maternal health-seeking behaviour as well as the moderating effects on the association between individual/household factors and maternal health-seeking behaviour/outcomes. Chapter 7 discusses the study hypotheses based on the results of the study's analyses. Finally, Chapter 8 discusses the major findings of the study. A conclusion as well as the research and policy implications are also presented.

CHAPTER 2

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.0   Introduction

Many years of research on maternal health have produced diverse findings on the determinants of maternal health-seeking behaviour. It is consistently found in the literature that maternal health outcomes/behaviour are generally poor in sub-Saharan Africa and South Asia; the two sub-regions are the major contributors to high maternal mortality rates and poor maternal health care-seeking behaviour. Thus this chapter provides a general overview of past studies and the current state of knowledge on the determinants of maternal health-seeking behaviour, in the first section. For clarity, the review of literature in this section is presented under four sub- headings: (a) the global overview of determinants of maternal health-seeking behaviours, (b) an overview of maternal health-seeking behaviour in Africa, (c) an overview of maternal health care-seeking behaviour in Nigeria, and (d) a general overview of the determinants of maternal health-seeking behaviour. Also, a tabular presentation of the reviewed literature is done in this section (see Appendix I). Section two discusses the theories that guide this study, their appropriateness and limitations. The third section presents a multi-factor conceptual framework that was used for analysis and key hypotheses of the study.

2.1   Global Overview

Maternal mortality is a major public health challenge globally. The high maternal mortality rate in many developing countries has been linked to inadequate reproductive health care for women. A study in Nicaragua found that women's decisions to seek care during pregnancy and delivery were influenced by individual and community knowledge and the acceptance of

maternal health services, partners' support, previous health care experiences and the degree of communication with other women and health workers (Lubbock & Stephenson, 2008). Further, women often rely on the advice and shared past experiences of older women within their network to direct their health-seeking behaviour. Thus their perception of prenatal and delivery care is greatly shaped by "positive personal experiences, an established sense of security in health facility, shared positive experiences and direct comprehensive communication with health workers" (Lubbock & Stephenson, 2008: 81). According to the authors, the shared cultural belief and women's acceptance that a woman's role is to care for children heightens the perceived opportunity costs of seeking care; hence prenatal and delivery care is considered important primarily to ensure the health of a child rather than that of the mother.

It has been observed that in developing countries women have "less freedom to act, less personal autonomy, and less access to information than their male partners or husbands" (Filippi *et al.* 2006:2), suggesting less access to maternal health care and consequent maternal mortality. Health-seeking behaviour is not only related to the individual's choice, but also to a large extent depends on the socio-cultural arrangements of communities; hence cultural beliefs and practices, cost, gender and distance were found to be associated with health-seeking behaviour (Shaikh *et al.* 2008; Griffiths & Stephenson, 2001). Bloom *et al.* (2001) found that women's autonomy and high economic status were positively associated with antenatal care utilization. Further, Shaikh & Hatcher (2004) noted that men control all aspects of resources and decide when and where women should seek health care in Pakistan. In addition, women were not allowed to visit a health facility or health care provider alone, or make personal decisions to spend money on health care. According to the authors, this lack of freedom to seek care without the permission of her husband or head of the family may result

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in a lack of attention to one's health and the inability of the women to access health care even in emergency situations. Matthews and Gubhaju (2004) examined contextual influences on the use of antenatal care in Nepal. They found that women who hold strong views on the right to refuse sex with their partner were more likely to use antenatal care. In addition, the authors noted that married women were more likely to use antenatal care if they made more decisions in the household, if they were educated, if they had educated partners and if they regularly listened to the radio or watched television.

Antenatal care attendance, hospital delivery, ethnicity and having problems after delivery were important factors associated with the uptake of postnatal care in Nepal (Dhakal *et al.* 2007). Women who had attended antenatal care were more likely to receive postnatal care; and those who delivered in the hospital were more likely to have postnatal care than those who delivered at home. In addition, women's experience of a health problem after delivery appeared to be a strong motivation for seeking postnatal care. Further, poor, illiterate and farm-working women from the Temang ethnic group were less likely to have access to postnatal care than those from Brahmin-chhetri. The authors gained the impression that these factors motivating women to seek postnatal care probably represent the value of information received during antenatal care and the perception that only women with health problems need to seek postnatal care.

Community level factors, such as the availability of a sub-centre in the primary sampling unit (PSU) and the distance of the PSU to the nearest primary health centre, were significantly associated with the utilization of maternal health service indicators in Uttar Pradesh (Tiwari, 2010). Furthermore, results suggested that women who belong to the general category of caste were more likely to use antenatal care; and as their standard of living increases, the

probability of using delivery care increases. In a similar study in India, Dolla (2008) found that the acceptability of the provider services, which depends on the satisfaction gained from the service, is a major determinant of the utilization of antenatal care. Other studies, in Nepal and Bangladesh, observed that predisposing and enabling characteristics such as educational level, autonomy, household structure, household wealth and place of residence were significant determinants of antenatal care and place of delivery (Hague, 2009; Matsumura & Gubhaju, 2001). Education in particular has been identified as relevant in the use of maternal health care and the enhancement of female autonomy in terms of decision making regarding their health.

In a systematic review of barriers in accessing maternal health care in low and middle-income countries, McNamee (2009) stressed the significant effects of demand-side determinants such as education, distance and wealth status on maternal health care use. A study on the Naogoan district of Bangladesh revealed that the husband's education, occupation and current use of contraception, as well as frequent visits of health care workers to respondents were significantly associated with antenatal care (Abadine *et al.* 2008). A higher likelihood of going for a medical check-up during pregnancy was observed among women who were currently using contraception and had ever been visited by a health care worker.

Urban residence, mass media and women's employment were found to be important determinants of institutional delivery (Navaneetham & Dharmalingam, 2002). The authors noted that non-working mothers and those who had greater exposure to mass media were more likely to deliver at health institutions than women who are working and those who have had little or no exposure to mass media. Other studies found that the husband's occupation and education, age, number of previous pregnancies, family size and access to a health care facility, as well as a knowledge of contraception, were associated with maternal health care

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utilization (Chakraborty *et al.* 2003; Hazarika, 2009). Furthermore, the study found that older women were more likely to seek maternal health care services than younger women; maternal health care behaviour decreased among women with a larger family size. In a study in Vietnam, Stephenson & Tsui, (2002) found that high parities were negatively associated with the likelihood of receiving antenatal care and giving birth in a health facility. The authors stated that drawing from their maternity experiences women may not feel the need to receive antenatal and delivery care; having a large number of children may present difficulties in attending health care facilities.

In addition, Stephenson and Tsui observed that the number of doctors in the community and the presence of a health facility in the community increased the use of antenatal and delivery care, suggesting that women are more likely to use health care services if they are available in the community. Koenig *et al.* (2007) noted that concern over medical costs and pronounced socio-economic disparities were major barriers to maternal care-seeking behaviour in urban and rural Bangladesh. Wide disparities in maternal health-seeking behaviour were observed across wealth quintiles, with the use of antenatal and delivery care increasing among women with higher socio-economic status. This suggests that maternal health care-seeking behaviour is strongly influenced by the financial resources available to the individual. Indicators of the presence of services in the community have been identified as important predictors of maternal health-seeking behaviour. Das *et al.* (2010) found that custom, lack of time to reach the health care facility, poverty, a poorer quality of housing, lack of water supply, population transience and hazardous location were associated with the choice of delivery location. Further, cultural norms and lack of institutional access were identified as the most important factors influencing home delivery. In spite of the awareness of the risks involved, women from the urban areas choose to go back to their villages and natal homes to deliver.

In a similar study, Tuladhar (2009) observed that financial constraint, lack of transportation and ignorance were important predictors of home delivery in Nepal. Another study in Nepal stressed that physical access to a health care facility was a significant predictor of prenatal care and delivery assisted by a health professional (Hotchkiss, 2001). Analyzing the patterns and determinants of maternal health care utilization, Obermeyer and Potter (1991) observed that the overall organization of the health care system, various providers of care and cultural factors, in addition to standard of living, were important predictors of maternal health care utilization. Ojanuga and Gilbert (1992) in their systematic review of women's access to health care in developing countries found that socio-cultural factors impinge negatively on women's access to health care. According to the authors, in Islamic countries for instance, a woman's place is thought to be restricted to the home and she has few options for economic independence. In addition, the cultural institution of purdah segregates Muslim women from public places and greatly impacts on her health care-seeking behaviour.

In support of the effect of cultural factors on health care-seeking behaviour, an ethnographic study conducted by Shaikh *et al.* (2008) showed that women's access to the outer world has been culturally entrenched in the society; this makes it difficult for them to consult a physician, even in an emergency situation. The authors further noted that cultural beliefs and practices often lead to a delay in seeking health care, home remedies and consultation with traditional healers. Writing on the determinants of antenatal care in Vietnam, Trinh *et al.* (2007) identified the external environment, predisposing characteristics and need as the most related factors to using antenatal care. Berlung and Lindmark (1998) noted that obstetric risk factors were associated with antenatal care visits in Sweden. For instance, complications during a current pregnancy were important for the number of extra visits planned by the staff.

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Writing on barriers to the utilization of prenatal care in Turkey, Erci (2003) noted that unwanted pregnancy and negative attitudes toward pregnancy, and attitudes toward prenatal care, were major barriers to the use of prenatal care. In addition, social support from family members significantly affected the use of antenatal care. Stressing the role of mothers-in-law in decisions to seek antenatal care, Simkhada *et al.* (2010) noted that mothers-in-law sometimes have a positive influence, especially when encouraging women to seek antenatal care, but more often it is negative. The main reasons why mothers-in-law do not support/encourage antenatal check-ups include expectations regarding pregnant women fulfilling their household duties, perceptions that antenatal care was not suitable, as well as strained power relations between mothers-in-law and daughters-in-law. Furthermore, women who felt that their friends and family members were unsupportive were twice as unlikely to attend antenatal care as other women (McCaw-Binns *et al.*1995).

These studies are relevant in providing insights into several determinants of maternal health care-seeking behaviour. However, due to differences in cultural and institutional settings, they do not provide an adequate and accurate framework through which all the predictors of maternal health care-seeking behaviour can be fully understood in other parts of the world. For better understanding of the determinants of maternal health care-seeking behaviour, it is important to examine other predictors, especially at the community level, that were not included in these studies. Obtaining new and additional information in different cultural settings like Africa, and Nigeria in particular, has the potential to improve knowledge directly applicable to the improvement of maternal health and health care-seeking behaviour.

2.2   Overview of African Studies

Among the middle income and least poor groups in the slums of Nairobi, women's autonomy was observed to be an enhancer of the use of maternal health services; and the poorest

women in the lower autonomy group tend to exhibit a higher use of maternal health services (Fotso *et al*. 2009). The study also found that education is a major determinant of health-seeking behaviour, but its effect is not mediated by women's autonomy. Similarly, women's autonomy was thought to be associated with maternal health care-seeking behaviour in Ethiopia (Woldemicael & Tenkorang, 2009). Women with higher autonomy were more likely to seek antenatal and delivery care than those with lower autonomy. Some studies in Kenya observed that the use of professional delivery was low and 1 out of 5 women delivered unassisted. Giving birth outside a health facility and attending antenatal care visits was significantly associated with a low socio-economic status, one hour's walking distance from the health facility and parity (Eijk *et al*. 2006; Brown *et al*. 2008).

Another study, in the Teso district of Kenya, noted that obstacles to the utilization of maternal health services are manifold. Most of the childbirths take place at home due to the unavailability and inaccessibility of health facilities, poverty, high user charges and poor maternal health services offered at local health facilities (Ikamari, 2004). An urban setting and having received iron sulphate and folate supplements during the first antenatal care visit were found to be independent predictors of more frequent visits (Delva *et al*. 2010). Mpembeni (2007) noted that some socio-demographic and economic factors such as age, level of education, marital status and distance to a health facility were significantly associated with delivery care utilization. The author claimed that education was relevant in influencing the status of women in the society and their decision making; hence an educated woman with higher socio-economic status has the ability to make appropriate decisions concerning her health. With respect to age, younger women tend to be in a high risk group and tend to fear home delivery; they are therefore more likely to deliver in a health facility.

On the contrary, Magadi *et al.* (2006) in a comparative analysis of the use of maternal health services between teenagers and older mothers in sub-Saharan Africa noted that younger women were more likely to initiate antenatal care late, make inadequate antenatal care visits during pregnancy and deliver outside health facilities, compared to older women. Community perceptions of the quality of care, community beliefs about the importance of health facility delivery and knowledge of the benefits of professional attended delivery were thought to be associated with health facility delivery (Kruk *et al.* 2010). The authors stated that the reputation of a facility's quality of care influences women's decisions and choices of where to give birth. This implies that if health facilities have a reputation for poor quality of care, women may be less likely to use them. Hazemba and Siziya (2008) found that the place of last childbirth was significantly associated with health facility delivery.

Socio-economic status, birth order, place and region of residence have been found to be associated with maternal health seeking behaviour (Ethiopian Society of Population Studies, 2008). Women with a higher economic status were more likely to receive antenatal, delivery and postnatal care than those in the lowest wealth quintile. The probability of seeking maternal health care for the first birth was higher than for subsequent births. This could probably be due to a lack of resources. Further, strong urban-rural and regional disparities in maternal health care behaviour were identified in the study, with urban women more likely to seek health care than the rural women, suggesting differentials in service and social environments. In Rwanda, the sex of the household head, antenatal care visits and husband's level of education have been identified as important predictors of maternal health care-seeking behaviour (Jayaraman *et al.* 2008). Women from female headed households were more vulnerable, often lacking economic resources, than those from male headed households, and were therefore less likely to access maternal health care. Antenatal care visits increased the probability of health facility delivery, but even when women who go for antenatal care

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deliver at home it is usually with the assistance of health care professionals. In addition, women whose husbands had some level of educational attainment were more likely to deliver in a health facility.

Mbuagbaw and Gofin (2010) found that wealth, residence, parity and desirability of pregnancy affect a woman's chances of having optimal antenatal care; these factors are also associated with having a greater number of antenatal care visits during pregnancy. In a study of inequality in maternal health care in 23 countries of sub-Saharan Africa, Magadi *et al.* (2003) reported that the urban poor had a significantly lower risk of home delivery than rural residents. The authors believed that this may be attributed to the problem of physical inaccessibility of health care services as well as cultural beliefs surrounding childbirth in most rural settings of sub-Saharan Africa. With respect to antenatal care, the authors noted that late initiation of antenatal care, and having fewer antenatal care visits, were more likely among the urban non-poor than the urban poor, suggesting that poverty is possibly a barrier to receiving maternal health care.

Stephenson *et al.* (2006) observed that religion, urban residence, exposure to family planning information, female education in the community, husband's approval of family planning in the community and mean number of women in the primary sampling unit with one previous birth in a health facility were significantly associated with delivery in a health facility. The study found that Muslim women were less likely to report delivering their last child in a health facility than Catholic women, while Protestant women were more likely to report having had a health facility delivery than Catholic women. A study in rural Mali reported that the utilization of maternal health services by women was strongly influenced by the practices of others in their area of residence and living in proximity with women who had secondary and higher education (Gage, 2007).

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The reviewed studies have highlighted some important predictors of maternal health care-seeking behaviour; however, they have largely ignored community factors with the exception of Gage (2007) and Stephenson *et al.* (2006). The implication is that some important determinants operating at the community level may have been omitted. There is a need to examine the influence of community attributes on maternal health-seeking behaviour, considering the fact that individual behaviour can be influenced by the characteristics of the community in which people reside. Understanding these factors has the potential to inform community level interventions aimed at increasing the use of maternal health care services. Besides, the study by Stephenson and colleagues was restricted to health facility delivery. Furthermore, most of the studies have focused on one or two aspects of maternal health care-seeking behaviour indicators, particularly concerning antenatal care and place of delivery. Postnatal care has received little attention in previous studies, yet it is an important component of the efforts to reduce maternal mortality and morbidity among mothers and their babies. For a comprehensive understanding of maternal health care-seeking behaviour, it is very important to examine the determinants of the key maternal health care-seeking behaviour indicators (antenatal, delivery and postnatal care) simultaneously.

2.3 Overview of Nigerian Studies

Nigeria is a major contributor to global statistics on maternal mortality. Maternal health care-seeking behaviour remains poor in the country. However, researchers have made concerted efforts to explain the drivers of this poor maternal health situation. In a study of utilization of health care services by pregnant mothers, Moore *et al.* (2011) found that maternal health care-seeking behaviour was associated with distance from home, unavailability of means of transport, lack of money, unfriendly attitude of staff at the health facility and unsatisfactory

service. According to the authors, distance to the health facility acts as a disincentive to seeking care and an obstacle to reaching care. Most pregnant women do not even attempt to reach health the facility for delivery, since it is difficult to walk long distances during labour. Worse still, transport was often not available. Further, unfriendly attitudes, the unavailability of staff at a health facility and long waiting hours were reasons for a lack of utilization of health facility for delivery.

In a study of intergenerational differences in antenatal care and supervised delivery, Doctor (2011) found that belonging to the youngest age cohort, rural residence, lack of schooling, residence in the northern region and poor economic status were determinants of low utilization of antenatal care and supervised delivery. Receiving antenatal care and having a supervised delivery were more likely among women with only one child, married mothers and those living in the southern part of Nigeria. According to the author, the northern region was disadvantaged compared to the southern zone in terms of receiving antenatal care and supervised delivery; this could be associated with illiteracy and socio-cultural beliefs and practices (e.g. permission from the husband to use health services and purdah restrictions) in Northern Nigeria, which deter women from having access to reproductive health services.

Iyaniwura and Yussuf (2009) noted that the perceived quality of care, formal education, high income, age and religion were important factors associated with antenatal care and delivery services. Educated women and those with a higher income were more likely to have received antenatal care, had more frequent visits and used a health facility for delivery, suggesting better exposure to information. Further, the authors found that traditional worshippers were more likely to deliver with traditional birth attendants; and younger women, 20 years of age or younger, were less likely to use antenatal care and delivery services than the older women, suggesting that younger women may be unmarried and lack social support.

Babalola and Fatusi (2009), stressing the importance of individual, household and state level factors, observed that education, socio-economic status (wealth quintiles), urban residence, ethnicity and saturation of mass media were strong predictors of maternal health care utilization. Aremu *et al.* (2011), in another study of the relationship between neighbourhood socio-economic disadvantage, individual wealth status and delivery care utilization in Nigeria, noted that women's occupation, women's and their partner's high level of education attainment, and possession of health insurance were associated with the use of a health facility for childbirth. Meanwhile, a young maternal age and residence in a disadvantaged neighbourhood are associated with home delivery.

In a study in south eastern Nigeria, a number of interplaying social, economic and health system factors were found to be associated with a low utilization of maternal health services. Promptness of care, friendliness of staff and cost were associated with the choice of place of delivery (Onah *et al.* 2006). The decision to deliver a child in a particular health facility was basically dependent on the proximity of a health facility, favourable cost and quality of care. In addition, the study found that "wives of salaried top civil servants, professional, business men and women were usually able to afford institutional deliveries while small scale farmers and traders are likely to deliver outside health institutions probably reflecting not only their usually lower level of education but also the irregular and seasonal nature of their income" (Onah *et al.* 2006:1876). The study further indicated that the number of years of both respondents' and their husbands' education were associated with an increased percentage of delivery in health facilities, indicating that a woman or husband with poor formal education is likely to have a low occupational status and family income. Consequently, such a woman would likely deliver outside health facilities.

Osubor *et al.* (2005) observed that poor acceptance of family planning and preference for traditional birth attendants (TBAs) were important factors associated with maternal health care-seeking behaviour. Reasons for the preference for the TBAs include accessibility, lower cost, and greater convenience. Other factors influencing health care-seeking behaviour include the quality of care and health providers' interpersonal relationship with clients. The authors concluded that efforts to improve the maternal health status of women in Nigeria should involve the examination and understanding of the sociological context of health care-seeking behaviour within communities.

Adamu and Salihu (2002) identified economic and socio-cultural factors that were barriers to women's use of antenatal care services and hospital delivery in rural Kano, North west Nigeria. One of the most important reasons for not attending antenatal care and preference for home delivery is financial deprivation. According to the authors, most women in the rural communities depend solely on their husbands' income, as well as farming and agricultural activities for their livelihood. The small savings therefore are not enough to obtain costly antenatal and hospital delivery services except in life-threatening situations. Further, the husband's denial and preferences, and the perception of women that 'it is easier at home' were other barriers to women's use of antenatal and delivery care services, as it was difficult for a woman to go out without the husband's permission except in extreme emergencies. In addition, the authors observed that home delivery was associated with the perception that delivering at home affords the women privacy and the company of relatives who understand their situation better.

A community's beliefs concerning the cause of an ailment and how effective alternative treatment is have been identified as important determinants of health care-seeking behaviour among rural women (Okojie, 1998). The author noted that some women register for antenatal

care, but deliver at home or with traditional birth attendants (TBAs). The major reasons for this were high hospital costs and the distance to a hospital. In addition, the use of health facilities was found to be influenced by the quality of care and attitudes of health personnel. The study also observed that health care-seeking behaviour was greatly influenced by women's status and influence within the household. Similarly, Okafor and Rizzuto (1994) confirmed that community perceptions, attitudes and beliefs were important constraints to accessing effective health care. For instance, traditional birth attendants (TBAs) were found to be significant sources of misinformation; at times they deliberately discourage women from seeking higher levels of maternal health care.

Awusi *et al.* (2009) in their study of antenatal care service utilization found that income yielding occupations strongly influenced the use of antenatal care. In addition, educational status, gestational age at initial antenatal care booking and the quality of antenatal care were observed to be significant predictors of antenatal, delivery and postnatal care in northern Nigeria (Oguntunde *et al.* 2010; Galadanci *et al.* 2007). A study by Adamu (2011) which analyzed regional differences in the patterns and determinants of maternal health care use found that the utilization of maternal health care service varied across the regions of Nigeria. Education, family wealth index and place of residence were strong predictors of service utilization in all the regions. The author was of the opinion that women who are educated are better able to break away from traditional practices to use modern health care services in order to enhance their health. In addition, the author argued that since health care utilization is primarily by out-of-pocket expenditure and most health care services are situated in the urban areas, far from rural dwellers, it is not surprising that wealth index and place of residence were strong predictors of maternal health service utilization.

Though these studies have highlighted important factors influencing the use of maternal health care services in Nigeria, most of them have focused on individual and household determinants, with the exception of Babalola and Fatusi, and Aremu and colleagues. However, most of them lack national coverage and their scope is small. For instance, the study by Onah and colleagues was designed to obtain information on factors associated with the utilization of maternal health services in Enugu, South Eastern Nigeria. Furthermore, most of the studies were conducted in small rural communities with a small sample size (for instance Osubor *et al*; Moore *et al*; Iyaniwura and Yuusuf; Adamu and Salihu). Considering the diverse socio-cultural and multi-ethnic setting of Nigeria, their results may not be generalizeable to the entire country. Though available data will not allow for an examination of all the predictors reviewed, this study builds on a multi-factor approach and uses national representative data to gain more insight into and understanding of the factors influencing maternal health care-seeking behaviour beyond the limitations of previous studies.

2.4   General Overview of Determinants of Maternal Health Care-Seeking Behaviour

Following empirical research and literature, unravelling the determinants of maternal health care-seeking behaviour in developing countries is a rather complex task. Although many studies have identified various determinants of antenatal care, antenatal care visits, place of delivery and postnatal care, most of these studies have focused on individual level determinants. Also, there seemed to be an endless debate on what really constitutes the determinants of maternal health care-seeking behaviour as these studies are conducted in different cultural settings. For instance, while Mpembeni (2007) found that delivery care is positively associated with maternal age, Kruk *et al.* (2010) indicated that maternal age is not an important predictor of health facility delivery. Kistiana (2009) in his study in Indonesia found that women's working status and the husband's occupation do not have a significant

impact on the probability of a women obtaining health care. In contrast, a study conducted in Nigeria and Nepal observed that women's employment and the husband's occupation were strongly associated with maternal health care-seeking behaviour (Adamu 2011; Dhakal, 2007).

While most studies have documented the positive effect of education on maternal health care-seeking behaviour, some researchers, however, have questioned the strong independent effects of education on the utilization of maternal health care services. For instance, Gage and Calixte (2006) argued that such factors as place of residence, the husband's educational attainment as well as socio-economic environment interact to confound the strong effect of education on maternal health care behaviour. In support of the argument that women's educational attainment alone may not be sufficient to improve health care-seeking behaviour, Kyomuhendo (2003) observed that there has not been an increase in the utilization of emergency obstetric care in Uganda despite an enabling policy environment and universal primary education. The author further argued that maternal health care-seeking behaviour of women in Uganda was not dependent on individual preferences but rather was conditioned by community poverty, norms and tradition.

In as much as maternal health care-seeking behaviour is not solely dependent on individual characteristics as indicated by empirical literature, it is imperative therefore to examine community characteristics that can interact with individual preferences or choices to influence maternal health-seeking behaviour. Against this backdrop this study makes an important contribution to the global debate on the contextual determinants of maternal health care-seeking behaviour with a special focus on how the interplay between individual and community characteristics influences maternal health care-seeking behaviour.

2.5   Theoretical Framework

Several theories or models have been used to explain how social conditions, community norms and individual behaviours are related to health outcomes and health behaviour. However, models that focus on individual behaviours do not take into consideration the interactions between social, cultural and environmental factors in detail. In view of this, two theoretical models were used in this study - the social ecological model of health promotion and the behavioural model of health services use, to explain the predictors of maternal health care-seeking behaviour. The social ecological framework is used in the explanation of multiple effects and the relationship between social elements in the environment, and it allows for the integration of multiple levels and contexts (Bronfenbrenner, 1979).

2.6   Social Ecological Model of Health Promotion

The social ecological model of health promotion is rooted in core principles of social ecological theory. The model emphasizes the interrelations between environmental conditions and human behaviour and wellbeing. Stokols (1996) in his study 'Translating social ecological theory into guidelines for community health promotion' outlined the core principles of the social ecological model of health promotion. One of the core tenets of the social ecological model is that environmental settings have multiple, physical, social and cultural dimensions that can influence health outcomes (including health behaviour). Physical and social conditions within an environment can affect the occupant's physiological, emotional and social wellbeing. The socio-physical environment includes various geographic, architectural, technological, organisational and socio-cultural conditions that are present within a particular setting or cluster, which are linked to health outcomes at both individual and community levels. The social ecological model also emphasizes that human health is

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influenced by a variety of personal attributes. For instance, environmental conditions such as population density, change of residence or economic recession may affect people's health and health behaviour differently depending on their personality, health practices and resources (Stokols, 1996). In sum, the theory holds that the environment is an enabler of health behaviour.

Applying the principles of the social ecological model, the socio-physical environment could be measured as a range of factors operating at the community and individual levels that can influence health care-seeking behaviour. For instance, social environmental conditions such as the levels of education in the community, poverty level, and availability of maternal health care services in the community can influence health care-seeking behaviour. Geographic conditions could reflect the location where women reside, which can also influence health behaviour (for instance, region of residence and place of residence, rural or urban). Technological conditions such as transport and mass media in the community and organisational conditions, which could refer to religious affiliation, may profoundly influence women's decisions to seek maternal health care. Socio-cultural conditions stipulated in the model could refer to women's ethnic origin- a reflection of cultural practices and norms which may also influence maternal health care behaviour.

2.7   The Behavioural Model of Health Services Use

A considerable number of studies in developing countries have explored the economic and socio-cultural barriers that deter women from seeking maternal health services. One of those studies is the work of Andersen (1995) on the behavioural model of health services use. This model was initially developed in the late 1960s by Andersen and was used to understand why families use health services; to define and measure equal access to health care and provide

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assistance in developing policies to promote equal access. Originally, the model focused on the family as the unit of analysis, but in subsequent work, the author emphasised the individual as the unit of analysis. The behavioural model of 1995 emphasized the multiple influences on health care service use and on health status. The key elements that can influence health care behaviour and health outcomes described in the model include environmental and population characteristics. Environmental factors include the health care system and the external environment, whereas population characteristics include predisposing, enabling resources and need.

Figure 2.1 The Behavioural Model of Health Service Use

ENVIRONMENT   POPULATION CHARACTERISTICS   HEALTH BEHAVIOUR

OUTCOMES

Health care system External Environment	Predisposing Characteristics ↓ Enabling Resources ↓ Need	Personal Health practices Use of health services	Perceived Health Status Evaluated Health Status Consumer Satisfaction
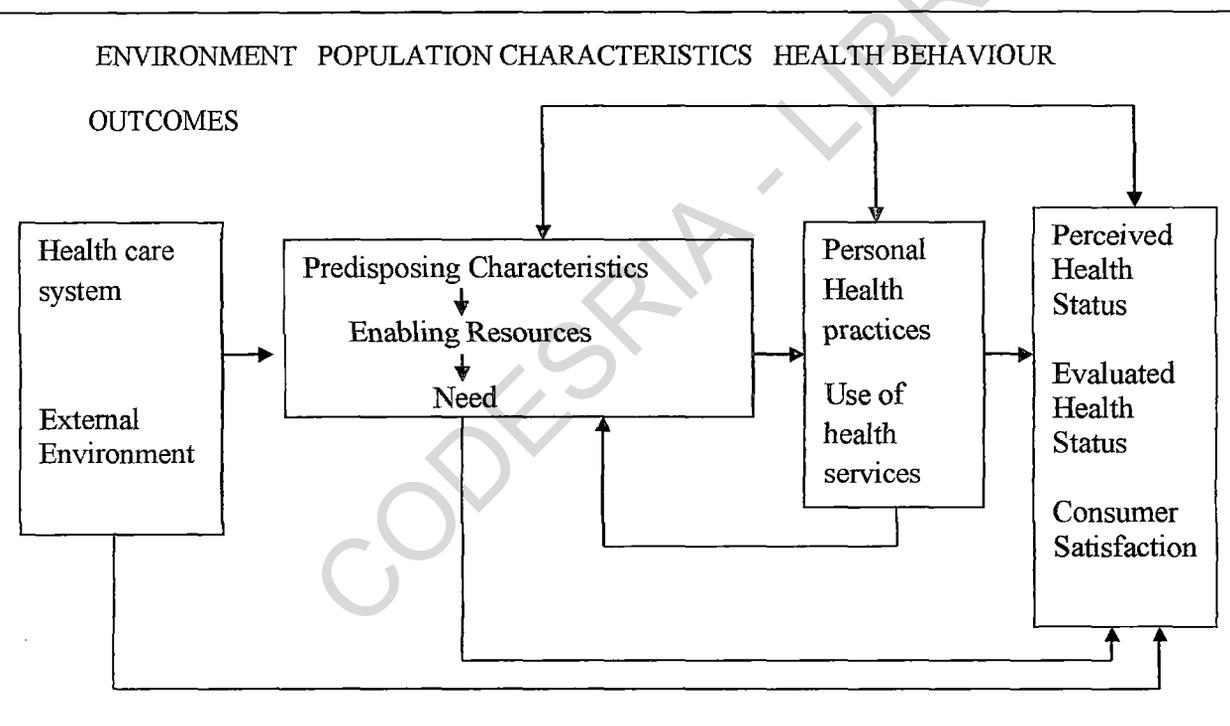
Source: Andersen, 1995, p.8

The main tenet of the behavioural model of health service use is the assumption that people's use of health care services is a function of predisposing factors (demographic and social

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structure), enabling factors (resources) which enable or impede use and their need for health care (perceived and actual) (Andersen, 1995).

Predisposing Characteristics

Following the principles of this model, predisposing demographic factors such as maternal age, parity, and marital status could influence the likelihood of seeking maternal health care. Social structure is measured by a wide range of factors that could determine social status and standing in the community, a person's ability to cope with and command the resources to deal with health problems, and how healthy or unhealthy the physical environment is likely to be. These characteristics could reflect educational attainment, occupation and women's autonomy. Health beliefs are attitudes, values and knowledge that people have about health and health care services, which could in turn influence their perceptions of need and use of maternal health services (Andersen, 1995).

Enabling Resources

The enabling resources in the model represent those resources that provide individuals with the means to use health care services. These resources must be available for use at any time they are needed, and can be found at the family and community levels. Family resources include family income (household wealth), health insurance coverage and a regular source of care (Andersen, 1995). These can also include the sex of the family head and family size which are important measures of family resources and welfare. Family resources determine the amount of funds available to the individual to cover health care and related costs.

Community Resources

Community resources include the number of health facilities and medical personnel available for the use of the individual. For example, the availability of a large number of health

facilities and personnel could reduce waiting time and increase the frequency of utilization of health care by individuals. Distance to health facility, money and transport can also enable women to seek care or deter them from seeking maternal health care. Resources at the community level can also include the nature of the community in which individuals reside (for instance, region of residence, place of residence (urban or rural) and ethnic concentration in the community). These could reflect local values and norms which consequently influence individual behaviour and decisions to seek maternal health care.

Need

Need based characteristics outlined in the model refer to health status or illness and its severity perceived by the individual or evaluated by the health providers (Andersen, 1995). The use of health care is determined by how individuals view their general health condition, how they experience the symptoms of illness as well as their perception of the severity of the illness. Though the predisposing and enabling factors are necessary for the utilization of health services, arguably they are not enough for actual use. Hence women's use of health care services according to the model is mostly triggered by their experiences and need during pregnancy, childbirth and postnatal stages or illness.

Despite the importance of these theories in the study of health and health behaviour, they have some limitations. The social ecological theory emphasised the integration of multiple levels of influence (individual and environmental factors) on health and health behaviour (McLaren & Hawe, 2005). The theory also incorporates two or more levels of influence which permits the examination of health problems and health behaviour at both individual and community levels (Stokols, 1996). However, one of the major limitations of the theory is that it places more emphasis on environmental factors. The behavioural model of health

service use has also outlined important factors influencing health care behaviour, but has focused mainly on the individual as the unit of analysis. Despite the recognition of individual and household factors, there is scant attention to broader environmental factors that may influence behaviour related to the use of health services. Hence the model has been criticised for paying less attention to social networks and the important interactions that exist between them and culture (Andersen, 1995).

2.8   Conceptual Framework

The literature review and theoretical frameworks reviewed informed a multi-factor conceptual framework that guided this study. Stokols (1996) social ecological model, applied in his study of community health promotion in United States, and Andersen's (1995) behavioural model of health service use which has been widely applied in the study of utilization of maternal health care services in developing countries, were adapted for this study.

Stokols's social ecological perspective emphasized the influences of physical and socio-environmental conditions (community factors) on health and health behaviour as well as multiple levels of influence at the individual and community levels (i.e. analysis at both individual and community level), while Andersen's model focused on predisposing (socio-demographic and structural factors), enabling (family and community resources) and need which influence women's decision to seek care.   These frameworks make important contributions to our understanding of a wide range of factors influencing maternal health care-seeking behaviour and could be applied to research as well as health promotion and intervention programmes.

However, the framework in Figure 2.2 builds on the two frameworks to incorporate two levels of influence at the individual and community levels. This is occasioned by the fact that individual behaviour can also be influenced by the characteristics of the community in which people reside. According to Stokols (1996) focusing on only individual level analysis may constitute a conceptual and programmatic "blind spot". Thus, "the conceptual 'blind spots' resulting from an exclusive focus on either behavioural or environmental factors at single and analytical levels are avoided by giving explicit attention to dynamic interplay among personal and situational factors in health at both individual and community levels" (Stokols (1996:287). In view of this, the two frameworks were modified and the classification of the variables was made based on the focus of this study. Thus the predisposing factors are the independent variables operating at the individual/household and community levels. This classification was also based on the fact that some variables belong in one or more groups (i.e. predisposing and enabling factors) (Amin *et al*. 2010). Distance to health facility, money and transport) were also included to logically organize the enabling factors. The conceptual framework for this study provides a logical organization of the determinants of maternal health-seeking behaviour; it is also useful for the understanding of factors that are likely to influence maternal health care behaviour at the individual and community levels.

The study's conceptual framework is presented in Figure 2.2.

Figure 2.2 Conceptual Framework for the Determinants of Maternal Health-Seeking Behaviour (Adapted and modified from Stokols (1996); Andersen (1995)

| Predisposing factors | ⟹ | Enabling factors | ⟹ | Outcome variables |

Individual / Household characteristics
- Maternal age
- Marital status
- Education
- Occupation
- Religion
- Autonomy (decision over own health)
- Parity
- Wealth index
- Household size
- Sex of household

Community factors
- Type of place of residence
- Region of residence
- Ethnic diversity
- Community women's education
- Community poverty
- Community media exposure
- Community hospital delivery

Health care access factors
- Distance to health facility
- Need Money
- Transport

Health behaviour
- Antenatal care visits
- Skilled antenatal care
- Place of delivery
- Skilled Postnatal care

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2.9   Explanation of the Conceptual Framework

From the conceptual framework in Figure 2.2 the predisposing factors include factors operating at the individual level (level-1) and community level (level-2) which can influence maternal health-seeking behaviour. According to the framework, the individual/household characteristics (individual level factors) such as maternal age, education, occupation, religion, marital status, women's autonomy, wealth index, household size, and sex of household head influence maternal health-seeking behaviour (outcome variables). The individual/household characteristics are also expected to mediate the enabling factors to influence health care-seeking behaviour outcomes. The framework recognised that community variables, including region of residence, type of place of residence (urban and rural), community mass media exposure, ethnic diversity, community women's education, community hospital delivery and community poverty, can have independent effects on maternal health care-seeking outcomes/behaviour. The community characteristics will also influence the enabling factors (health care access factors) such as money, transport and distance to health facility and subsequently maternal health care-seeking outcomes/behaviour. The conceptual framework also indicates that a combination of both individual and community factors will influence the outcome variables.

2.10   Statement of Hypotheses

Based on the research objectives and the theoretical frameworks and empirical literatures reviewed, the study hypotheses are as follows:

- Maternal health care-seeking behaviour is lower among women from Northern region of Nigeria than among those from Southern region. This is based on the assumption that environmental settings have multiple, physical, social and cultural dimensions

that can influence health outcomes/behaviour (Stokols, 1996). Environmental conditions such as low socio-economic development and consequent low socio-economic status and the location of more health care services in the Southern states than in the Northern states may constrain women in the North from seeking maternal health care (Adamu, 2011; NPC & ICF Macro, 2009).

- Maternal health care-seeking behaviour is lower for women in female headed households than for those from male headed households. This is on the premise that the head of a household is a determinant of family income and welfare (NPC & ICF Macro, 2009) and family resources determine the amount of funds available to the individual to cover health care and related costs (Andersen, 1995). Many poor households are headed by women, usually single mothers, widows, or women who have been abandoned (Rutstein & Johnson, 2004). Also in patriarchal societies including Nigeria, men have greater control over resources and women's reproductive behaviour (DeRose, 2003; Bankole & Sigh, 1998; DeRose, Nii-Amoo Dodoo and Patil, 2002). Thus it is most likely that women from female headed households may lack economic resources to seek maternal health care.

- Community women's education is significantly associated with maternal health care-seeking behaviour. This assumes that education enhances female autonomy and creates a more egalitarian society where women can negotiate better quality maternal health care services (Gabrysch & Campbell, 2009; Zerai, 1996).

- Maternal health care seeking behaviour is higher among women living in communities with a high proportion of women who have delivered in a health facility than among those living in communities with a low proportion of women that have

delivered in a health facility. This is based on the assumption that a high proportion of delivery in a community is a proxy for the availability of maternal health care services and the interaction with health practices of others, which in turn has the potential to increase maternal health care-seeking behaviour (Antai, 2009; Stephenson *et al.* 2006). In a community where health facility delivery is a common health practice, it becomes a norm which other women in the community may emulate.

- Ethnic diversity is positively and significantly associated with maternal health care-seeking behaviour. This is based on the premise that heterogeneity and social and ecological settings in Africa (Brockerhoff and Hewett, 1998) and in Nigeria in particular, may influence decisions to seek care.

- The association between individual/household factors and maternal health care-seeking behaviour will be moderated by community factors. This is based on the assumption that the magnitude of some individual effects on maternal health outcome variables (including health behaviour) changes as functions of some neighbourhood or community effects (Vu, 2005).

CHAPTER 3

DATA AND METHODOLOGY

3.0   Introduction

This chapter provides detailed information of the study area, study design, data sources, methods and research procedures. The chapter also provides a detailed description of the sample design, definition of variables used for analyses, the statistical methods employed for data analysis, and discusses the limitations of the study.

3.1   Study Design

The study is a cross sectional study, through the analysis of secondary dataset, the 2008 Nigeria Demographic and Health Survey.

3.2   Background of Study Area

Nigeria was created in 1914 by the British, through the amalgamation of the Northern and Southern protectorates.

3.2.1   Geography

Geographically, the country is located in the West African sub-region and bordered by Niger in the north, Chad in the north east, Cameroon in the east and Benin in the west. Nigeria covers a land area of 923.8 thousand square kilometres (356,700 square miles). Annual rainfall ranges from 381 centimetres along the coast to 64 centimetres or less in the far north. The country's terrain ranges from southern coastal swamps to tropical forests, open woodlands, grasslands, and semi-desert in the far north.

3.2.2 Government

Nigeria gained full independence in October 1, 1960, as a federation of three regions (northern, western, and eastern) under a constitution that provided for a parliamentary form of government. Under the constitution, each of the three regions retained a substantial measure of self-government. In October 1963, Nigeria altered its relationship with the United Kingdom, became a federal republic and promulgated a new constitution. The country is made up of 36 states and a Federal Capital Territory (Abuja) which is the administrative capital of the country. States are divided into a total of 774 local government areas. All of the 36 states and the Federal Capital Territory (FCT) are grouped into six geopolitical zones – South-East, South-South, South-West, North-Central, North-East and North-West.
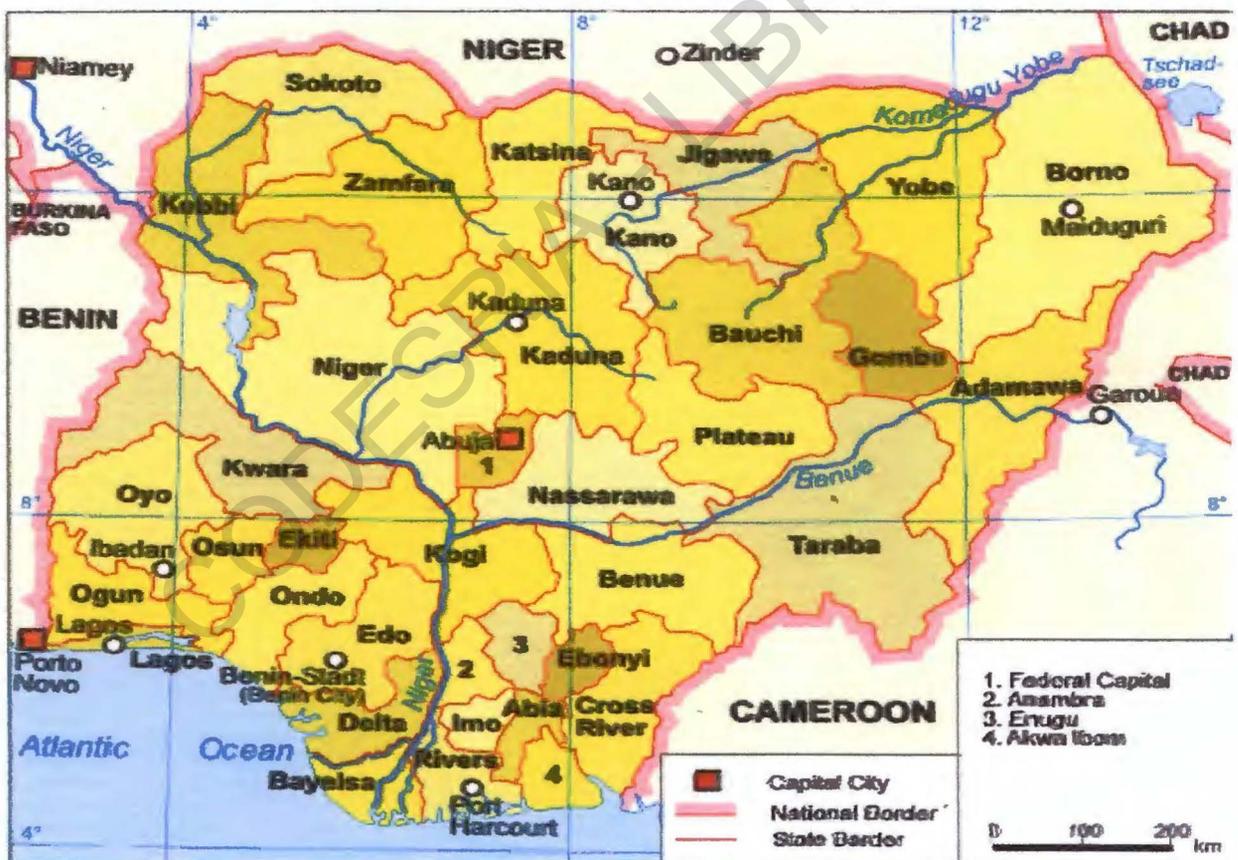
Figure 3.1 Map of Nigeria showing the 36 States and the Federal Capital Territory
Source: Wikipedia, 2006.

3.2.3 Population

Nigeria is Africa's most populous country. With a population growth rate of 2.0% (in 2010) the country accounts for over half of West Africa's population. The majority of the people live in the rural areas, while less than 25% are urban dwellers. Nigeria is culturally diverse. It is made up of about 250 ethnic groups with a variety of customs, languages, and traditions. The dominant ethnic group in the northern part of the country is the Hausa-Fulani, most of whom are Muslims. Other minority ethnic groups in the north are the Nupe, Tiv and Kanuri. The Yoruba people are predominant in the southwest. Half of them are Christians and half Muslims. The Igbo are found in the south eastern region and are predominantly Christians. The major southern minority ethnic groups include the Efik, Ibibio, and Ijaw.

3.2.4 Economy

Agriculture was the mainstay of Nigeria's economy, but the oil boom of the 1970s led the country to neglect its strong agricultural base in favour of an absolute dependence on crude oil. Nigeria is the largest exporter of crude oil in Africa. It is a member of the Organization of Petroleum Exporting Countries (OPEC), and its current crude oil production averages around 1.6 million barrels per day. Nigeria's proven oil reserves are estimated to be 36 billion barrels; natural gas reserves are well over 100 trillion cubic feet (Bureau of African Affairs, 2011). The country's economic strength is derived largely from its oil and gas reserves, which account for 99 percent of export revenues and 78 percent of government revenues (NPC & ICF Macro, 2009). In addition, the economy has continued to witness a massive growth of "informal sector" economic activities, estimated to be as high as 75% of the total economy. The agricultural sector, which has suffered mismanagement and poorly conceived government policies, still accounts for about 33% of GDP and two-thirds of employment (Bureau of African Affairs, 2011). Agriculture provides a significant fraction (approximately

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10%) of non-oil growth. With the onset of democratic administration in 1999, economic policies have become more favourable to investment and there has been tremendous progress toward establishing a market-based economy. As a result, there has been an improvement in the performance of the domestic economy. Nigeria's GDP growth rate was estimated at 2.7 percent in 1999, 2.8 percent in 2000, 3.8 percent in 2001 and by 2006, the real GDP growth rate was estimated at 6.0 percent (NPC & ICF Macro, 2009). In 2009, the GDP was estimated at $339 billion of which agriculture accounted for 33%, industry 34%and services 23%; while the real GDP growth rate was estimated at 6.1% and per capita GDP was $2,300 (Bureau of African Affairs, 2011).

3.2.5 Education

Education in Nigeria has gone through a series of policy changes. National policies on educational matters are vested in the Federal Ministry of Education. The ministry focuses on six areas of education including Early Childhood Education, Basic Education, Secondary Education, Tertiary Education, Adult and Non-formal Education, and Special Needs Education. The National Policy on Education grants every child the right to free primary education; this has consequently increased the enrolment of children and the number of educational institutions in the country. Currently Nigeria operates the 6-3-3-4 system of education introduced in 1981 which provides six years of primary education, followed by three years of junior secondary education, and three years of senior secondary education. The last four years comprise university or polytechnic education. In an effort to meet Nigeria's manpower requirements for national development, the Universal Basic Education (UBE) launched in October 1999 made it compulsory for every Nigerian child to be educated free up to junior secondary school level (NPC & ICF Macro, 2009).

3.2.6   Development Policies and Programmes

The rapid population growth and the associated adverse effect on national development has been one of the major challenges facing the Nigerian government. In response to this, the National Policy on Population for Development was approved in 1988. As a result of emerging issues in the country such as HIV/AIDS, poverty and gender inequality, the 1988 National Population Policy was reviewed, giving way to the National Policy on Population for Sustainable Development, launched in 2005. The new policy emphasized the improvement of quality of life and standard of living for the Nigerian population (NPC & ICF Macro, 2009). The major targets of the 2004 National Policy on Population for Sustainable Development were to reduce the national population growth rate to 2 percent or lower by 2015, the total fertility rate by at least 0.6 children every five years, child mortality rate to 45 per 1,000 live births by 2010 and the maternal mortality ratio to 125 per 100,000 live births by 2010 and to 75 by 2015 (NPC & ICF Macro, 2009).

3.2.7   Health

In view of the emerging issues, the National Health Policy promulgated in 1981 was revised. The Revised National Health Policy, launched in 2004, describes the goals, structure, strategy, and policy direction of the health care delivery system in Nigeria (NPC & ICF Macro, 2009). The overall objective of the Revised National Health Policy is to strengthen the national health system in order to provide effective, efficient, quality, accessible and affordable health services that will improve the health status of the people of Nigeria, through the achievement of the Millennium Development Goals (MDGs) (NPC & ICF Macro, 2009). The major targets of the policy include a reduction of under-five mortality and maternal mortality by 75% by 2015. The primary health care (PHC) in Nigeria is regarded as the framework through which the objectives of the National Health policy will be achieved.

The primary health care delivery services include health education, adequate nutrition, safe water and sanitation, reproductive health-family planning, and immunization. However, the health sector generally is characterised by wide regional disparities in status, service delivery, and resource availability. More health services are located in the southern states than in the northern states.

3.2.8   Rationale for Selection of Study Area

Nigeria, though the most populous country in Africa, is ravaged by high rates of maternal mortality, under-five mortality, low contraceptive usage, reproductive tract infections, and other maternal morbidity (Nigeria Reproductive health sub-programme, 2007). Maternal mortality was estimated at 15 per 1000 live births (Population Reference Bureau, 2005). In addition, the country has an under-five mortality of 157 per 1000 live births (NPC & ICF Macro, 2009). Other poor health outcomes include high teenage pregnancy (23%), poor pregnancy outcomes (such as stillbirth, spontaneous abortion, and low birth weight), poor survival chances for the newborn, and a high unmet need for family planning among currently married women (20%). The rate of stillbirths is 39 deaths per 1000 pregnancies (NPC & ICF Macro, 2009). Furthermore, maternal health care-seeking behaviour as established by empirical literature is very poor in the country. In view of this, it is therefore timely and worthwhile to be studying a country with myriads of poor maternal health outcomes and challenges. Furthermore, given the heterogeneity of the population of Nigeria, it is possible to get a wide range of information from different ethnic and religious groups on the factors affecting maternal health-seeking behaviour.

3.3   Data Source

The study uses data from the 2008 Nigeria Demographic and Health Survey (NDHS). The data set provided information on: knowledge and the use of family planning methods; fertility preferences; antenatal, delivery and postnatal care; marriage and sexual activity; teenage pregnancy and motherhood; women's work; the nutritional status of women and children; awareness and behaviour regarding HIV/AIDS and other sexually transmitted infections (STIs); maternal mortality, women's status obstetric fistulae; domestic violence; female genital cutting (FGC) and malaria prevention and treatment. The data collected is intended to provide comprehensive information that will enable policy makers to design appropriate programmes for improving health in Nigeria. The methodologies used for the surveys as contained in the 2008 NDHS are as follows:

3.4   Organization

The 2008 NDHS was conducted by the National Population Commission from June to October 2008. It is the most comprehensive of all the demographic surveys (forerunners were held in 1990, 1999 and 2003) conducted in the country. The Nigeria Demographic and Health Survey of 2008 is the only survey with disaggregated data at both the 6 geopolitical zones and 36 states including the Federal Capital Territory (FCT) (NPC & ICF Macro, 2009). The survey was funded by the United States Agency for International Development (USAID) and United Nations Population Fund (UNFPA). Technical assistance was provided by ICF macro through MEASURE DHS+. DHS is a programme sponsored by USAID to conduct population and health surveys with the aim of obtaining information on major population and health indicators.

3.5   Sample Design

The NDHS 2008 was designed to provide population and health indicators at the national, zonal and state levels. For administrative purposes, Nigeria is divided into states and each state is subdivided into Local Government Areas (LGAs). Each LGA is subdivided into localities. These localities are then subdivided into convenient areas called census enumeration areas (EAs). The sample frame used in the 2008 NDHS was lists of EAs developed from the 2006 population census. The primary sampling unit (PSU), which is referred to as the cluster, was selected from the lists of EAs. The 2008 NDHS sample was selected using a stratified two-stage cluster design, made up of 888 clusters; 286 in the urban and 602 in the rural areas. A weighted probability sample of 36,800 households was also selected and a minimum of 950 interviews were completed for each state. For each cluster, a listing of household and mapping was done, and the lists of households were used as the sampling frame for the selection of households in the second stage. All private households were listed and an average of 41 households were selected in each cluster, by equal probability systematic sampling. All women aged 15-49 who were either permanent residents of the households or visitors present in the households on the night before the survey were interviewed. A total sample of 33,385 women were interviewed. The response rates for the household and eligible women are 98.3 percent and 96.5 percent respectively.

3.6   Survey Questionnaires

Three questionnaires were used in the 2008 Nigeria Demographic and Health Surveys and these include the household, women's and men's questionnaires. The questionnaires (adapted from the DHS model questionnaire) reflected important population and health issues in Nigeria. These questionnaires were developed in English and then translated into three major Nigerian languages (Hausa, Igbo and Yoruba). The women's questionnaire was administered to all women aged 15-49 listed in the household questionnaire. The questionnaire also

provided information on respondents' background characteristics including the type of place of residence, region of residence, age, education, occupation, household wealth index, marital status and ethnicity. For the purposes of this study, analysis is limited to women aged 15-49.

3.7 Data Processing

The 2008 NDHS data was processed by the NPC personnel at the National Population Commission's demographic laboratory in Abuja.

3.8 Methods

3.8.1 Study Population and Sample Size

This study is based on women aged 15-49 who had last delivered a child in the five years preceding the 2008 Nigeria DHS. The reason is that it is assumed that information on maternal health care for the most recent birth is more accurate than that given for the previous birth (it minimizes recall bias on the part of respondents) (Kistiana, 2009). Sample size is one of the important parameters of any sample design and affects the accuracy of a survey more than any factor. In this study, four categories of maternal health-seeking behaviour indicators were used. The missing cases and non-response were excluded from the analysis, hence the sample size consists of 17560 women for skilled antenatal care, 16005 for antenatal care visits, 17542 for place of delivery and 17437 for postnatal care.

3.8.2 Variables Used in the Study and Rationale for Selection

The choice of variables used in the study was based on empirical and theoretical literature reviewed.

3.8.3 Dependent Variables

The selection of the dependent variables was occasioned by their importance in the prevention of adverse maternal health outcomes. The dependent variables include antenatal care visits, skilled antenatal care, place of delivery and postnatal care.

Antenatal Care Visits

The number of antenatal care visits a woman attends as shown in previous studies is important in the prevention of pregnancy complications and adverse maternal and child health outcomes (Ikamiri, 2004). The 2008 Nigeria Demographic and Health Survey asked the respondents: How many times did you receive antenatal care during this pregnancy? The responses enabled a classification of the number of times antenatal care was attended.

Skilled Antenatal Care

Skilled antenatal care was considered as an outcome variable of interest in this study because of its relationship with positive maternal health outcomes. Several studies have demonstrated its importance in the early detection of pregnancy complications. The information provided by health professionals during antenatal care visits is important for the successful management of pregnancies as well as the subsequent wellbeing of the mother and her newborn (Kistiana, 2009). In addition, a study in Vietnam found that antenatal care played a major role in the reduction of maternal mortality by improving the nutritional status of women and screening for high risk pregnancies (Swenson *et al.*, 1993). In the 2008 Nigeria DHS, respondents were asked the following questions: Did you see anyone for antenatal care for this pregnancy? And if the answer was yes, who did you see? The responses enabled a dichotomous classification of antenatal care provided by health professionals (doctor nurse/midwife) as recommended by WHO and antenatal care that was not attended to by health professionals

Place of Delivery

Place of delivery is another outcome variable of interest in the study. It is worth studying because empirical research has established its importance in studies of maternal health care-seeking behaviour. Moreover, it has been documented that most maternal and newborn deaths can be averted during delivery if an appropriate choice of place of delivery is made. Delivery

in a health facility assisted by skilled professionals has the potential to reduce maternal mortality (Kruk *et al.*, 2010). In addition, Thaddeus and Maine (1994) have consistently found that place of delivery is associated with the reduction in maternal mortality. The 2008 Nigeria Demographic and Health Survey elucidated information on place of delivery by asking the respondents 'where did you give birth to (Name of the child)?. The responses resulted in the creation of a dichotomous dependent variable, categorised as delivery that took place at home as opposed to delivery in a health facility (both public and private).

Postnatal Care

As documented in the literature, most maternal and neonatal mortality occurs in the first week after delivery (Warren *et al.* 2009). Postnatal care is one of the important interventions to help reduce maternal and new born deaths (Titaley *et al.* 2010). Thus its relevance in this study cannot be overemphasised. The 2008 Nigeria DHS asked relevant questions related to postnatal care; these are: (a) Before you were discharged after (name of child) was born, did any health care provider check on your health?, (b) After you were discharged, did any health care provider or a traditional birth attendance check on your health?, (c) Who checked on your health at that time?, (d) How long after delivery did the first check take place?

3.8.4 Independent Variables

The independent variables were selected based on empirical and theoretical works reviewed (for example Stokols's social ecological model of health promotion and Andersen's behavioural model of health service use). The independent variables are factors operating at the individual and community levels and represent predisposing and enabling factors which determine maternal health-seeking behaviour. The selection of these variables was occasioned by the fact that they are measurable and can have a profound influence on maternal health care-seeking behaviour.

3.8.5   Individual Variables

These are socio-demographic factors operating at the individual level and include the following:

Maternal Age at Last Birth

A mother's age at the birth of a child has been found to play an important role in decisions to seek maternal health care (Adamu, 2011), and it is associated with experience and knowledge, which in turn translates into the use of maternal health care services. The inclusion of maternal age in the study is also because of its demographic and biological importance. The survey did not provide direct questions on the mother's age at last delivery, thus this variable was calculated by subtracting the century month code (CMC) of the date of birth of the child from the current age reported by the respondent. In the survey, the respondents were asked: How old were you at your last birthday? The age of the child was assessed through these questions: a) In what month and year was (Name of child) born? b) What is his/her birthday?

Educational Attainment

Evidence from empirical research has consistently shown a strong and positive association between education and the use of maternal health care services in developing countries (Rogan & Olvena, 2004). Govindasamy and Ramesh (1997) have also suggested that education has the potential to liberate women from strict cultural practices and enhance their use of maternal health care services. Thus the inclusion of this variable is important in enhancing our understanding of maternal health-seeking behaviour.

The 2008 Nigeria DHS asked a question on whether the highest level of school the respondents had attended was primary, secondary, or higher.

Occupation

Economic dependency has been one of the major barriers to women's control over their reproductive behaviour in developing countries. However, empirical literature has shown that a woman's occupation is an important factor that influences her access to maternal health care services. This is because women who are working and earning money will have greater autonomy and control over financial resources, and thus they are more able to pay for maternal health care services (Adamu, 2011). Furthermore, it has been argued that employment can increase women's autonomy and reproductive health status because it raises awareness and provides new ideas, behaviour and opportunities through interaction with other people outside the home and community (Sharma *et al.* (2007:674). Therefore, for a better understanding of other pathways through which occupation influences maternal health care-seeking behaviour, the inclusion of the variable in this study is important. In the survey questionnaire, respondents were asked: What is your occupation, that is, what kind of work do you mainly do?

Religion

The relevance of religion in the study of maternal health care-seeking behaviour lies in its significant role in shaping beliefs, norms and values related to childbirth and the use of maternal health care services (Adamu, 2011). For instance, Ghuman (2003) argued that strict Islamic injunctions which encourage male domination constrain women's autonomy and thus limit their ability to make important decisions and so restrict their movement. This in turn could prevent women from seeking maternal health care even when complications arise. In the 2008 NDHS questionnaire, respondents were asked: What is your religion?

Ethnic Origin

Ethnic origin which represents cultural identity has been found to be significantly associated with the utilization of maternal health care (Babalola & Fatusi, 2009), and its inclusion in the study will throw more light on our understanding of the influence of the socio-cultural context on maternal health care-seeking behaviour. In the 2008 Nigeria Demographic and Health Survey, information on the respondents' ethnic origin was assessed through this question: What is your ethnic origin?

Parity

Several studies have shown a strong negative relationship between parity and maternal health care- seeking behaviour (Chakraborty *et al.* 2003). The inclusion of this variable is intended to capture the effects of the number of children ever born on a woman's likelihood of seeking maternal health care. The information on parity was assessed through relevant questions in the survey questionnaire related to reproduction. These include: (a) Do you have any sons or daughters to whom you have given birth who are now living with you?, (b) How many sons live with you? And how many daughters live with you? (c) Do you have any sons or daughters to whom you have given birth who are alive but do not live with you?, (d) How many sons are alive but do not live with you? And how many daughters are alive but do not live with you?

Women's Autonomy

Contemporary empirical research has established that women's autonomy is an important determinant of maternal health care behaviour (Kistiana, 2009). As a result, the variable was included in the study to enhance our understanding of the effects of women's empowerment (for example, decision making power) on maternal health care-seeking behaviour. In the 2008 Nigeria DHS, women's autonomy was measured as her decision making power on various

issues. With respect to this study, women's autonomy is measured as a woman's decision making power over her own health. In the survey questionnaire, respondents were asked 'Who usually makes decisions about health care for yourself: you, your husband/partner, you and your husband/partner jointly, or someone else?'

Marital Status

Studies indicate that marital status is associated with some maternal health-seeking behaviour indicators, like antenatal care visits, but showed no significant association with others (Eijk *et al.* 2006). It is therefore important to understand how this variable influences other maternal health care indicators, for example skilled antenatal and postnatal care. In the 2008 Nigeria DHS, respondents were asked related questions concerning their marital status. These include: Are you currently married or living together with a man as if married? Have you ever been married or lived together with a man as if married? What is your marital status now: are you widowed, divorced, or separated?

3.8.6 Household Variables

These are independent variables operating at the household level. The variables include:

Household Wealth Index

Household income or wealth has widely been recognised as an important factor influencing decisions to seek maternal health care. This variable, however, may represent financial autonomy and may increase our understanding of how family income influences a woman's propensity to seek maternal health care. In the 2008 Nigeria DHS, information on household wealth was assessed through questions on respondents' household assets (e.g. type of flooring, water supply, electricity, radio, television, refrigerator, type of vehicle). Household wealth index in the study is the DHS wealth index measured as a standardized composite variable made up of quintiles. This was derived through Principal Component Analysis (from

Factor Analysis) and based on household assets. Each quintile represents a relative measure of a household's socio-economic status (Rutstein and Johnson, 2004).

Sex of Household Head

The sex of a household head has been identified as an important determinant of maternal health care-seeking behaviour. Some studies have indicated that women from female headed households are more vulnerable, lack financial resources and are less likely to receive maternal health care (Jayaraman *et al.*, 2008). The selection of this variable therefore is based on its importance as a determinant of family income and indicator of family welfare (NPC & ICF Macro, 2009). This variable therefore has the potential to enhance our understanding of maternal health care-seeking behaviour. In the 2008 Nigeria Demographic and Health Survey, respondents were asked to list the names of persons who usually live in the household starting with the head of the household. The respondents were further asked: Is (Name) male or female?

Household size

Household size has been associated with household income and welfare. It has been observed that economic resources are often more limited in larger households (NPC & ICF Macro, 2009) and this in turn may restrict women from seeking maternal health care. Household size is therefore relevant in studies of maternal health care-seeking behaviour. The 2008 Nigeria DHS household questionnaire asked respondents to list the names of persons who usually live in their households and quests of the household.

3.8.7 Enabling Variables

The enabling variables used in the study include the following:

Getting Money

Empirical research has established that money (financial resources) was associated with the use of maternal health care services (Andersen, 1995; NPC & ICF Macro, 2009).

The rationale for including this variable in the study is that it is a significant determinant of maternal health care-seeking behaviour, and can enable or deter a woman from accessing maternal health care. In the 2008 NDHS questionnaire, women were asked: Is getting money needed for treatment a big problem or not a big problem when you want to get medical advice or treatment?

Transport Cost

Cost of transportation is another important factor that can prevent a woman from having access to maternal health care. Information on transport costs is important in understanding and addressing the barriers some women face in seeking care during pregnancy, and at the time of delivery (NPC & ICF Macro, 2009). The 2008 Nigeria DHS asked respondents: Is having to take transport a big problem or not a big problem when you want to get medical advice or treatment?

Distance to Health Facility

Similar to the two access care factors discussed above, distance to a health facility has been observed as an important factor that can influence a woman's access to health care. Thus information on this variable is equally important in understanding the problems women face in seeking maternal health care and how to address these problems. In the survey questionnaire, respondents were asked: Is the distance to the health facility a big problem or not a big problem when you want to get medical advice or treatment?

3.8.8   Community Variables

Community variables are factors operating at the community level which can influence maternal health-seeking behaviour. These were analyzed at the level of the primary sampling

unit (PSU), which are administratively defined areas used as proxies for neighbourhoods or communities (Antai, 2009). The community variables of interest include the following:

Region of Residence

The location of a woman's residence has been recognised as a significant determinant of maternal health-seeking behaviour. The region of residence is a pointer to the level of socio-economic development and will therefore enhance our understanding of the differentials in availability of maternal health care services as well as maternal health care-seeking behaviour. In the 2008 Nigeria DHS, region of residence was categorized into six major geopolitical zones: North Central, North East, North West, South East, South West and South South.

Type of Place of Residence

The importance of the type of place of residence in determining a woman's decision to seek maternal health care can also be explained through the availability of health care services (Kistiana, 2009). The 2008 Nigeria DHS lacks information on maternal health service availability, thus this variable was included in the study to capture the inequality in the distribution of maternal health care services. Place of residence in the 2008 NDHS was categorised as urban and rural.

Ethnic Diversity

Some studies have identified an association between ethnic diversity and reproductive health indicators (Uthman, 2010). This variable was included to capture the effect of heterogeneity on maternal health care-seeking behaviour. Information on ethnic diversity is lacking in the 2008 NDHS. Thus the variable was constructed based on the aggregation of individual responses to the question on the ethnic origin of respondents.

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Community Mass Media Exposure

Existing research on maternal health has documented the important role of mass media in disseminating information on health related issues through radio, television, news-papers and magazines. Thus a study of the mass media is important in understanding how exposure to health information can affect a woman's decision to seek maternal health care. In the 2008 Nigeria Demographic and Health Survey, respondents were asked relevant questions on exposure to information through media resources. These are as follows: Do you listen to the radio almost every day, at least once a week, less than once a week or not at all? Do you watch television almost every day, at least once a week, less than once a week or not at all? The responses to these questions enabled the construction of the community mass media exposure variable.

Community Women's Education

Previous studies have shown that community women's education is associated with maternal health care-seeking behaviour. In this study, the variable was selected because it could reflect women's socio-economic status as well as their increased autonomy, which in turn could influence maternal health care-seeking behaviour. The 2008 Nigeria DHS did not provide information on the proportion of educated women in the community. The variable was therefore constructed based on the aggregation of responses on individual educational attainment.

Community Poverty

Studies have shown an association between community poverty and maternal health care behaviour. The role of this variable in understanding maternal health care-seeking behaviour is very important; it could reflect women's economic status in the community, which in turn could influence their decisions to seek maternal health care.

The 2008 NDHS lacks data on community poverty, hence the variable was constructed based on information on the DHS household wealth index.

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Community Hospital Delivery

Empirical research on maternal health care has indicated that community hospital delivery is strongly associated with maternal health care-seeking behaviour indicators (for example Stephenson *et al.* 2006). This variable is used as a proxy for the availability of health facilities, which is an important determinant of maternal health care-seeking behaviour. The variable was constructed based on the question relating to respondents' place of delivery.

3.9 Variables and their Measurement

The measurement of the dependent and independent variables used in the study as well their coding are presented in the tables below.

Table 3.1 Dependent variables and their measurement and coding

Variables	Measurement/Definition	Coding
Skilled Antenatal care	This is measured as receiving antenatal care from health professionals (doctors, nurses\midwives)	ANC -Received (1) Did not receive (0)
Antenatal care visit	Measured as the number of antenatal care attendance	≤ 3 visits (0) 4 or more (1)
Place of delivery	Measured as delivery that took place at home or in a health facility. Responses to the question on the place of delivery in the survey enabled a dichotomous classification of those who delivered in a health facility relative to those who delivered at home. Delivery in a health facility is delivery that took place in public and private hospitals, clinics, health posts, others, while delivery at home includes own home and other home.	Home (0) Health facility (1)
Postnatal care	This is measured as a postnatal examination by a skilled health care provider (doctor, nurse/midwife) within 41 days following childbirth (NPC & ICF Macro, 2009)	Received (1) Did not receive (0)

Table 3.2 Individual-level variables and their measurement and coding

Variables	Measurement/Definition	Coding
Maternal age at last birth	Actual age of the respondent at the time of last delivery. This variable was constructed and calculated by subtracting the century month code (cmc) of the date of birth of the child from the century month code of the date of birth reported by the respondent.	Numeric response 15-24 (0) 25-34 (1) 35-49 (2)
Education	Highest level of education attained by respondents	No education (0) Primary (1) Secondary (2) Higher (3)
Occupation	Occupation of respondents. This was re-grouped into unemployment, formal employment (a merger of all professional and non-professional white collar jobs), agricultural employment and skilled manual workers.	unemployed (0) formal employment (1) Agric employment (2) Manual workers (3)
Religion	This is the religious affiliation of respondents. The survey provided information on religious affiliation in five categories. For this study religion is recoded into three categories.	Muslim (0) Christians (1) Traditional/Others (2)
Ethnic origin	This is defined as the ethnic affiliation of respondents categorised as Hausa, Igbo, Yoruba and others. Hausa is a merger of Hausa, Fulani and Kanuri ethnic groups. This is because they have common identity, language and religion. Other minority ethnic groups are merged as Northern/ Southern minority ethnic groups	Hausa (0) Igbo (1) Yoruba (2) Northern/Southern minority (3)
Parity	This variable is measured as Number of children ever born (live births)	Numeric response 1-2 (0) 3-4 (1) 5+ (2)
Women's autonomy	This variable is measured as decision making on a woman's own health care. The relevant question in the survey on who makes the final decision on own health care elicited categorical responses.	Wife alone (0) Wife/husband (1) Husband alone/ Others (2)
Marital status	This is the marital status of respondents, re-coded into three groups.	Never married (0) Currently Married (1) Formerly married (2)

Table 3.3 Household variables and their measurement and coding

Variables	Measurement/Definition	Coding
Household wealth index	Household wealth quintile of the respondent derived from the DHS wealth index. The DHS wealth index was calculated using household assets.	Poorest (0) Poor (1) Medium (2), Rich (3) Richest (4)
Sex of household head	Sex of the head of household.	Male (0) Female (1)
Household size	Measured as number of usual members in a household. From the numerical responses given to the question on number of household members, a household size variable was generated. A number of family members 1-4 is considered small, while 5 or more is classified as large.	Small (0) Large (1)

Table 3.4 Enabling variables and their measurement and coding

Variables	Measurement/Definition	Coding
Need money	This is defined as a perceived problem of money involved in accessing health care	Not a big problem (0) Big problem (1)
Transport	The variable is defined as a perceived problem of obtaining transport in accessing health care.	Not a big problem (0) A big problem (1)
Distance to health facility	Defined as a perceived problem of distance in accessing health care	Not a big problem (0) A big problem (1)

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Table 3.5 Community-level variables and their measurement and coding

Variables	Measurement/Definition	Coding
Region of residence	Defined as geopolitical zones with administrative boundaries, representing socio-economic context.	North Central (0) North East (1) North West (2) South East (3) South South (4) South West (5)
Type of place of residence	Defined as urban or rural	Urban (0) Rural (1)
Ethnic diversity	This is defined as the proportion of women from different ethnic groups (Hausa, Igbo, Yoruba, and Northern/Southern minority ethnic groups) in the primary sampling units (PSU) (Uthman, 2010). This measure was divided into three categories based on quantiles.	Low (1) Middle (2) High (3)
Community media exposure	This is the proportion of women who had media exposure in the community (PSU), assessed through responses on whether respondents read newspapers, listened to radio and watched television, every day, at least once a week, or less than once a week. To obtain the proportion exposed to mass media, these responses were aggregated at the community level (PSU). The measure was then divided into three quantiles.	Low (1) Medium (2) High (3)
Community women's education	This is measured as the proportion of women with secondary and higher education in the community (primary sampling unit or cluster). The proportion of women with secondary and higher education was obtained by aggregating the individual responses at the community level (PSU). The measure was then divided into three categories based on quantiles.	Low (1) Middle (2) High (3)
Community poverty	This variable is defined as the proportion of women in the two poor wealth quintiles (poorest and poorer) in the primary sampling unit (Rutstein & Johnson, 2004). This measure was then divided into three categories based on quantiles.	Low (1) Middle (2) High (3)
Community hospital delivery	Measured as the proportion of women who delivered in a health facility in the PSU (Antai, 2009). This measure was divided and categorised into three based on quantiles	Low (1) Middle (2) High (3)

3.10   Analytical Techniques and Statistical Models

Management of data and analysis was done using Stata 11.1 software. A number of variables were constructed, and recoded. For instance, community variables such as ethnic diversity (proportion of women from different ethnic groups in the PSU), community mass media exposure (proportion of women exposed to mass media in the PSU), community women's education (proportion of women with secondary and higher education in the PSU), community poverty (proportion of women from poorest households in the PSU) and community hospital delivery (proportion of women who delivered in a health facility in the PSU) were constructed through the aggregation of the individual level data at the community level (cluster).

In this analysis, the cluster or primary sampling unit (PSU) was used as the level of aggregation. The cluster is a civil administrative unit used as a proxy for the community (Pearl *et al.* 2001; Koenig *et al.* 2003). A total of 888 clusters were represented in the cluster sampling strategy adopted to draw the DHS original sample, but for the purpose of this study analysis was restricted to 886 clusters as indicated in the dataset. Specifically, the measurements related to the proportion of women from different ethnic groups, proportion exposed to mass media, proportion with secondary and higher education, proportion of women from the poorest households and proportion of those who had delivered in a health facility in the PSU, were constructed based on individual measures of the ethnic origin of women, exposure to mass media, education, household wealth index and health facility delivery respectively. In constructing the community variables, the index woman was excluded. This is because the inclusion of the index woman in the aggregation of individual measures would result in inter-correlation between individual and community-level variables, which in turn could result in a downward bias of the effects of either or both variables on individual outcomes (Do, 2008; Shieh and Fouladi, 2003). Furthermore, the inclusion of both

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individual and community level measures of the variables would help to avoid bias and the confounding effects that may be associated with models that use only aggregate measures (Greenland, 2001; Wakefield and Salway, 2001).

In addition, to ensure reliable data, sample weights provided in the DHS data were applied for the univariate and bivariate analyses in order to adjust for non-response and over sampling of some areas. The study employed univariate (frequency tables) bivariate (cross-tabulations, chi square test of associations and multilevel logistic regression techniques. Logistic regression is a predictive model that can be used when the dependent variable is binary. It does not assume a linear relationship between the independent and dependent variable; and a normal distribution of the dependent variable or the error term. Preliminary data suggests that the relationship between maternal health care-seeking behaviour and the independent variables is nonlinear, thus making logistic regression appropriate for this study.

3.11   Addressing the Research Objectives
This section outlines briefly how each of the study objectives was addressed.

3.11.1 Objective 1
The first objective examined the patterns of and differences in maternal health care-seeking behaviour in Nigeria. This objective was addressed using frequencies and cross-tabulations to identify the distributions of the dependent variables (antenatal care visits, skilled antenatal care, place of delivery and postnatal care) by selected independent variables at both individual and community levels (for instance education, religion, occupation, women's autonomy, household economic status, and region of residence). The chi square test of association was used to test the statistical significance of these bivariate distributions of the dependent variables across the independent variables.

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3.11.2 Objective 2

The second objective examined the impact of community factors on maternal health care-seeking behaviour. In order to examine the independent effects of community factors on maternal health care-seeking behaviour, a multilevel model for binary responses was utilized.

3.11.3 Objective 3

The third objective investigated whether community factors moderated the association between individual/household factors and maternal health care-seeking behaviour. This objective was addressed using multilevel logistic regression models. Both individual and community level predictors were simultaneously included in the regression equations with the individuals as the units of analysis. The multilevel modelling allowed the examination of community effects after controlling for individual-level confounders (Snijders and Bosker, 1999).

3.12   Multilevel Modelling

Most statistical methods assume that observations in the dataset are independent of each other, but when groups of observations share some common features or have information at different levels (for instance individual, community and region), they are no longer independent (Vu, 2005). This kind of data is therefore called hierarchical data. The DHS dataset has a hierarchical structure with women living within households and households located within communities, thus violating the assumption of independence of ordinary (linear) logistic regression models (Stephenson *et al.* 2006).

A multi-level modelling technique was employed in the study to account for the hierarchical nature of the data, and to be able to estimate community level effects on the outcome variable (maternal health care-seeking behaviour). Further, with hierarchical data, multilevel

modelling is required in order to remove the effect of clustering so as to obtain valid point estimates for the parameters and standard errors for the point estimates; and also to study the effect of variables that operate at different levels of the hierarchy and how the variability in the outcome variable is distributed across the levels of the hierarchy (Vu, 2005). The author has argued that through this, researchers can determine the level of hierarchy that has the greatest variation. This information is expected to be useful to health policy makers because interventions targeted at that level will have the greatest probability of success and thus the greatest effect on the whole community (Vu, 2005). In addition, the advantage of this model is that the researcher simultaneously estimates the individual and community level effects on the outcome variable (Zerai 1996).

A two-level model

A two-level multilevel logistic regression model was applied in the study. This consists of two sub-models at level 1 and level 2. This implies that individuals (level 1) were nested within communities (level 2). The level 1 model represents the relationships among the individual level variables[1], while the level 2 model examines the influence of community level factors.

A two-level model for a dichotomous outcome

A two-level multilevel model for a dichotomous outcome uses a binomial sampling and a logit link (Vu, 2005). In level 1 model, the outcome variable Y_{ij} for individual i living in community j is written as follows:

Probability $(Y_{ij} = 1 | B) = \Phi_{ij}$

Level 1 variance $= [\Phi_{ij} (1 - \Phi_{ij}]^*$

---

[1] Both individual and household characteristics are considered as 'individual- level' variables in the study. The reason for this is that the analysis is based on two levels and the average number of women in a household as contained in the dataset is small (1.7); thus the household cannot be considered as a level of analysis in this case.

Predicted log odds $n_{ij} = \log [\Phi_{ij} / (1 - \Phi_{ij})]$

$$n_{ij} = \beta_{0j} + \sum_{q=1}^{Q} \beta_{qj} X_{qij} \qquad (1)$$

Where

Φ_{ij} is the probability that the ith individual in the jth community take value "1" ("1" indicates that the event will occur)

β_{0j} is the level 1 intercept

β_{qj} is level 1 coefficients

X_{qij} is level 1 predictor q for ith individual within jth community

In level 2 model for a two-level model for dichotomous outcome, each of the level 1 coefficients, β_{qj} defined in the level 1 model becomes an outcome (Vu, 2005) and can be expressed as follows:

$$\beta_{qj} = \gamma_{q0} + \gamma_{q1} W_{1j} + \gamma_{q2} W_{2j} + \ldots\ldots\ldots\ldots + \gamma_{qS_q} W_{Sqj} + u_{qj}$$

$$= \gamma_{q0} + \sum_{s=1}^{S_q} \gamma_{qs} W_{sj} + u_{qj} \qquad (2)$$

Where

γ_{qs} (q = 0,1,...................S_q) are level 2 coefficients

Wsj are level 2 predictors and u_{qj} is level 2 random effects

All the level 2 random effects are assumed to have normal distribution with mean of 0 (zero) and variance of τ_{qq} (Vu, 2005). A comparison of the variance component (τ_{qq}) of the intercept (β_0) with its standard error gives an indication whether there are variations among communities in terms of maternal health-seeking behaviour.

3.13   The Multilevel Modelling Strategy

Before fitting the multilevel regression models, a stepwise logistic regression (forward selection procedure) was used to select the independent variables associated with each of the maternal health care-seeking behaviour indicators. This was done to identify the variables that are significantly related to the outcome variables. Thus only variables that showed a significant association with each of the outcome variables or were biologically important were included in the multilevel regression models.

In building the multilevel models, the general goals of multivariate analysis were taken into consideration. These include: the most biologically reasonable, the best fit and the most parsimonious model (Tan, 2001). The principle 'the most parsimonious' enables the researcher to choose among many alternative models, a model that includes a very small number of variables, all things being equal (Vu, 2005). However, the three important multilevel strategies were applied in order to build a model with predictive power as well as a model that satisfies these general goals. More importantly, this process allowed a simultaneous examination of the ith individual living within jth community (Goldstein, 1995; Statistics Canada, 2002; Vu, 2005).

Multilevel analysis was done in two stages so as to compare the independent effects of individual/ household factors and the independent effects of community level factors. In the first stage (in Chapter 5), three models were fitted.

The first model, which is usually called the "empty" or "null" model, was fitted without explanatory variables. In other words, it contains no covariates, but decomposes the total variance into individual and community components. The empty model also enables the researcher to verify if the random effects at the community level are large enough to justify assessing random effects at that level and to test the hypothesis that the community level

variance is equal to zero (Babalola & Fatusi, 2009). Furthermore, the empty model was used to determine whether the overall difference between communities and individuals in terms of maternal health outcome/behaviour (namely antenatal care visit, skilled antenatal care, place of delivery and postnatal care) was significant.

The second model, referred to as the "individual model", included individual characteristics. This is to allow the assessment of the association between the outcome variable and individual characteristics. The model containing the individual level variables was used to determine whether the variation across communities could be explained by the characteristics of the individuals residing within that community or not. The third model contained both the individual and enabling variables. This model also allowed the assessment of the independent effects of the individual/household level variables on maternal health care-seeking behaviour. In the second stage (Chapter 6) a total of four models were fitted. The first model is the empty model which has been described earlier. A second model was also fitted, containing only the community characteristics to allow the assessment of the impact of the community variables on the outcome variable, while the third model included both the community and enabling factors.

Lastly a fourth model was generated, which is called the "final model". This included explanatory variables at both the individual and community levels. The final model was used to test for the independent effect of community contextual variables above and over the individual variables. This model also enabled the researcher to estimate whether the community factors moderated the association between the individual/household factors and maternal health care-seeking behaviour.

3.14   Fixed and Random Effects

Fixed effects are the individual and community covariates, expressed as odds ratio (OR) and 95% confidence interval (95% CI). The random effects are the measures of variation in maternal health care-seeking behaviour across communities. The ratio of the variance at the community level to the total variance is referred to as the intra-class correlation coefficient. This is an important tool for assessing the degree of homogeneity within units such as families or communities (Graffiths *et al.*, 2004). The precision was measured by the standard error (SE) of the independent variables (Antai, 2009). The results of random effects (which are the measures of variation) are expressed as Variance Partition Coefficient (VPC) (which in this study is equal to intra-class correlation (ICC)); and proportional change in variance (PCV).

For binary outcomes, the partition of variance between different levels does not have a similar interpretation to the case of the linear model. As a result, the VPC in this analysis was calculated based on the linear threshold model or latent variable method which converts the individual level variance from the probability scale to the logistic scale, on which the community level variance is expressed (Merlo *et al.* 2006). In other words, by using the linear threshold model, the unobserved individual outcome variable follows a logistic distribution with individual level variance σ^2_e equal to $\pi^2/3$ (equal to 3.29). In this case, the VPC corresponds to the intra-class correlation coefficient (ICC), which is a measure of general clustering of the individual outcome of interest in the communities.

The intra-class correlation is calculated as:

$$\rho = (\sigma^2_\mu / (\sigma^2_\mu + \pi^2/3)) \qquad (3)$$

Where:

ρ is the intra-class correlation (ICC). σ^2_μ is the variance at the community level. $\pi^2/3 = 3.29$ and represents the fixed individual variance (Snijders & Bosker, 1999).

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Proportional change in variance (PCV)

Community differences in maternal health care-seeking behaviour may be attributable to contextual influences or differences in the individual composition of communities (including unobserved individual characteristics) (Merlo *et al.*, 2004). In view of this, while adjusting for the individual characteristics in the multilevel models, some part of the compositional differences were taken into consideration to explain some of the community differences observed in the empty model. Thus the equation for the proportional change in community variance is:

$$PCV_1 = (V_{N-1} - V_{N-2}) / V_{N-1} \qquad (4)$$

Where

V_{N-1} is the community variance in the empty model and V_{N-2} is the community variance in the models including individual characteristics or community characteristics.

3.15   Statistical Tests for the Multilevel Models

The maximum likelihood was evaluated by integrating out the random effects using the adaptive Gaussian quadrature (AGQ) (Gutierrez, 2007) available in Stata (version 11.1), while the likelihood ratio (LR) statistics were used to test the null hypothesis that the community level variance is equal to zero. Regression diagnostic AIC (Akaike information criterion) and the BIC (Bayesian information criterion) was used to determine the goodness of fit of the model. The AIC is appropriate for comparing non-nested models such as those estimates used in the analysis and is calculated as -2 (log-likelihood of fitted model) +2p, where p is the number of parameters in the model (Boco, 2010). The AIC and BIC values for each model are compared and the model with the lowest value is considered to be the better model (Uthman & Kongnyuy, 2008).

3.16 Ethical Consideration

This study is based on an analysis of the existing survey data set with all identifier information removed. The conduct of the survey was approved by both the Ethics Committee of the Opinion Research Corporation Macro International Incorporated (ORC Macro Inc.), at Calverton in the USA and the National Ethics Committee in the Federal of Ministry of Health in Nigeria. Informed consent was obtained from all the participants before participation in the survey and information was collected anonymously and confidentially.

3.17 Limitations of the Study

This study has some limitations that are noteworthy, and all study results must be interpreted with consideration of these limitations. One key limitation of the study is associated with the definition of relevant 'groups', which is a great challenge in multilevel analysis. The study used primary sampling units (PSU) as a proxy for the community and this may have biased the results due to selection bias. Communities or neighbourhoods are defined in relation to geographical criteria, administrative boundaries or respondents' perceptions (Gage, 2007). As Boco (2010) noted, using the DHS primary sampling unit as the community may bias results towards a functioning population as a result of endogeneity and selection effects. Selection bias recognizes the fact that individuals or families have some degree of choice regarding the communities in which they live (Vu, 2005). In consideration of this fact, if important unmeasured individual characteristics lead individuals (women) to choose certain kinds of communities which influence their health care-seeking behaviour either positively or negatively, then the observed effects of community level factors in this study may have been biased and the direction of this selection bias is unclear. In other words, it is not certain whether this bias would result in an overestimation or underestimation of the true effects of the community factors in this study.

It has frequently been argued that the selection bias results in an overestimation of community effects since advantaged populations are most likely to live in advantaged communities; while disadvantaged groups are more likely to live in disadvantaged communities as they cannot afford better neighbourhoods (Vu, 2005). Thus the coincidence of having high levels of health care-seeking behaviour among women in advantaged communities may result from living in such communities. However, the emphasis here is that the important individual factors controlled for in this study may be linked to some of the unobserved factors, and thus would help reduce the potential biases that would otherwise have resulted from not controlling for some possible confounders.

In addition, the possibility of transactional effects on the results of this study should also be taken into consideration. The transactional model states that it is not only individuals that can create and shape their communities, but also that characteristics of individuals or families can be shaped by the communities in which they live (Brooks-Gunn *et al.*, 1997). Furthermore, it has been argued that if aspects of the social environment influence health including health behaviour, by operating as upstream determinants of individual characteristics, then controlling for many downstream individual characteristics (as shown in the study) may over-adjust the true effects of the community contexts (Merlo, 2003). The community in which an individual resides may affect her characteristics in many ways. For instance, communities with a proportion of educated women can influence individuals' socio-economic status. The community effects in the study were estimated, while controlling for maternal age, educational attainment, ethnic origin, religion, occupation and household wealth index among others. Therefore, if community factors do affect these individual level variables, which in turn influence maternal health care-seeking behaviour, the control for these variables may have over-adjusted the true effects of the community variables.

Another limitation of the study relates to the community contextual variables used in the analysis. With the exception of region of residence and place of residence, all the community variables were constructed by aggregating the individual level characteristics at the community level. The problem with this approach is that it could result in multicollinearity, since the same variables were aggregated at the community level (Boco, 2010; Rajaratnama *et al.* 2006). However the test for collinearity showed that most of the variables were not highly correlated. In addition, it is associated with the problem of making inferences at a higher level (community level) based on information from data collected at a lower level (individual level) (Boco, 2010).

The 2008 Nigeria Demographic and Health Survey data was collected retrospectively. This, however, may be associated with recall bias, given that the events took place five years following the survey. For instance, women may forget or may not accurately recall during the interview the number of antenatal care visits, place of delivery and postnatal care attendance. Further, because of the high level of illiteracy, especially among women in the northern region, there may have been misunderstandings of some questions and concepts, resulting in biased responses and misreporting of antenatal, delivery and postnatal care. Further, the assets-based wealth index used in the DHS is only a proxy indicator of household economic status; hence it may not produce results similar to those obtained from direct measures of income in other datasets where such data are reliably collected (Antai, 2009).

The Nigeria Demographic and Health survey provides cross-sectional data, which makes it difficult to establish a cause-effect relationship of variables. In addition, being a cross-sectional data the study was not able to capture changes in communities and regions of residence and thus ignored potential effects of stability and change in a given community on

the health behaviour of individual residents. Put differently, the study was unable to measure the length of time that women had spent in their communities and the extent of their exposure to the community environment. As such, it was not possible to determine whether associations of community characteristics with maternal health care-seeking behaviour were due to cumulative effects. This bias may result in an underestimation of community effects, since people living in a community or neighbourhood for a long time are more exposed to their communities than people who have recently moved there; those exposed for a longer period of time are probably more likely to have their health or health behaviour affected by community characteristics (Vu, 2005).

3.18   Study Strengths

Despite the identified limitations, the validity of the study remains significant. It is a large population based study with a national coverage. Its representativeness affords the researcher the opportunity to examine maternal health care-seeking behaviour simultaneously among women in Nigeria's heterogeneous regions. The findings are relevant for comprehensive national policy initiatives and can be generalized to other developing countries. The strength of the study also lies in its major findings, which are consistent with theoretical perspectives and empirical research findings in Africa and developing countries.

The study findings represent a further step toward an improved understanding of community factors influencing maternal health care-seeking behaviour in developing countries, Nigeria in particular. The study also provides empirical evidence that information about a community is important for a better understanding of variations in its antenatal, delivery and postnatal care. Moreover, examining different domains of communities and their effects on maternal health care-seeking behaviour allows for more complete tests of relevant theories, suggesting which aspects of communities are potential targets for policy manipulation.

CHAPTER 4

PATTERNS OF AND DIFFERENTIALS IN MATERNAL HEALTH CARE-SEEKING BEHAVIOUR

4.0   Introduction

This chapter presents the distribution of the study population by maternal health care-seeking behaviour and selected background characteristics, as well as the patterns of maternal health care-seeking behaviour in Nigeria. First, the description of the study population by antenatal care, antenatal care visits, place of delivery and postnatal care was presented. This was followed by a description of the study population by selected background characteristics (individual and community). Community data and individual data were treated separately in the descriptive analysis. Further, descriptive community data are presented with the aid of pie charts. Finally, the bivariate relationship between health care-seeking behaviour indicators and the respondents' background characteristics was presented.

4.1   Description of Study Population by Maternal Health Care-Seeking Behaviour

This section presents the descriptive statistics of the study population with respect to the dependent variables (antenatal care visits, skilled antenatal care, place of delivery and postnatal care).

Table 4.1 Percentage distribution of women aged 15-49 years by antenatal care visits, skilled antenatal care, place of delivery and postnatal care, Nigeria 2008 DHS

	All women	Percent
ANC visits		
≤ 3 visits	8102	50.6
4 or more visits	7903	49.4
Total	16005	100
Skilled ANC		
Not received	7381	42.0
Received	10179	58.0
Total	17560	100
ANC visits		
≤ 3 visits	8102	50.6
4 or more visits	7903	49.4
Total	16005	100
Place of delivery		
Home	10759	61.3
Health facility	6783	38.7
Total	17542	100
Postnatal care		
Not received	11646	66.8
Received	5791	33.2
Total	17437	100

Figures do not add up to DHS total sample of 17635 because of the exclusion of missing values and non-response.

Table 4.1 shows that less than half (49.4%) of the study sample had had four or more antenatal care visits, whereas women who had received skilled antenatal care accounted for 58% of the study population. In the study sample, the majority of women (61.3%) delivered at home, whereas 38.7% delivered in a health facility. Meanwhile, only 33.2% of the women received postnatal care.
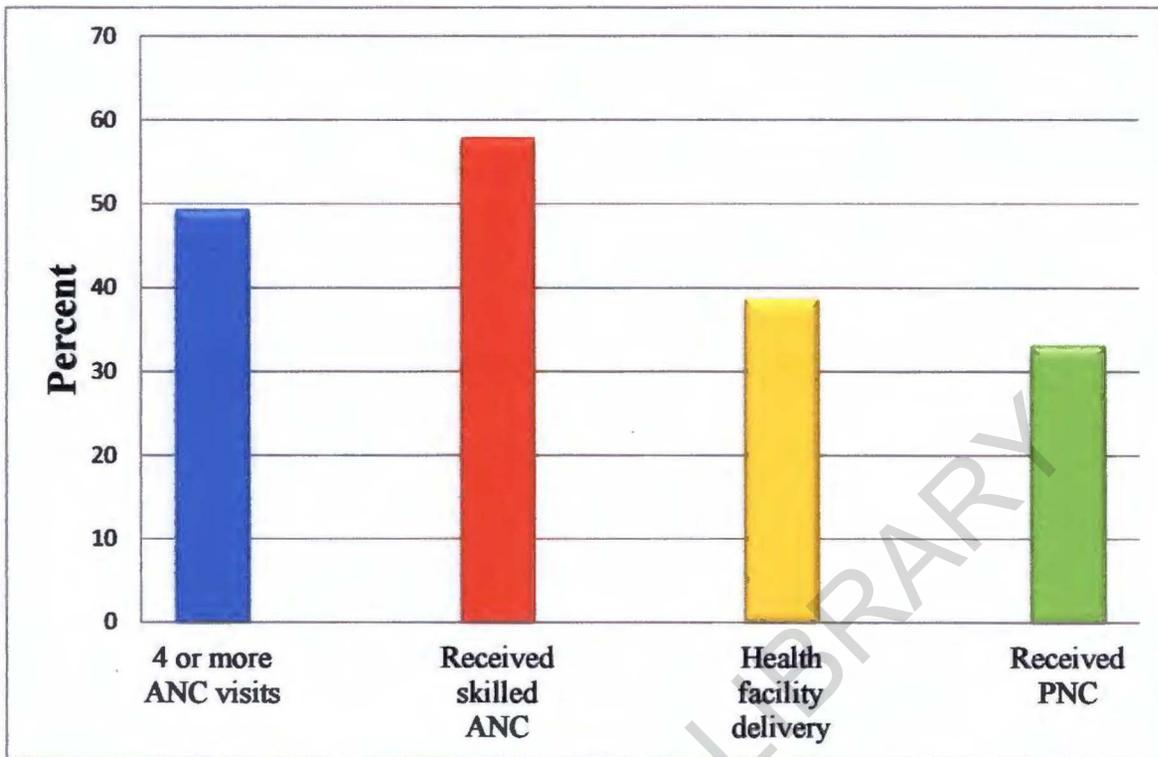
Figure 4.1: Distribution of maternal health care-seeking behaviour in the study population.

4.2   Description of Study Population by Background Characteristics

In this section, the descriptive statistics of the study population by selected individual/household and community characteristics was presented.

4.2.1   Individual/household Level Characteristics

This sub-section presents the description of individual/household characteristics which could influence maternal health care-seeking behaviour. These include: maternal age at last birth, marital status, educational attainment, occupation, religion, ethnic origin, parity, household wealth index, household size and sex of household head. In addition,

enabling variables such as money, transport and distance to health facility were also presented.

Table 4.2 Percentage distribution of women by individual characteristics, Nigeria 2008 DHS

Variable	Percent	All women (n)
Maternal age at birth		
15-24	36.9	6476
25-34	44.7	7847
35-49	18.4	3238
Marital status		
Never Married	2.4	422
Currently married	94.6	16605
Formerly married	3.0	533
Educational attainment		
No education	45.4	7969
Primary	22.8	4004
Secondary	25.9	4542
Higher	5.9	1045
Occupation		
Unemployed	30.4	5312
Formal employment	41.4	7235
Agricultural employment	17.2	3005
Manual workers	10.9	1910
Religion		
Muslim	54.3	9482
Christian	44.0	7685
Traditional/Others	1.7	297
Ethnic origin		
Hausa	39.6	6924
Igbo	11.6	2033
Yoruba	15.0	2627
Northern/Southern minority	33.7	5887
Women's autonomy (decisions over own health)	8.8	1450
Wife alone	33.1	5477

Wife/husband	58.2	9634
Husband alone/Others		
Parity		
1-2	40.7	7144
3-4	32.7	5740
5 or more	26.6	4677
Household wealth index		
Poorest	23.1	4059
Poor	22.2	3898
Middle	19.0	3332
Rich	18.2	3187
Richest	17.6	3084
Household size		
Small (<5 members)	28.7	5041
Large (5 or more members)	71.3	12519
Sex of Household head		
Male	89.3	15689
Female	10.7	1871
Need money		
Not a big problem	41.0	7177
A big problem	58.9	10322
Transport		
Not a big problem	63.5	11104
A big problem	36.5	6385
Distance		
Not a big problem	61.4	10734
A big problem	38.6	6754

As shown in Table 4.2 above, the percentage increased along the younger age groups, peaked at 25-29 years (26%) and dropped at the older ages. A significant proportion of women (41%) had given birth to one or more children. The majority of the women (95%) were currently married. The study population is made up of a significant percentage of women with no education (45%). Women who had primary and secondary education comprised 26% and 23% of the study sample respectively, whereas the lowest proportion (6%) had higher education.

For the entire sample, 54% were Muslims and 44% were Christians, while others were traditional religionists. A significant proportion (30%) of the women were unemployed. Over one third were in formal employment, while 17% worked in the agricultural sector. The lowest proportion (11%) of the study sample were manual workers. The ethnic origin of the women reflects the dominance of the three major ethnic groups in Nigeria; Hausa 40%, Igbo 12% and Yoruba 15%. The minority ethnic groups from Northern and Southern Nigeria make up 34% of the sample. More than half of the women reported that their husbands or other people have a final say over their n health. Almost two thirds of women perceived that money is a big problem in accessing medical care, while more than one quarter perceived that transport and distance were big problems. Less than half of the women (45%) were in the two poorest wealth quintiles, while the lowest proportion was in the richest wealth quintile. More than two thirds (71%) of women in the sample were from large households, while more than three quarters (89%) were from male headed households.

4.2.2 Community Level Characteristics

At the community level, there were seven (7) variables reflecting 7 different domains of communities; these include place of residence, region of residence, community women's education, community hospital delivery, community poverty, community mass media exposure and ethnic diversity. All are categorical variables.

Table 4.3 Percentage distribution of women by community characteristics, Nigeria 2008 DHS

Variable	Percent	All women (n)
Type of place of residence		
Urban		
Rural	30.2	5308
	69.8	12253
Region of residence		
North Central	14.3	2516
North East	15.6	2745
North West	30.4	5337
South East	9.1	1599
South South	13.1	2303
South West	17.4	3061
Community women's education		
Low		
Medium	42.6	7487
High	29.0	5097
	28.3	4976
Community hospital delivery		
Low	40.3	7072
Medium	27.4	4807
High	32.4	5682
Community poverty		
Low	30.5	5356
Medium	29.4	5166
High	40.1	7039
Community mass media exposure		
Low	32.9	5779
Medium	32.4	5683
High	34.7	6098
Ethnic diversity		
Low	41.1	7223
Medium	28.4	4984
High	30.5	5354

Table 4.3 presents the descriptive analysis of the community-level variables. A large proportion (70%) of the study population lived in the rural areas, while 30.2% lived in the urban areas. One third of the women resided in the North West region, while about 14% and 16% lived in North Central and North Eastern regions respectively. In the study population, the lowest proportion of women lived in the South Eastern region, whereas about 17% and 13% lived in South West and South South respectively. A significant 43% of the study

sample lived in communities with a low proportion of educated women, while more than one

quarter lived in communities with a medium and high proportion of educated women. The

highest proportion of the women (40.3%) resided in communities with a low proportion of

women that had delivered in a health facility, whereas over one third and 27% lived in

communities with a medium and high proportion of women who had had a health facility

based delivery respectively. Women who lived in communities with a high and a low

proportion of women from poor households constituted 40.1%, and 31% of the study

population respectively. Over one third of the women resided in communities with a high,

medium and low proportion of women who were exposed to mass media. A significant

41.1% of the study sample resided in communities with a low proportion of women from

different ethnic groups, while 31% and 28.4% lived in high and medium ethnic diversity

communities respectively.

Table 4.4 Inter-correlations among community level variables

	Type of place of residence	Region	Community women's education	Community hospital delivery	Community poverty	Community mass media exposure	Ethnic diversity
Type of place of residence	1	-	-	-	-	-	-
Region	-0.159	1	-	-	-	-	-
Community women's education	-0.427	0.348	1	-	-	-	-
Community hospital delivery	-0.429	0.303	0.682	1	-	-	-
Community poverty	0.588	-0.398	-0.638	-0.627	1	-	-
Community mass media exposure	-0.445	0.277	0.558	0.464	-0.497	1	-
Ethnic diversity	-0.064	-0.021	0.499	0.385	-0.109	0.189	1

4.3 Patterns of Maternal Health Care-Seeking Behaviour

This subsection presents the bivariate relationship between women's characteristics and maternal health care-seeking behaviour indicators.

4.3.1 Antenatal Care Visits and Skilled Antenatal Care with Respondents' Background Characteristics

Table 4.5 presents the bivariate association between selected individual/household and community characteristics and antenatal care indicators (antenatal care visits and skilled antenatal care).

Table 4.5 Percentage distribution of women by individual, household and community characteristics controlling for antenatal care visits and skilled antenatal care, Nigeria 2008 DHS

Variable	Skilled ANC		ANC visits		
	Received	Did not receive	≤ 3 visits	4 or more visits	
	%	%	%	%	P-value
Maternal age at last birth					
15-24	51.9	48.1	57.3	42.7	
25-34	63.9	36.1	43.9	56.1	0.001
35-49	55.7	44.3	53.2	46.8	
Marital status					
Never Married	66.2	33.8	43.7	56.3	
Currently married	57.5	42.5	51.0	49.0	
Formerly married	65.0	35.0	44.4	55.6	0.002
Educational attainment					
No education	31.0	69.0	76.8	23.2	
Primary	69.1	30.9	40.1	59.9	
Secondary	86.3	13.7	20.1	79.9	
Higher	97.8	2.2	5.9	94.1	0.001
Occupation					
Unemployed	47.7	52.3	61.6	38.4	
Formal employment	67.2	32.8	39.1	61.0	
Agricultural employment	53.5	46.5	58.6	41.4	
Manual workers	58.2	41.8	50.7	49.3	0.001
Religion					
Muslim	42.6	57.4	65.3	34.7	
Christian	77.9	22.1	30.5	69.5	
Traditional/Others	38.5	61.5	64.6	35.4	0.001

Ethnic origin					
Hausa	31.8	68.2	76.7	23.3	
Igbo	88.3	11.7	19.7	80.3	
Yoruba	88.1	11.9	9.5	90.5	
Northern/Southern minority	65.0	34.9	46.0	54.0	0.001
Women's autonomy (decisions over own health)					
Wife alone	73.8	26.2	31.2	68.8	
Wife/husband	72.4	27.6	35.5	64.5	
Husband alone/Others	46.7	53.3	62.2	37.8	0.001
Parity					
1-2	47.7	39.2	47.7	52.3	
3-4	59.2	40.8	48.8	51.2	
5 or more	52.3	47.7	57.2	42.8	0.001
Household wealth index					
Poorest	23.6	6.4	83.8	16.2	
Poor	39.9	60.1	69.1	30.9	
Middle	64.3	35.7	46.1	53.9	
Rich	82.4	17.7	25.7	74.3	
Richest	94.1	6.0	7.6	92.4	0.001
Household size					
Small (<5 members)	63.8	36.2	43.6	56.4	
Large (5 or more members)	55.6	44.4	53.4	46.6	0.001
Sex of household head					
Male	56.6	43.4	51.9	48.1	
Female	69.1	30.9	39.8	60.2	0.001
Need money					
A big problem	50.8	49.2	58.7	41.3	
Not a big problem	68.4	31.6	39.1	60.9	0.001
Transport					
A big problem	44.1	55.9	64.8	35.2	
Not a big problem	66.0	34.0	42.5	57.5	0.001
Distance					
A big problem	45.8	54.2	63.4	36.6	
Not a big problem	65.7	34.3	42.6	57.4	0.001
Type of place of residence					
Urban	84.2	15.8	22.5	77.5	
Rural	46.6	53.4	62.4	37.6	0.001
Region of residence					
North Central	65.3	34.7	47.9	52.1	
North East	43.1	56.9	67.1	32.9	
North West	31.3	68.7	78.0	22.0	
South East	87.2	12.8	22.0	78.0	
South South	70.0	30.0	35.8	64.2	
South West	87.5	12.5	10.5	89.5	0.001
Community women's education					
Low	29.1	70.9	78.3	21.7	
Medium	72.2	27.8	37.6	62.4	
High	86.8	13.2	19.1	80.9	0.001
Community hospital delivery					
Low	25.2	74.8	81.6	18.4	
Medium	70.9	29.1	39.2	60.8	
High	87.8	12.2	18.1	81.9	0.001

Community poverty					
Low	90.4	9.6	13.5	86.5	
Medium	62.2	37.8	46.5	53.5	
High	30.2	69.8	78.3	21.7	0.001
Community mass media exposure					
Low	34.4	65.6	74.5	25.6	
Medium	60.3	39.7	49.5	50.5	
High	78.2	21.8	28.2	71.8	0.001
Ethnic diversity					
Low	38.1	61.9	71.0	29.0	
Medium	75.5	24.5	29.6	70.4	
High	68.4	31.6	41.7	58.3	0.001
Total	58.0	42.0	50.6	49.4	

Note: ANC visits and skilled ANC have the same p-value

Results in Table 4.5 above shows that women in age group 25-34 and older women (35-49 years) were more likely to have four or more antenatal care visits and receive skilled antenatal care than younger women aged 15-24 years. However, attendance of four or more antenatal care visits and receipt of skilled antenatal care was less likely among formerly and currently married women compared to the never married women. Education is significantly related to the number of antenatal care visits and skilled antenatal care. Having four or more antenatal care visits and receiving skilled antenatal care was more likely among women with higher and secondary education compared to those who had no education. Women who were in formal employment were more likely to have four or more antenatal care visits and to receive skilled antenatal care than the unemployed.

Religion is significantly associated with antenatal care visits and skilled antenatal care. Muslims exhibited the lowest levels of attending four or more antenatal care visits and of the receipt of skilled antenatal care compared to Christians. A profound outcome observed in the data is a wide variation in antenatal care for women from different ethnic origins. Attendance of four or more antenatal care visits, as well as the receipt of skilled antenatal care, were higher among women from Igbo, Yoruba and Northern/Southern minority ethnic groups than among Hausa women. Women who reported that they make decisions jointly with their

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husband or partner regarding their own health care were less likely to attend four or more antenatal care visits and also less likely to receive skilled antenatal care than those who make decisions alone. Women of higher parity (3-5+) were less likely to attend four or more antenatal care visits but more likely to receive skilled antenatal care relative to those who had one or two pregnancies. Women who indicated that money, transport and distance were not a big problem in obtaining health care were more likely to attend four or more antenatal care visits and receive skilled antenatal care than those who reported otherwise.

The distribution of number of antenatal care visits and skilled antenatal care across economic status is consistent with the conventional wisdom that women who are in the richest wealth quintile are more likely to have four or more antenatal care visits, and more likely to afford and seek skilled antenatal care, than those in the poorest wealth quintile. The highest proportion of the receipt of skilled antenatal care (64%) and having had four or more antenatal care visits (56%) was observed among women from small households compared to those from large households. Results further indicated a significant relationship between antenatal care and the sex of the household head, with women from female headed households more likely to seek skilled antenatal care and have four or more antenatal care visits compared to those from male headed families.

Rural women were less likely to have had at least four antenatal care visits and received skilled antenatal care than urban women. Regional variations in having four or more antenatal care visits and the receipt of skilled antenatal care were pronounced, with the lowest proportion observed among women in North West and North East compared to North Central; while women from South West, South South, and South East had the highest proportion. Women who lived in communities with a high proportion of educated women; a high proportion of those who had had a health facility delivery; a high proportion of women who were exposed to mass media, and a high proportion of those from different ethnic groups

Table 4.4 presents the inter-correlation among the community level variables. The highest correlation was observed between community hospital delivery and community women's education (Pearson correlation = 0.682) and the lowest was the correlation between ethnic diversity and region (Pearson correlation = -0.021).

One data series with positive values are best described and understood with the aid of pie charts. Thus, for a clearer understanding of the distribution of community characteristics, the following pie charts are presented.
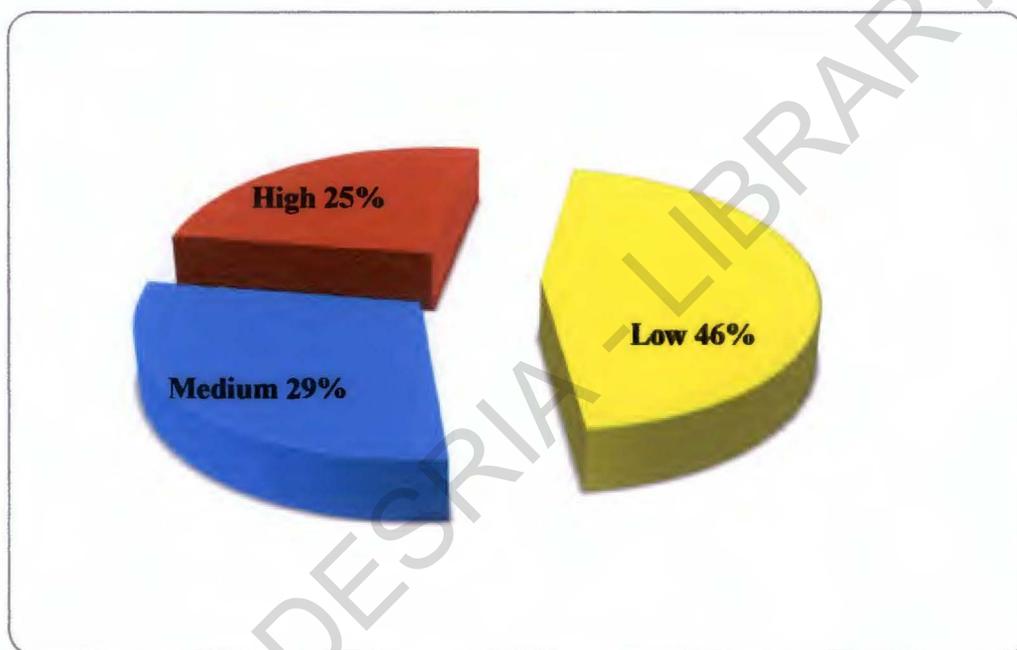
Figure 4.2: Distribution of community women's education in the PSU

Figure 4.2 shows that 46% are communities with a low proportion of women with secondary and higher education in the PSU. Whereas about 25% represent communities with a high proportion of women with secondary and higher education, 29% are communities with a medium proportion of educated women.
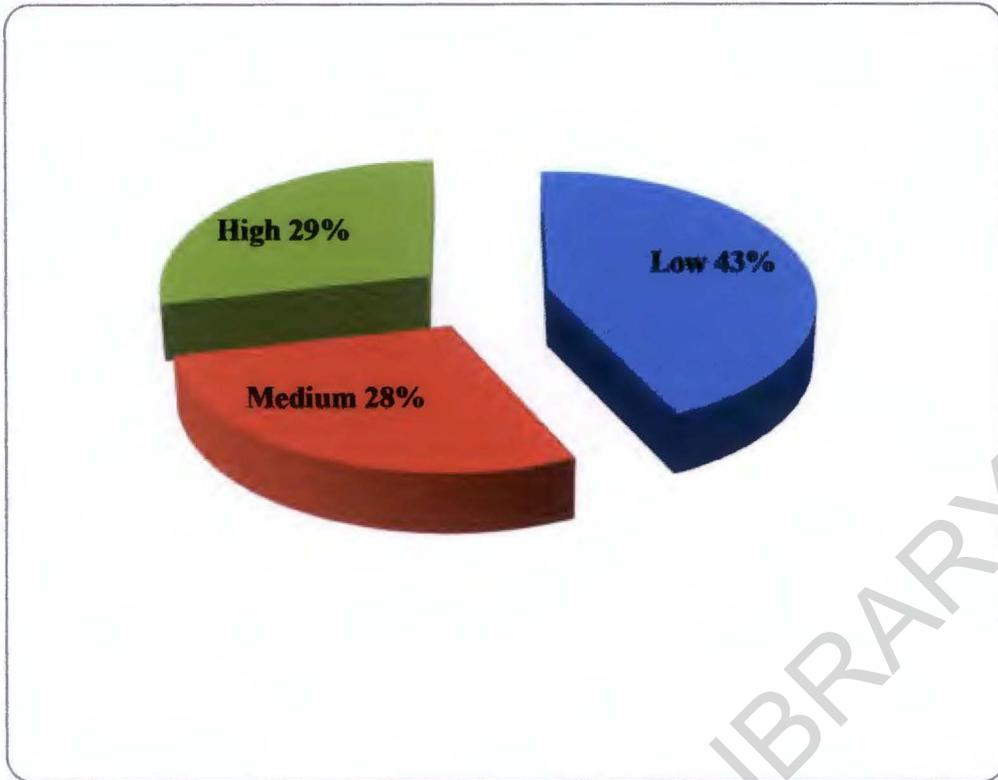
Figure 4.3: Distribution of community hospital delivery in the PSU

Figure 4.3 indicates the distribution of community hospital delivery (in quantiles) in the primary sampling unit. From the pie chart, 29 percent are communities with a high proportion of women that delivered in a health facility, whereas 28 percent represent communities with a medium proportion of women who had had health facility delivery. As shown, 43 percent are communities with a low proportion of women who had delivered in a health facility.
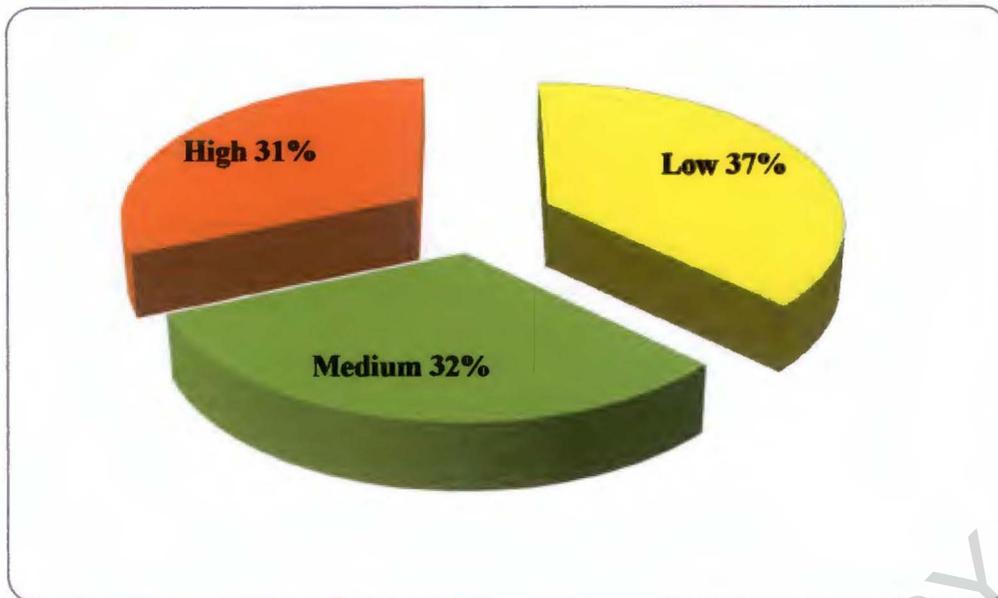
Figure 4.4: Distribution of community mass media exposure in the PSU

Figure 4.4 indicates the distribution of community mass media exposure in the primary sampling unit. From the chart, it is clear that community mass media exposure was fairly and evenly distributed in the PSU. As indicated, 37 percent are communities with a low proportion of women who were exposed to mass media in the cluster or primary sampling unit. It is interesting to note that communities with a low proportion of educated women and a low proportion of health facility delivery tend to have low a proportion of women exposed to mass media.
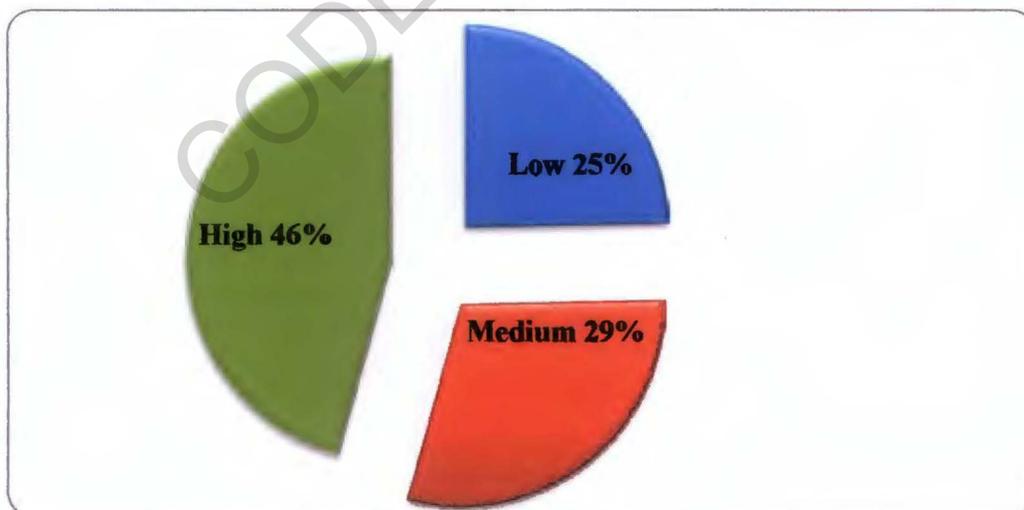
Figure 4.5: Distribution of community poverty in the PSU

The level of poverty in the primary sampling unit is shown in figure 4.5. The pie chart indicates that 46 percent are communities with a high proportion of women from poor households, while 30 percent represent communities with a medium proportion of women from poor households. The chart also showed that 25 percent are communities with a low proportion of women from poor households.
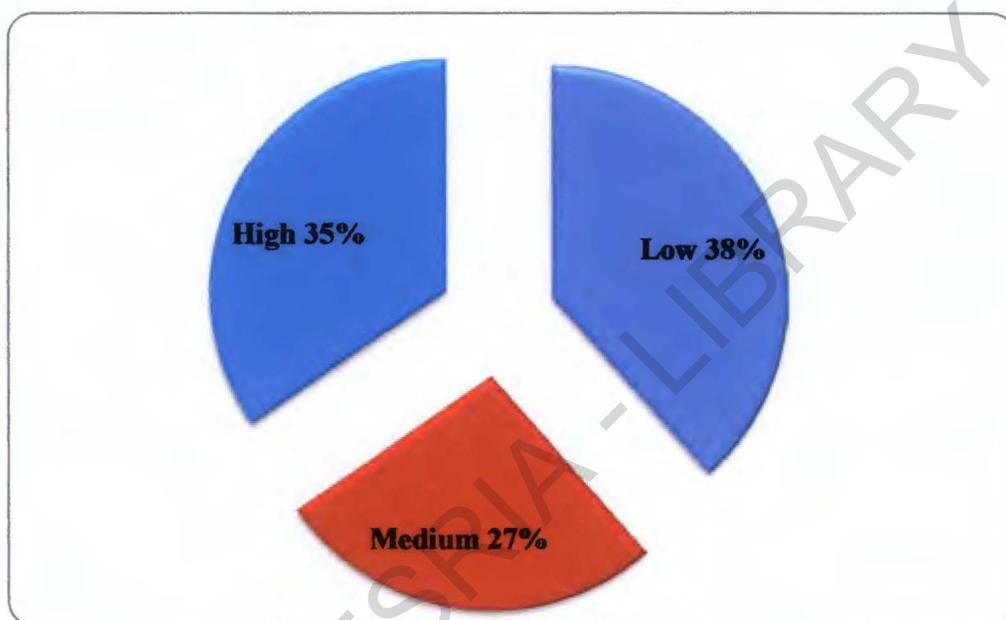
Figure 4.6: Distribution of ethnic diversity in the PSU

Another domain of the community, ethnic diversity, is presented in figure 4.6. This is measured as the proportion of women from different ethnic groups in a community. As shown in the pie chart, 38 percent represent communities with a low concentration of different ethnic groups. Whereas 35 percent of the communities have a high proportion of women from different ethnic groups, 25 percent represent communities with a medium concentration of women from different ethnic groups.

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had a greater propensity for attending four or more antenatal care visits and receiving skilled antenatal care. In contrast, the lowest proportion of antenatal care attendance and receipt of skilled antenatal care was observed among women who lived in communities with a high level of poverty.

4.3.2 Place of Delivery

The bivariate association between the individual-level and community-level characteristics and place of delivery is presented in Table 4.6.

Table 4.6 Percentage distribution of women by background characteristics, controlling for place of delivery, Nigeria 2008 DHS

Variable	Place of delivery		
	Health facility (%)	Home (%)	P-value
Maternal age at birth			
15-24	32.5	67.5	
25-34	44.4	55.6	
35-49	37.0	63.0	0.001
Marital status			
Never Married	49.3	50.7	
Currently married	38.2	61.8	
Formerly married	44.6	55.4	0.001
Educational attainment			
No education	10.9	89.0	
Primary	43.6	56.4	
Secondary	70.7	29.3	
Higher	91.4	8.6	0.001
Occupation			
Unemployed	28.1	71.9	
Formal employment	50.4	49.6	
Agricultural employment	31.9	68.1	
Manual worker	34.0	66.0	0.001
Religion			
Muslim	21.3	78.7	
Christian	60.9	39.1	
Traditional/Others	19.3	80.7	0.001

Ethnic origin			
Hausa	9.3	90.7	
Igbo	79.7	20.3	
Yoruba	79.3	20.4	
Northern/Southern minority	40.8	59.2	0.001
Women's autonomy (decisions over own health)			
Wife alone	59.3	40.7	
Wife/husband	53.6	46.4	
Husband alone/Others	26.3	73.7	0.001
Parity			
1-2	43.8	56.2	
3-4	39.3	60.7	
5 or more	30.1	69.9	0.001
Household wealth index			
Poorest	8.4	91.6	
Poor	17.5	82.5	
Middle	36.1	63.9	
Rich	61.9	39.1	
Richest	85.1	14.9	0.001
Household size			
Small (<5 members)	47.9	52.1	
Large (5 or more members)	34.9	65.1	0.001
Sex of household head			
Male	37.3	62.7	
Female	50.3	49.7	0.001
Need money			
A big problem	33.1	66.9	
Not a big problem	46.8	53.2	0.001
Transport			
A big problem	26.0	74.0	
Not a big problem	45.9	54.1	0.001
Distance			
A big problem	27.7	72.3	
Not a big problem	45.6	54.4	0.001
Type of place of residence			
Urban	65.3	34.7	
Rural	27.1	72.9	0.001

Region of residence			
North Central	43.2	56.9	
North East	14.0	86.0	
North West	9.3	90.7	
South East	77.8	22.2	
South South	51.8	48.2	
South West	77.7	22.3	0.001
Community women's education	9.3	90.7	
Low	48.1	51.9	
Medium	73.2	26.8	0.001
High			
Community hospital delivery			
Low	4.0	96.0	
Medium	41.0	59.0	
High	79.8	20.2	0.001
Community poverty			
Low	77.9	22.1	
Medium	35.7	64.3	
High	11.0	89.0	0.001
Community mass media exposure			
Low	4.0	96.0	
Medium	41.0	59.0	
High	79.8	20.2	0.001
Ethnic diversity			
Low	19.1	80.9	
Medium	59.6	40.4	
High	45.5	54.5	0.001
Total	38.7	61.3	

Results in Table 4.6 indicated that maternal age is significantly associated with place of delivery. Delivery in a health facility increases with maternal age, with women in age group 25-34 more likely to deliver in a health facility than those in age groups 15-24 and 35-49. The pattern follows a U-shaped graph with the peak among women aged 25-34 years. Married women had the lowest proportion (38%) of health facility delivery compared to the unmarried (49.3%) and formerly married (47%). The relationship between place of delivery

and education was highly significant. The result shows that women with a higher education were more likely to deliver in a health facility relative to those with no schooling. The working status of women shows a positive and significant association with decisions to deliver in a health facility, with women in formal employment more likely to deliver in a health facility than those who were unemployed. The result also indicates a significant association between religion and place of delivery. A higher proportion of Christian women (61%) delivered in a health facility than their Muslim counterparts (21%).

The percentage of health facility delivery varied among women from different ethnic groups, with the Igbo and Yoruba more likely to deliver in a health facility than Hausa women. Women's autonomy had a strong association with place of delivery. The data revealed that women whose husbands have a final say over their own health care were less likely to deliver in a health facility than women who made decisions concerning their health care alone. Parity had a significant inverse relationship with place of delivery. This is indicated by the consistent decline in the proportion of women who delivered in a health facility with the increase in the number of children ever born. Women with fewer than three pregnancies were 43% more likely to deliver in a health facility than those of parity five or more (30%). Women who reported that money, transport and distance were not constraining factors to accessing health care had a higher proportion of health facility delivery. Household economic status was a significant predictor of place of delivery. A significant percentage (81%) of women in the richest wealth quintile delivered in a health facility, while the lowest proportion (8.4%) of health facility delivery was observed among women in the poorest wealth quintile. The result indicates that women from larger households were less likely to deliver in a health facility than those from small households. Meanwhile, a higher proportion (50.3%) of health facility delivery was observed among women from female headed households.

Women who resided in the rural areas exhibited lower levels of health facility delivery (27.1%) than those who resided in the urban areas. A significant regional variation in place of delivery was observed. The proportion of health facility delivery was higher among women from the Southern region, lower among women from the Northern region. Women from communities with a high proportion of educated women, a high proportion of women who had health facility delivery, a high proportion of women that had been exposed to mass media and a high concentration of women from different ethnic groups were more likely to deliver in a health facility than those from disadvantaged communities. The result also indicates that community poverty is significantly associated with place of delivery, with women from high poverty communities less likely to deliver in a health facility than their counterparts from communities with a low level of poverty.

4.3.3   Patterns of Postnatal Care-seeking behaviour

Results of the association between household and community characteristics and postnatal care are presented in Table 4.7.

Table 4.7 Percent distribution of women who had a live birth in the five years preceding the survey by background characteristics controlling for skilled postnatal care, Nigeria 2008 NDHS

Variable	Skilled postnatal care	
	Received (%)	P-value
Maternal age at birth		
15-24	28.0	
25-34	38.1	
35-49	31.4	0.001
Marital status		
Never Married	42.3	
Currently married	32.9	
Formerly married	37.0	0.001

Educational attainment		
No education	10.8	
Primary	36.6	
Secondary	58.3	
Higher	81.2	0.001
Occupation		
Unemployed	24.9	
Formal employment	43.1	
Agricultural employment	25.4	
Manual workers	30.8	0.001
Religion		
Muslim	21.5	
Christian	48.4	
Traditional/Others	15.6	0.001
Ethnic origin		
Hausa	10.6	
Igbo	51.7	
Yoruba	70.7	
Northern/Southern minority	37.1	0.001
Women's autonomy (decisions over own health)		
Wife alone	52.1	
Wife/husband	45.5	
Husband alone/Others	22.8	0.001
Parity		
1-2	37.5	
3-4	34.1	
5 or more	25.6	0.001
Household wealth index		
Poorest	6.7	
Poor	15.3	
Middle	30.9	
Rich	50.7	
Richest	75.1	0.001
Household size		
Small (<5 members)	40.9	
Large (5 or more members)	30.1	0.001
Sex of household head		
Male	32.2	
Female	41.5	0.001

Need money	27.5	
A big problem	41.5	0.001
Not a big problem		
Transport		
A big problem	20.1	
Not a big problem	40.8	0.001
Distance		
A big problem	21.6	
Not a big problem	40.5	0.001
Type of place of residence		
Urban	57.4	
Rural	22.7	0.001
Region of residence		
North Central	37.7	
North East	15.5	
North West	10.9	
South East	44.6	
South South	44.6	
South West	69.9	0.001
Community women's education		
Low	9.2	
Medium	40.1	
High	62.5	0.001
Community hospital delivery		
Low	5.8	
Medium	37.4	
High	64.0	0.001
Community poverty		
Low	65.6	
Medium	31.2	
High	10.1	0.001
Community mass media exposure		
Low	14.5	
Medium	31.4	
High	52.7	0.001
Ethnic diversity		
Low	14.6	
Medium	51.1	
High	41.7	0.001
Total	33.3	

Results in Table 4.7 showed that maternal age was significantly associated with postnatal care. Middle aged women (25-34) were more likely to receive postnatal care than younger women, aged 15-24 years, and older women (35-49). The highest level of postnatal care was observed among women who had higher education (81%), while it was lower for those who had no education. Married women were less likely to receive postnatal care than the never married and formerly married. The highest proportion (43%) of women who received postnatal care were in formal employment. Similarly, Christian women had a higher proportion of postnatal care than Muslims. Ethnic and regional differentials in receiving postnatal care were observed. Women from the Igbo and Yoruba ethnic groups exhibited the highest level of receipt of postnatal care, while the lowest proportion was observed among Hausa women.

Women's autonomy, parity, perceived problem of money, transport and distance were significantly associated with postnatal care. Women who made joint decisions with their husbands/partners and those whose husbands made decisions alone over their own health care were less likely to receive postnatal care than women who made decisions alone. The percentage of women who received postnatal care declined as parity increased. The result also showed that household wealth is significantly associated with postnatal care, with women from the richest wealth quintile more likely to receive postnatal care than those in the poorest wealth quintile. The percentage of women who received postnatal care was lower among women from large households (31.5%) and higher among those from female headed households (42%) compared to those from small and male headed households respectively. Type of place of residence showed a significant association with postnatal care. The lowest proportion of postnatal care was found among rural women compared to their urban counterparts. The result also revealed huge regional variations in receiving postnatal care.

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Women from the Northern region tended to have lower levels of postnatal care than those from the southern region. The highest percentage of postnatal care was observed among women from South West (70%), while the proportion of postnatal care was evenly distributed among women from South East and South South, at 45% each. Women from North West and North East had the lowest proportion of postnatal care, ranging from 11% to 16% respectively. The proportion of postnatal care increased with living in advantaged communities with a high proportion of women with secondary and higher education, a high proportion who had delivered in a health facility, a high proportion of women who had had mass media exposure and a high proportion of those from different ethnic groups. However, the proportion decreased with residence in communities with high levels of poverty.

Following important findings from the bivariate analyses, which suggested that Christian women were more likely to seek antenatal, delivery and postnatal care than their Muslim counterparts, and that education is strongly associated with maternal health care-seeking behaviour, an interaction term was introduced into the analysis in this section to verify the differential effect of education on religion and its association with the pattern of maternal health care-seeking behaviour. Separate analysis was done in this section for each of the maternal health care-seeking behaviour indicators. In model 1 of Table 4.8, results for the effects of education on religion and the association with antenatal care were presented, while interaction model 2 shows results for the association with antenatal care visits.

Models 3 and 4 present results for the association with place of delivery and postnatal care respectively. Results from all the models indicate that Christian and Muslim women with secondary and higher education were more likely to receive antenatal care, have institutional delivery and attend postnatal care than traditional religious women with no education.

With respect to antenatal care visits (model 2), Muslims with secondary and higher education were 2.8 times more likely to attend four or more antenatal care visits, while their Christian counterparts were 1.8 times more likely to attend, compared to traditional women with no education. The most intriguing aspect of the result is the high probability of receiving skilled antenatal care (model 1) observed among both Muslims and Christians with secondary/higher education. The odds were 3.5 times for educated Muslims and 3.2 times for educated Christians. Results also showed that Muslims with a higher education were 5.2 times as likely to deliver in a health facility as traditional religionists with no education or higher education. On the other hand, Christians with secondary/higher education had odds of health facility delivery of 4.9 times. Similarly, Muslim women with secondary/higher education were 3.9 times (while educated Christians were 2.1 times) more likely to receive postnatal care compared to the reference category.

The model fit statistics shown at the end of Table 4.8 indicated that model 3 is a better fit for the data examined. This is attested by the values of the Pseudo R^2. Model 3 (that is, the model for place of delivery) has the best precision of the models constructed for maternal health care-seeking behaviour indicators. The R^2 value in this model is 0. 47, indicating that the variables in the model predicted 47% of the variability in the outcome variable.

Table 4.8 Odds ratio of the effects of education and interaction with religion on skilled antenatal care, ANC visit, place of delivery and postnatal care, Nigeria 2008 DHS

Variable	Model 1	Model 2	Model 3	Model 4
	Skilled ANC	ANC Visit	Place of delivery	Postnatal care
	Odds ratio	Odds ratio	Odds ratio	Odds ratio
Maternal age at birth				
15-24	1.000	1.000	1.000	1.000
25-34	1.051	0. 942	0.727***	0.892
35-49	1.171*	1.141	0.808*	1.012
Occupation				
Unemployed	1.000	1.000	1.000	1.000
Formal employment	1.247*	1.260*	1.247*	1.147*
Agricultural employment	0. 996	0.923	1.094	1.077
Manual workers	1.476*	1.408*	1.146	1.161*
Ethnic origin				
Hausa	1.000	1.000	1.000	1.000
Igbo	3.891*	2.557*	4.923*	3.201*
Yoruba	1.804*	3.038*	2.935*	2.043*
Northern/Southern minority	1.916*	1.892*	2.373*	2.092*
Women's autonomy (decisions over own health)				
Wife alone	1.000	1.000	1.000	1.000
Wife/husband	1.287*	1.362*	1.131	1.132
Husband alone/Others	1.053	1.069	0.974	0 .972
Parity				
1-2	1.000	1.000	1.000	1.000
3-4	0.884*	0.926	0 .788*	0 .856*
5 or more	0 .840*	0.865*	0 .715*	0.747*
Need money				
Not a big problem	1.000	1.000	1.000	1.000
A big problem	0 .691*	0.662*	0 .885	0 .928
Transport				
Not a big problem	1.000	1.000	1.000	1.000
A big problem	0 .993*	0. 887*	0 .744*	0 .747*
Distance				
Not a big problem	1.000	1.000	1.000	1.000
A big problem	0 .751	0.916	1.031	0 .887
Household wealth index				
Poorest	1.000	1.000	1.000	1.000
Poor	1.458*	1.594*	1.304*	1.637*
Middle	1.932*	2.034*	1.670*	2.157*
Rich	2.476*	2.512*	2.392*	2.783*
Richest	4.114*	4.831*	4.252*	4.705*
Household size				
Small (<5 members	1.000	1.000	1.000	1.000
Large (5 or more members)	0.980	1.015	0.961	0 .928

Sex of household head				
Male	1.000	1.000	1.000	1.000
Female	1.066	0.970	1.063	1.101
Type of place of residence				
Urban	1.000	1.000	1.000	1.000
Rural	0.839*	0.909	1.062	0.912
Region of residence				
North Central	1.000	1.000	1.000	1.000
North East	1.057	1.205*	0.765*	0.971
North West	0.556*	0.549*	0.620*	0.807*
South East	0.669*	1.055	0.778	0.428*
South South	0.342*	0.744*	0.731*	0.688*
South West	0..941	1.998*	1.244*	1.276*
Community women's education				
Low	1.000	1.000	1.000	1.000
Medium	1.227*	1.130*	1.194*	1.181*
High	0.787	0.856	1.486*	1.360*
Community hospital delivery				
Low	1.000	1.000	1.000	1.000
Medium	1.934*	1.853*	5.350*	3.161*
High	2.629*	1.894*	16.365*	5.222*
Community poverty				
Low	1.000	1.000	1.000	1.000
Medium	0.857*	0.937	0.991	1.076
High	0.585*	0.625*	0.936	0.905
Community mass media exposure				
Low	1.000	1.000	1.000	1.000
Medium	1.766*	1.634*	0.966	1.133*
High	2.239*	1.965*	0.902	1.111
Ethnic diversity				
Low	1.000	1.000	1.000	1.000
Medium	1.070	0.906	0.683*	1.112
High	1.145	0.964	0.534*	1.033
Education x Religion				
No education/primary xTraditional	1.000	1.000	1.000	1.000
Secondary/higher xTraditional/Others	1.161	1.518	3.206*	0.999
No education/primary x Muslims	1.271	0.977	2.349*	1.546*
Secondary/higher x Muslims	3.500*	2.833*	5.287*	3.881*
No education/primary x Christians	1.802*	1.378*	2.434*	1.404
Secondary/higher x Christians	3.159*	1.868*	4.954*	2.072*
Log likelihood	-7330.1205	-6865.3483	-5655.2606	-6624.3721
Number of observations	16568	15382	16550	16472
LR chi2(46)	8171.17	7488.64	9930.23	6808.01
Pseudo R2	0.3579	0.3529	0.4675	0.3394

Significance level *p<0.05.

4.4 Discussion

Overall, results from the bivariate analyses revealed that individual characteristics and community level factors were strongly associated with all indicators of maternal health-seeking behaviour. Consistent with previous studies (for example Forte *et al*. 2004) the proportion of women seeking maternal health care consistently rises with age. The outcome that younger women (25-34) were more likely to receive antenatal care, deliver in a health facility and have postnatal care compared with older women (35-49) may suggest that younger women may have more knowledge of maternal health services and modern medicine (Kistiana, 2009). In addition, this finding probably reflects recent improvements in maternal health programmes (Forte *et al*. 2004).

The relationship between education and maternal health-seeking behaviour is consistent with expectations and existing literature which suggests that highly educated women are more likely to have greater exposure to and knowledge of maternal health care than their uneducated counterparts. On marital status, the result that married women were less likely to seek skilled antenatal care, attend antenatal care visits, deliver in a health facility and receive postnatal care may be a pointer to women's lack of autonomy. The patriarchal structure of Nigerian society which emphasizes male dominance and decisions over women's reproductive health makes this result even more persuasive. In confirmation of this, the result reveals that women whose husbands made decisions alone concerning their health care exhibited the lowest levels of receipt of antenatal, delivery and postnatal care. This result, however, highlights the importance of female autonomy and rights in decisions concerning maternal health care. In line with expectation, the bivariate results show that religion is significantly associated with all indicators of maternal health-seeking behaviour. Christians were more likely to seek maternal health care than Muslims. This is consistent with findings

elsewhere which acknowledges strict Islamic practices (obtaining the husband's permission and purdah) which restrict Muslim women from seeking maternal health care services (Adamu & Salihu, 2002). Parity was inversely related to maternal health-seeking behaviour. The proportion of women receiving antenatal care, delivery and postnatal care decreased as parity increased, suggesting some level of confidence usually exhibited by women who had had 3-5 pregnancies. Presumably, this may be the result of the assumption that they are more experienced, as indicated by some studies (Awusi, 2009). The result that women from large households were less likely to seek maternal health care confirms the hypothesis that having a large number of children may pose difficulty in seeking maternal health care services (Kistiana, 2009). With respect to occupation, results followed the same pattern for all indicators of maternal health care-seeking behaviour.

Women in formal employment exhibited the highest level of receiving antenatal, delivery and postnatal care compared with the unemployed. This finding may suggest a higher propensity of financial independence and empowerment which is an important determinant of maternal health care-seeking behaviour. The association with the sex of the household head yielded unexpected and intriguing results. The finding that women from female headed households were more likely to seek antenatal care, deliver in a health facility and have postnatal care than those from male headed households is contrary to expectations. While this outcome contradicts the emphasis on the likelihood of women from male headed households having more resources and a higher propensity to seek maternal health care (Jayaraman, 2008), it highlights the role of female autonomy in seeking maternal health care. Generally, this result could be attributed to the small number of female headed households in the data and should be interpreted with caution. Religion, ethnic origin and region of residence which represent cultural identity factors remained very strong predictors of maternal health-seeking behaviour.

One important dimension of the results is the association between community level factors and maternal health-seeking behaviour. Place of residence, region of residence, community women's education, community hospital delivery, community poverty, community mass media exposure and ethnic diversity are strong predictors of antenatal care, place of delivery and postnatal care in varying degrees. This finding indicates a high level of socio-economic development in advantaged communities (for example urban areas) which makes maternal health care services more accessible to women in such communities. This result may also indicate the need for particular attention to the role of social contexts in understanding maternal health care-seeking behaviour in a heterogeneous society like Nigeria. Results from the interaction term showed a contrary result compared to the bivariate results.

CHAPTER 5

MATERNAL HEALTH CARE-SEEKING BEHAVIOUR: ROLE OF INDIVIDUAL AND HOUSEHOLD FACTORS

5.0   Introduction

This chapter presents the results of the effects of individual/household factors on maternal health care-seeking behaviour. The rationale for examining the independent effects of the individual/household factors is to further understand the role of these factors in explaining the observed patterns of and differences in maternal health care-seeking behaviour in Nigeria; and to be able to estimate whether the community factors have moderating effects on the association between individual/household factors and maternal health care-seeking behaviour. Multilevel analysis was utilized and separate analysis was done for each of the maternal health care-seeking behaviour indicators. This is because there are some differences in the predictors of the outcome variables, hence only the variables that were significantly associated with each of the maternal health care-seeking behaviour indicators in the stepwise logistic regression (see Appendix II for details) were included in the multilevel analysis.

5.1   Independent Effects of Individual/household factors on Antenatal Care Visits

This sub-section presents the effects of individual-level factors on antenatal care visits. The total variance in having four or more antenatal care visits associated with communities is presented in model 1 (empty model) of Table 5.1.

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Table 5.1 Multilevel logistic regression odds ratio of the effects of individual/household factors on antenatal care visits, Nigeria 2008 DHS

Variable	Model 1	Model 2	Model 3
	Empty model	Individual variables	Individual & Enabling variables
		Odds Ratio	Odds Ratio
Fixed effects			
Individual characteristics			
Maternal age at last birth		1.000	1.000
15-24		1.216*	1.218*
25-34		0.978	0.980
35-49			
Educational attainment			
No education		1.000	1.000
Primary		2.923*	2.916*
Secondary/higher		5.881*	5.526*
Ethnic Origin			
Hausa		1.000	1.000
Igbo		9.606*	11.132*
Yoruba		32.992*	33.936*
North/South minority		4.300*	4.478*
Occupation			
Unemployed		1.000	1.000
Formal employment		1.579*	1.560*
Agricultural employment		0.950	1.017
Skilled manual workers		1.639*	1.645*
Women's autonomy			
Wife alone		1.000	1.000
Wife/husband		1.873*	1.844*
Husband alone/others		1.169	1.132
Household wealth index			
Poorest		1.000	1.000
Poorer		2.250*	2.216*
Middle		5.103*	4.709*
Richer		11.375*	9.880*

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Richest		46.122*	38.666*

Need money

A big problem			1.000
Not a big problem			0.537*

Distance

Not a big problem			1.000
A big problem			0.740*

Random effects parameters	Empty	Individual	Individual/ Enabling
Variance (SE)	11.071* (3.903)	2.969* (1.024)	2.833* (0.965)
VPC=ICC (%)	77	47.4	46.2
(PCV) (%)	Reference	73.2	74.4
Log-likelihood	-8155.0025	-6806.1056	-6733.6896
Model fit statistics			
AIC	16316	13650.2	13509.4
BIC	16339.2	13795.6	13669.9

The empty model contains no variables but partitions the variance into two component parts. SE = Standard error, VPC= Variance Partition Coefficient, PCV = Proportional change in variance, AIC=Akaike information criterion, BIC = Bayesian information criterion
Significance level *p<0.05

Results in the empty model showed that there is a variation in the likelihood of having four or more antenatal care visits across communities, and this variation was significant (τ = 11.071, p = 0.001). As shown by the variance partition coefficient, the intra-community correlation coefficient was estimated at 77%, which is variability in the outcome variable that could be attributed to the community level.

Model 2 included only the individual/household variables. Results showed that maternal age at last delivery is significantly associated with antenatal care visits. Middle aged women (25-34) were 1.2 times more likely to attend four or more antenatal care visits than those of a

younger age (15-24). Meanwhile, women aged 35-49 years had 2 percent lower odds of attending four or more antenatal care visits. With respect to other individual/household variables, the educational level of the woman, ethnic origin, occupation, women's autonomy and household wealth index were significantly associated with antenatal care visits. Women with primary and secondary/higher education had significant odds of having four or more antenatal care visits that were 2.9 times and 5.8 times higher respectively compared to those with no education. Women's occupation has a seemingly paradoxical association. Women who worked in the formal sector and skilled manual workers were almost twice more likely to have four or more antenatal care visits than those with no employment. Relative to Hausa women, those from Igbo, Yoruba and Northern/Southern minority ethnic groups were 9.9 times, 32.9 times and 4.3 times respectively more likely to make four or more antenatal care visits.

Women who made joint decisions with their husbands regarding their own health care were 1.9 times more likely to attend four or more antenatal care visits than those who made decisions alone. However, decisions on health care by the husband alone or others were not significantly associated with four or more antenatal care attendances. In line with expectations, the odds of having four or more antenatal care visits was 46 times and 5.1 times higher for women from the richest and middle income households respectively relative to women from the poorest households.

In comparison to the empty model, the variation in having four or more antenatal care visits was significant across communities ($\tau = 2.969$; $p<0.001$). The intra-community correlation was 47.4% and the proportional change in variance was 73.2%, indicating that the clustering of the outcome variable (antenatal care visit) across communities is the result of the composition of the communities by individual/household level characteristics.

Enabling variables such as the perceived problem of money and transport were introduced in model 3, and results indicated that all the individual/household variables remained significantly associated with antenatal care visits. The odds of having four or more antenatal care visits remained higher but with a slight reduction for categories of education, occupation, women's autonomy, and household wealth index. Women with secondary and higher education, those who made joint decisions on health care with their husbands, and those who were in formal employment still had a higher likelihood of having four or more antenatal care visits than those in the reference category. Relative to women in the poorest households, the odds of having four or more antenatal care visits was 38 times higher for women in the richest households, and 4.7 times higher for women in the middle households. Results also showed increased and higher odds of attending four or more antenatal care visits for women of middle age (25-34) and those from Igbo Yoruba and Northern/Southern minority ethnic groups. With respect to the enabling variables, women who perceived that money and distance to health facility were big problems in accessing health care were 47% and 26% respectively less likely to have four or more antenatal care visits compared to those who did not perceive them to be big problems.

Compared to model 2, the level 2 variance components in Table 5.1 (model 3) showed that there is a significant variation in the odds of having four or more antenatal care visits between communities (τ = 2.833, p = 0.001). The intra-community correlation was 46%. The proportional change in variance of 74.4% indicates that the clustering of antenatal care visits in the communities is to a large extent the result of the composition of communities by individual level characteristics. However, model 3 provides no real improvement over model 2, although the overall model performance measures are strong (as indicated by the smaller values of AIC and BIC at the bottom of Table 5.1); and the enabling variables are significant,

implying that women are less likely to attend antenatal care visits if they perceive that money and distance are big problems in obtaining health care.

5.2 Independent Effects of Individual/household Factors on Skilled Antenatal Care

The effects of individual/household characteristics on skilled antenatal care are presented in this sub-section. In Table 5.2 below, the total variance in receiving skilled antenatal care associated with communities was estimated using the empty model (Model 1). The model contains no variables but partitions the total variance into the sum of the individual and community level components and in addition provides an estimate of intra-class correlation coefficient (ICC) or variance partition coefficient (VPC).

Table 5.2 Multilevel logistic regression odds ratio of the effects of individual/household factors on skilled antenatal care, Nigeria 2008 DHS

Variable	Model 1 Empty model	Model 2 Individual variables Odds Ratio	Model 3 Individual & enabling variables Odds Ratio
Fixed effects			
Individual characteristics			
Maternal age at last		1.000	1.000
birth		1.041	1.048
15-24		0.956	0.962
25-34			
35-49			
Educational attainment			
No education		1.000	1.000
Primary		2.065*	2.104*
Secondary/Higher		3.763*	3.783*
Religion			
Muslim		1.000	1.000
Christian		0.988	0.998
Traditional/Others		0.532*	0.511*
Ethnic Origin			
Hausa		1.000	1.000
Igbo		7.021*	8.201*
Yoruba		4.461*	4.640*
Others		2.562*	2.683*

Occupation			
Unemployed		1.000	1.000
Formal employment		1.370*	1.370*
Agricultural employment		0 .996	1.015
Manual workers		1.482*	1.490*
Women's autonomy			
Wife alone		1.000	1.000
Wife/Husband		1.412	1.394*
Husband alone/Others		1.099	1.079
Household wealth index			
Poorest		1.000	1.000
Poorer		1.447*	1.441*
Middle		2.553*	2.498*
Richer		4.322*	4.205*
Richest		10.113*	9.607*
Getting money			
Not a big problem		-	1.000
A big problem			0.698*
Transport			
A big problem			1.000
Not a big problem		-	0.806*
Random effect	**Empty**	**Individual**	**Individual/Enabling**
parameters	6.290*(0.417)	2.095* (0.160)	2.136* (0.446)
Variance (SE)	65.6	38.9	39.3
(VPC)=ICC (%)	Reference	66.7	66
PCV (%)			
Log-likelihood	**-8221.3601**	**-6887.8711**	**-6829.3433**
Model fit statistics			
AIC	16448.7	13817.7	13704.7
BIC	16472.1	13979.9	13882.2

The empty model contains no variables but partitions the variance into two component parts. SE = Standard error, VPC= Variance Partition Coefficient, PCV = Proportional change in variance, AIC=Akaike information criterion, BIC = Bayesian information criterion Significance level *p<0.05

Results in the empty model indicated that there is variation in the odds of receiving antenatal care across communities and that the variance was significant ($\tau = 6.290$, $p = 0.001$). As indicated by the variance partition coefficient, the intra-community correlation coefficient as

shown by the estimated intercept component variance, 65.6% of the variance could be attributed to the community level.

The individual level variables were introduced in model 2 and results show that maternal age at last delivery and women's autonomy were not significant predictors of skilled antenatal care. However, women with secondary/higher education were 3.7 times more likely to receive skilled antenatal care than women who had no schooling. Similarly, women with primary education were 2.1 times more likely to receive antenatal care than those who had no education. Christian women and those who were affiliated to traditional religion were 2 percent and 47 percent respectively less likely to receive skilled antenatal care than Muslims. The difference, however, is not significant at 5% significance level. Women from the Igbo, Yoruba, Northern/Southern minority ethnic groups had odds of receiving antenatal care that were 7 times, 4.5 times and 2.5 times higher respectively than Hausa women. Women in formal employment (white collar jobs) and manual workers exhibited a higher likelihood of receiving skilled antenatal care (1.3 times and 1.5 times higher, respectively) compared to women that were unemployed. Surprisingly, women who worked in the agricultural sector were 1 percent less likely to receive antenatal care relative to the unemployed. As expected, women from the richest, richer and middle households were 10.1 times, 4.3 times and 2.5 times respectively more likely to receive skilled antenatal care than those from the poorest households.

Compared to the empty model, the variation in receiving skilled antenatal care in model 2 remained significant across communities (τ = 2.095; p<0.001). The intra-community correlation was 38.9% and the proportional change in variance of the odds of receiving antenatal care, which is 67% across communities, was explained by individual level compositional factors. This indicates that part of the clustering of receiving antenatal care

between communities is the result of the composition of the communities by the education, religion, occupation, ethnic origin and household wealth index of the women.

With the introduction of enabling variables such as perceived problem of money and transport in model 3, the individual/household variables remained significantly associated with antenatal care. However, the odds increased for most variable categories with the exception of household wealth index. Notably, the association of women's autonomy with skilled antenatal care that was not statistically significant in the previous model disappeared, while maternal age at last delivery was still not significantly associated with antenatal care. As shown, women who made joint decisions with their husbands on their own health care were almost twice more likely to receive skilled antenatal care than those who made decisions alone. The pattern of association, however, remained the same as that discussed in the first model for all other individual/household level variables. Women who had secondary/higher education, those who belong to Igbo, Yoruba and Northern/Southern minority ethnic groups, were 3.8 times, 8.2 times, 4.6 times and 2.6 times respectively more likely to receive skilled antenatal care compared to women in the reference category. Similarly, while women from richest households and those in formal employment had higher odds of receiving antenatal care, those affiliated to traditional/other religions were 49 percent less likely to receive skilled antenatal care than Muslims. However, the difference for Christians was not statistically significant. Meanwhile, women who perceived that money and transport are problems in obtaining health care had a 31% and 20% lower likelihood of receiving antenatal care respectively.

In comparison to model 2 the variation in receiving skilled antenatal care in model 3 remained significant across communities ($\tau = 2.136$, $p = 0.001$). The intra-community correlation increased to 39.3%. The proportional change in variance of 66% in the odds of receiving

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skilled antenatal care was explained by individual level characteristics. The addition of the enabling variables in model 3 did not provide much improvement over model 2, though the smaller values of AIC and BIC (i.e. in model 3) indicate that the overall performance measures of the model are strong.

5.3   Independent Effects of Individual/household Factors on Place of Delivery

In this sub-section, the independent effects of individual-level factors on place of delivery were presented. The total variance in having a health facility delivery at the community level was presented in the empty model (Table 5.3).

Table 5.3 Multilevel logistic regression odds ratio of the effects of individual/household factors on place of delivery, Nigeria 2008 DHS

Variable	Model 1 Empty model	Model 2 Individual variables	Model 3 Individual & Enabling variables
		Odds Ratio	Odds Ratio
Fixed effects			
Individual characteristics			
Maternal age at last		1.000	1.000
birth		1.142	1.134
15-24		1.394*	1.377*
25-34			
35-49			
Educational attainment			
No education		1.000	1.000
Primary		1.889*	1.867*
Secondary/Higher		4.133*	3.997*
Religion			
Muslim		1.000	1.000
Christian		1.243	1.264*
Traditional/Others		0.445*	0.442*
Ethnic Origin			
Hausa		1.000	1.000
Igbo		21.091*	23.031*
Yoruba		13.588*	13.735*
Others		3.871*	3.927*

Occupation		
Unemployed	1.000	1.000
Formal employment	1.220*	1.212*
Agricultural employment	1.034	1.065
Manual workers	1.021	1.023
Women's autonomy		
Wife alone	1.000	1.000
Wife/Husband	1.230	1.204
Husband alone/Others	0.948	0.945
Household wealth index		
Poorest	1.000	1.000
Poorer	1.829*	1.761*
Middle	3.548*	3.293*
Richer	8.558*	7.767*
Richest	23.897*	20.963*
Parity		
1-2	1.000	1.000
3-4	0.683*	0.682*
5+	0.646*	0.650*
Need money		
Not a big problem	-	1.000
A big problem		0.871
Transport		
Not a big problem	-	1.000
A big problem		0 .674*

Random effects parameters	*Empty*	*Individual*	*Individual/ Enabling*
Variance (SE)			
(VPC) =ICC (%)	7.467* (0.492)	1.933* (0.774)	1.861*(0.714)
(PCV) (%)	69.4	37	36.1
	Reference	74.1	75.1
Log-likelihood	-7376.9092	-5957.9257	-5922.6036
Model fit statistics			
AIC	14759.8	11961.9	11895.2
BIC	14783.2	12139.4	12088.1

The empty model contains no variables but partitions the variance into two component parts. SE = Standard error, VPC= Variance Partition Coefficient, PCV = Proportional change in variance, AIC=Akaike information criterion, BIC = Bayesian information criterion Significance level *p<0.05

As shown in the empty model, the variation in the odds of a woman delivering a baby in a health facility between communities was significant ($\tau = 7.467$, $p = 0.001$). The variance partition coefficient or the intra-community correlation coefficient as shown by the estimated intercept component variance is 69.4%. This is the variability in the place of delivery (health

facility delivery) attributed to the community level, while the remaining 31.6% could be attributed to the individual level.

Model 2 contained the individual level variables. Results showed that maternal age at last delivery is significantly associated with place of delivery. The likelihood of having a health facility delivery was 1.4 times higher for older women (35-49) than for younger women (15-24). This could be because older women may have more knowledge of maternal health care services. Women's autonomy is not significantly associated with place of delivery. Consistent with the results of previous analyses in this study in Chapter 4, women's education, religion, ethnic origin, occupation, household wealth index and parity were significantly associated with health facility delivery. However, occupation showed a rather weak association. Women with higher education and Christians were 4 times and 1.2 times respectively more likely to deliver in a health facility compared to women with no schooling and Muslims.

With respect to ethnic origin, having a health facility delivery was 21 times, 13.5 times and 3.9 times more likely among women from Igbo, Yoruba and those from Northern/Southern minority ethnic groups respectively relative to Hausa women. Women that were in formal employment had odds of delivering in a health facility that were almost twice as high as those who were not employed. As expected, the likelihood of having a health facility delivery was higher for women from the richest and middle households by 23.8 times and 3.5 times respectively compared to those from the poorest households. Parity is negatively associated with place of delivery. The results specifically showed that as the level of parity increases, women were less likely to deliver in a health facility than those that have one or two children.

Compared to the empty model, the variation in the odds of having a health facility delivery was significant across communities ($\tau = 1.933$; $p<0.001$). The intra-community correlation

was 37%, indicating the clustering of the outcome variable at the community level. The 74.1% proportional change in variance suggests that the clustering was explained by the individual characteristics of the women.

The enabling variables were controlled for in model 3 and results showed that all the individual/household variables remained significantly associated with place of delivery, with the exception of women's autonomy. However, there was a reduction in the odds of having a health facility delivery for women aged 35-49 and those with primary and secondary/higher education. Interestingly, being a Christian was significantly associated with increased odds of having a health facility delivery; 1.3 times compared to Muslims. However, being a traditional religionist reduced the odds by 56 percent. Women who were of Igbo, Yoruba and Northern/Southern ethnic origin had increased odds of having a health facility delivery relative to Hausa women. Having a baby in a health facility remained more likely for women in the richest and middle households although with decreased odds. Women of higher parity (5 or more) had a 35 percent reduction in the odds of having a health facility delivery.

With respect to the enabling variables, transport was significantly associated with place of delivery. Women who perceived that transport was a problem in obtaining health care had 33% lower odds of having their baby in a health facility compared to those who perceived that it was not a big problem. The perception that money was a big problem in obtaining health care was not significantly associated with place of delivery.

In comparison to model 2 the variation between communities in the odds of having a health facility delivery remained significant ($\tau = 1.861$, $p = 0.001$). The intra-community correlation was 36.1%. This indicates that the variation in having a health facility delivery across communities was mainly explained by individual level characteristics; the inclusion of the enabling variables had a minimal effect on the contribution of the individual/household

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variables. The results of the model fit statistics at the bottom of Table 5.3 suggest that model 3 provides no real improvement over model 2.

5.4   Independent Effects of Individual/household Factors on Skilled Postnatal Care

The independent effects of individual/household factors on postnatal care are presented in this sub-section. The empty model in Table 5.4 below contained no covariates but partitions the total variance in receiving postnatal care into the sum of the individual level and community level variances.

Table 5.4 Multilevel logistic regression odds ratio of the effects of individual/household factors on postnatal care, Nigeria 2008 DHS

Variable	Model 1 Empty model	Model 2 Individual variables	Model 3 Individual & Enabling variables
		Odds Ratio	Odds Ratio
Fixed effects			
Individual-level characteristics			
Maternal age at last birth			
15-24		1.000	1.000
25-34		1.136	1.115
35-49		1.266*	1.239
Educational attainment			
No education		1.000	1.000
Primary		2.819*	2.7825*
Secondary/Higher		6.970*	6.675*
Religion			
Muslim		1.000	1.000
Christian		0.602 *	0 .615*
Traditional/Others		0.224*	0 .221*
Ethnic Origin			
Hausa		1.000	1.000
Igbo		8.217***	9.067*
Yoruba		17.863***	17.567*
Northern/Southern minority		6.884*	7.015*

Occupation			
Unemployed		1.000	1.000
Formal employment		1.258*	1.254*
Agricultural employment		1.064	1.125
Manual workers		1.175	1.186
Women's autonomy			
Wife alone		1.000	1.000
Wife/Husband		1.199	1.161
Husband alone/Others		0.84 5	0 .829
Household wealth index			
Poorest		1.000	1.000
Poorer		2.935*	2.692*
Middle		8.331*	7.071*
Richer		20.652*	16.355*
Richest		74.753*	56.962*
Household size			
Small (<5 members)		1.000	1.000
Large (5 or more members)		0.716*	0.728*
Distance			
Not a big problem			1.000
A big problem			0.804
Transport			
Not a big problem			1.000
A big problem			0.502*
Random effects parameters	*Empty*	*Individual*	*Individual/ Enabling*
Variance (SE)	10.352* (2.924)	2.211* (0.525)	2.105* (0 .512)
(VPC) = ICC (%)	75.8	40.1	39
(PCV) (%)	Reference	78.6	79.6
Log-likelihood	-8232.0508	-6823.4022	-6757.4023
Model fit statistics			
AIC	16470.1	13690.8	13562.8
BIC	16493.5	13860.5	13747.8

The empty model contains no variables but partitions the variance into two component parts. SE = Standard error, VPC= Variance Partition Coefficient, PCV = Proportional change in variance, AIC=Akaike information criterion, BIC = Bayesian information criterion Significance level *p<0.05.

The results presented in the empty model (model 1) in Table 5.4 showed that the between community variance in postnatal care was significant ($\tau = 10.352$, $p = 0.001$). This is equally expressed as the variance partition coefficient (VPC) or intra-class correlation coefficient (ICC), which is estimated at 75.8%. This indicates the variability of the outcome variable at the community level. The result further indicates that the community variance in postnatal care is large, suggesting huge differences in receiving postnatal care across communities.

In model 2, the effects of the individual/household level variables on postnatal care were assessed. Maternal age at last delivery, education, religion, ethnic origin, household wealth index and household size were significantly associated with postnatal care. Women aged 35-49 years had significantly higher odds of receiving postnatal care, 1.3 times higher than those of younger women aged 15-24 years. Women with primary and secondary/ higher education had higher odds of receiving postnatal care (2.8 times and 6.9 times higher, respectively than those of women who had had no education. The likelihood of receiving postnatal care was 78% lower for women in traditional religions and 40% lower for Christian women compared to Muslims. This result is intriguing and also unexpected. Women from Igbo, Yoruba and Northern/Southern minority ethnic groups were 8.2 times, 17.9 times and 6.9 times respectively more likely to receive skilled postnatal care than Hausa women. The association between occupation and postnatal care was weak, but women who were in formal employment were 1.2 times as likely to receive postnatal care as the unemployed women.

The odds of receiving postnatal care were 74.8 times and 8.3 times higher for women from the richest households and middle households respectively, relative to those from the poorest households. Meanwhile, the odds of receiving postnatal care were 29% lower for women from large households (consisting of 5 members or more) compared to those from small

households. Compared to the empty model, the variation in postnatal care in model 2 remained significant across communities ($\tau = 2.211$, $p = 0.001$) and the intra-community correlation was 40.2%. The proportional change in variance was 78.6%, indicating that the clustering of postnatal care across communities was explained by individual differences in age, education, religion, ethnic affiliation, occupation, household wealth index and household size.

The enabling variables were included in model 3. The inclusion of these variables decreased the odds of receiving postnatal care slightly across almost all the categories of the individual/household level variables. The results showed that maternal age at last delivery and women's autonomy were not significantly associated with skilled postnatal care. The disappearance of the significance of maternal age at last delivery may be the result of the weak association shown in the previous model (model 2). However, education, religion, ethnic origin, occupation, household wealth index and household size remained significantly associated with postnatal care. The pattern of relationship between the categories of the individual level variables was similar to that discussed in model 2. The results showed that the odds of receiving postnatal care remained higher for women with a higher education, those from Igbo, Yoruba and Northern/Southern minority ethnic groups, those in formal employment and women from the richest households. Meanwhile such odds remained lower by 39 percent for Christian women, 78 percent for women affiliated to traditional religion and 28 percent for women from large households.

Among the enabling variables, only the perceived problem of transport was significantly associated with postnatal care. Women who perceived that transport was a big problem in accessing health care were 50% less likely to receive postnatal care than those who reported that it was not a big problem. In comparison to model 2 the variation in receiving postnatal

care across communities was significant ($\tau = 2.105$, $p = 0.001$). The intra-community correlation was 39%. The proportional change in variance of 76.6% in the odds of receiving postnatal care between communities was explained by individual level characteristics. Overall, results indicated that the enabling variables had little effect on the contribution of the individual/household variables. Stated differently, model 3 provides no substantial improvement over model 2. However, the smaller values of AIC and BIC at the bottom of Table 5.4 suggest that the overall performance measures of the model are strong.

5.5   Discussion

This chapter estimated the effects of individual/household level factors on maternal health care-seeking behaviour. Specifically, results showed that maternal age at last birth, education, ethnic origin, parity, household wealth index and household size were significantly associated with maternal health care-seeking behaviour. Most often age is used as a proxy for accumulated experience, including the use of health services (Burgard, 2004; Elo, 1992). The effect of the mother's age at last delivery on maternal health care-seeking behaviour as indicated in the study is unclear. Previous studies have reported young women's age (25-34) as a significant predictor of maternal health care-seeking behaviour (Kistiana, 2009). However, the results indicated that older women (35-49 years) were more likely to receive postnatal care and deliver in a health facility than younger women, whereas younger women (25-34) were more likely to attend four or more antenatal care visits than older women. Moreover, maternal age was not significantly associated with skilled antenatal care. The anomaly in the relationship between age and the use of health care services was also noted by studies elsewhere (Simkhada *et al.* 2007).

As expected, women with secondary/higher education were more likely to attend antenatal care visits, receive skilled antenatal care, deliver in a health facility and receive postnatal care. This is consistent with previous studies and supports the notion that educated women are more likely to realise the benefits of using maternal healthcare services (Matsumura & Gubhaju 2001). The result further suggests that education increases female autonomy (Raghupathy 1996), decision-making power within the household (Matsumura & Gubhaju 2001) and builds greater confidence and capability to make decisions concerning their own health (WHO & UNICEF 2003).

Besides, there are other pathways through which the strong and significant effect of education on maternal health-seeking behaviour can be explained. These include:
"Higher receptivity to new health-related information, socialisation to interact with formal services outside the home environment, familiarity with modern medical culture, access to financial resources and health insurance, more control over resources within the household and wiser spending, a more egalitarian relationship and better communication with the husband, increased self-worth and self-confidence, better coping abilities and negotiating skills as well as reduced power differential towards health care providers and thus better communication and ability to demand adequate services" (Gabrysch & Campbell, 2009: 7).
The observed association of education and maternal health care could also reflect a woman's childhood background, which includes familiarity with health services as well as certain norms and beliefs regarding health care (Navaneetham & Dharmalingam, 2002).

The finding on ethnic origin suggests socio-economic and cultural differences in maternal health care-seeking behaviour. This is because different cultural groups have different practices relating to pregnancy, childbirth and postnatal period which probably explain the observed ethnic differences in maternal health care (Magadi *et al.*, 2000). The fact that being

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members of Igbo, Yoruba and Northern/Southern minority ethnic groups was associated with the highest odds of seeking four or more antenatal care visits, skilled antenatal care, health facility deliveries and postnatal care may be explained by the fact that these ethnic groups are relatively more developed socio-economically than the Hausa ethnic group. More specifically, women in some cultures may not seek health care services due to cultural requirements of seclusion (Mesko *et al.* 2003). Considering the fact that the Hausa ethnic group in this study is predominantly Muslim, the Islamic cultural or religious practice of the seclusion of women (purdah) may have contributed to the low maternal health care-seeking behaviour observed among the Hausa women.

Religion is often considered a marker of cultural background and is thought to influence beliefs, norms and values in relation to health care services and women's status (Glei *et al.* 2003). The association of religion and maternal health care-seeking behaviour in this study yielded mixed results. With respect to skilled antenatal and postnatal care, the association was negatively significant. Contrary to expectations, Christians were less likely to receive skilled antenatal and postnatal care than Muslims. Surprisingly, being a Christian was not significantly associated with delivery in a health facility. These results generally may be the result of the small number of Christians in the study and therefore be interpreted with caution. Besides, the results to some extent support the hypothesis that "while some religious differences are likely to attenuate in the context of socio-economic factors, there is the likelihood of the persistence of some differences" (Gyimah *et al.* 2006: 2934).

Thus the significant attenuation of the effect associated with Christian and traditional religious women as well as the insignificant association observed could suggest that much of the religious differences in maternal health care-seeking behaviour may be due to the confounding effects of the other individual/household level variables not included in the
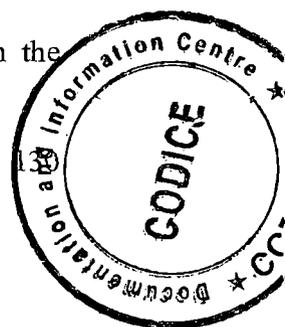
study. In other words, results suggest that religion may be masking other characteristics associated with maternal health care behaviour (Gyimah, 2009).

As found in this study, the association between parity and maternal health care-seeking behaviour (place of delivery) can be supported by the evidence that maternal health care-seeking behaviour is lower for high parity women (women with 3-5 live born children) than for low parity women (those with 1-2 live born children) (Simkhada *et al.* 2007). As indicated in previous studies, the low maternal health care-seeking behaviour found among women of higher parity may be associated with "time management, limited resources in the family and negative perceptions resulting from previous pregnancies" (Simkhada *et al.* 2007: 257). Other studies have argued that high parity may reflect a lack of access to family planning services, which apparently may be associated with a lack of access to maternal health care (Gabrysch & Campbell, 2009). High parity can also indicate traditional attitudes, and sometimes lower socio-economic status (which constrains women from seeking care) which is difficult to control for adequately (Stephenson & Tsui, 2002).

The results of the study indicated that women who belong to the richest households were more likely to seek maternal health care than those from poor households. This evidence is consistent with that of other studies (Anwar *et al.* 2004; Rahman *et al.* 2007; Amin *et al.* 2001). Belonging to rich households may represent high socio-economic status, which is associated with the accessibility and affordability of quality maternal health care services. However, it has also been documented that low socio-economic status is a social "cause" of health related behaviour and may be important for interventions (Hobel & Culhane, 2003). Thus, economic improvement of the poor mother may have a reinforcing effect on the improvement of the use of maternal health care service and therefore needs to be strengthened (Amin *et al.* 2010). Household size was found to be a significant predictor of postnatal care.

The likelihood to seek postnatal care decreased consistently as the number of household members increased. A large family size could reflect a lower household income and resources (both time and money) available to seek maternal health care (Kistiana, 2009).

As expected, occupation was significantly associated with maternal health care-seeking behaviour. Being in formal employment was associated with increased odds of seeking maternal health care. While this result is consistent with the findings from other studies (Adamu, 2011), it contrasts with findings from a study in Nepal where working women were less likely to seek maternity care (delivery at a health facility) (Matsumura & Gubhaju, 2001). However, formal employment could be an indication that the earning ability of women is an important determinant of maternal health care-seeking behaviour (Miles-Doan & Brewster 1998).

As found in the study, women's autonomy (decision making over their own health) was significantly associated with antenatal care visits. The relationship with other indicators was not statistically significant. Specifically, women who made joint decisions with their husbands were more likely to attend four or more antenatal care visits than those who made decisions alone. This finding may suggest women's low autonomy and inability to seek maternal health care without their husbands' permission, which is prevalent in Nigeria. However, some studies have argued that women's inability to decide on their own to seek health care may be due to a lack of control over material resources needed to pay for expenses, or probably because their mobility may be restricted or they may lack access to vehicles and other means of transportation (Adamu and Salihu 2002; Furuta & Salway, 2006; Thaddeus & Maine, 1994).

The perceived problem of distance was significantly associated with maternal health care-seeking behaviour. The indicator measures the accessibility of health care. In line with

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expectations, results indicated that women who perceived that distance to the health facility was a big problem in obtaining health care were less likely to attend four or more antenatal care visits and receive postnatal care. Distance has been found to have dual effects in studies of maternal health care-seeking behaviour. In the first place, it is regarded as a disincentive to seeking care and secondly an actual obstacle to reaching care after a decision has been made to seek it (Gabrysch & Campbell, 2009). In this study, the obstacle effect of distance is stronger, probably because most women in Nigeria reside in the rural areas where transport and poor roads are a big challenge. This assertion is confirmed by the 2008 Nigeria DHS report that in Nigeria physical barriers are a challenge to the health care delivery system.

Similarly, the perception of women that transport was a problem for obtaining health care was associated with a significant lower odds of attending four or more antenatal care visits, receiving skilled antenatal care, having a baby in a health facility and receiving postnatal care. This is consistent with findings elsewhere (Gage & Calixte, 2006; Glei et al. 2003). It was argued that the obstacle effect of distance on maternal health care-seeking behaviour is stronger when combined with lack of transport and poor roads (Gabrysch & Campbell, 2009).

The findings on the perceived problem of money may reflect economic accessibility. This refers to the relationship between the financial capability of the individual or family and costs of health care services including transportation costs (Gabrysch & Campbell, 2009). Gabrysch and Campbell also argued that perception that money is a problem in accessing health care can strongly affect whether a woman reaches a health facility or not; and the anticipation of a high cost of maternal health care services can also affect her decision to seek care.

CHAPTER 6

COMMUNITY FACTORS AND MATERNAL HEALTH CARE-
SEEKING BEHAVIOUR

6.0   Introduction

This chapter addresses the second and third objectives of this study which seeks to examine the independent effects of community factors on maternal health care-seeking behaviour and investigate the extent to which community factors moderate the association between individual/household factors and maternal health care-seeking behaviour. To achieve these objectives, the multilevel modelling strategy described in section 3.15 was applied, to build multilevel logistic regression models to investigate maternal health care-seeking behaviour in Nigeria. A set of four models was fitted. The first contains no covariates but included only the estimated community mean – probability of maternal health care-seeking behaviour which provides estimates of the variance in probability of maternal health care-seeking behaviour observed between communities. Stated differently, the empty model (model 1) enabled the estimation of the extent of clustering or variations in the outcome variable across communities.

The second model (model 2) included only the community level factors (type of place of residence, region, community women's education, community hospital delivery, community poverty, community mass media exposure and ethnic diversity). This is to allow the assessment of the impact of community factors on maternal health care-seeking behaviour. In model 3 enabling variables (i.e. perceived problem of money, transport and distance) were added. Model 4 included both the community and individual/household variables. Thus model 4 investigated the attributes of the contextual effect of the community on maternal

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health care-seeking behaviour and investigated the extent to which community factors moderate the association between individual/household factors and maternal health care-seeking behaviour.

Analysis was done separately for each of the maternal health care-seeking behaviour indicators. This is because only variables which were significantly associated with each of the outcome variables in the stepwise logistic regression (see appendix 2), or which were biologically important, were retained in the models. The variances at the community level estimated from each model (that is from model 1 to model 4), the proportional change in variance (PCV) as well as the model fit statistics (AIC and BIC), were compared to test whether adding new variables helped to achieve a better explanatory model for maternal health care-seeking behaviour. In addition, the estimate of the community level residuals, 95% confidence intervals and associated standard errors were plotted graphically for each of the maternal health care-seeking behaviour indicators.

The equation for the final multilevel model (model 4) for maternal health care-seeking behaviour is written as follows:

Level-1 model

Probability that the outcome variable will take place = P (Vu, 2005)

$\log[P/(1-P)] = \beta 0 + \beta 1$ (Maternal age at last delivery) + $\beta 2$ (Education) + $\beta 3$ (Ethnic origin) + $\beta 4$ (Religion) + $\beta 5$ (Occupation) + $\beta 6$ (Women's autonomy) + $\beta 7$ (Parity) + $\beta 8$ (Household wealth index) + $\beta 9$ (Household size)

Where

$\beta 0$ is the level 1 intercept

$\beta 1$.........+$\beta 9$ are the level 1 (individual-level) covariates.

Level-2 Model

$\beta 0 = \gamma 00 + \gamma 01$ (Type of place of residence) $+ \gamma 02$ (Region) $+ \gamma 03$ (Community women's education) $+ \gamma 04$ (Community hospital delivery) $+ \gamma 05$ (Community poverty) $+ \gamma 06$ (Community mass media exposure) $+ \gamma 07$ (Ethnic diversity) $+U0$

Where

$\gamma 00$ is the level-2 intercept

$\gamma 01$........ $+\gamma 07$ are the level-2 (community-level) covariates

U0 is the level-2 random effects

6.1 Independent Effects of Community Factors and Moderating Effects on the Association between Individual/household Factors and Antenatal Care Visits

This sub-section presents the independent effects of community factors on the number of antenatal care visits, as well as the moderating effects of community factors on the relationship between individual level factors and the outcome variable. Results are presented in Table 6.1.

Table 6.1 Multilevel logistic regression odds ratio of the effects of community factors on antenatal care visits for the most recent birth in the five years preceding the survey, Nigeria 2008 DHS

Variables	Model 1 Empty model	Model 2 Community variables Odds Ratio	Model 3 Community/ Enabling Odds Ratio	Model 4 Individual / community Odds Ratio
Fixed effects				
Individual characteristics				
Maternal age at last birth				
15-24		-	-	1.000
25-34				1.179
35-49				0.923

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Educational attainment			1.000
No education	-	-	2.572*
Primary			5.153*
Secondary/Higher			
Ethnic Origin			
Hausa	-	-	1.000
Igbo			2.965*
Yoruba			4.522*
North/South minority			2.405*
Occupation			
Unemployed	-	-	1.000
Formal employment			1.567*
Agricultural			0.940
employment			1.764*
Skilled manual workers			
Women's autonomy			
Wife alone	-	-	1.000
Wife/Husband			2.043*
Husband alone/Others			1.409*
Household wealth			
index			1.000
Poorest	-	-	1.915*
Poorer			3.123*
Middle			4.899*
Richer			15.547*
Richest			
Need money			
Not a big problem		1.000	-
A big problem		0.446*	
Distance			
Not a big problem		1.000	-
A big problem		0.728*	
Region of residence			
North Central	1.000	1.000	1.000
North East	0.598*	0.557*	1.229
North West	0.161*	0.138*	0.331*
South East	1.933*	2.232*	1.158
South South	0.792	0.795	0.614*
South West	7.808*	7.209*	4.096*
Community women's			
education			
Low	1.000	1.000	1.000
Medium	2.994*	3.071*	1.316

High		3.435*	3.435*	0.863
Community hospital delivery				
Low		1.000	1.000	1.000
Medium		5.057*	4.840*	4.038*
High		5.817*	5.642*	4.232*
Community poverty				
Low		1.000	1.000	1.000
Medium		0.351*	0.402*	0.844
High		0.091*	0 .117*	0.361*
Community mass media exposure				
Low		1.000	1.000	1.000
Medium		2.618*	2.586*	2.332*
High		3.937*	3.711*	3.159*
Random effects parameters	**Empty**	**Community**	**Community/ Enabling**	**Individual/ Community**
Variance	11.071*	2.550*	2.438*	2.149* (0.662)
(SE)	(3.903)	(0.719)	(0.661)	39.5
VPC=ICC (%)	77	43.6	42.5	80.6
(PCV) (%)	Reference	76.9	77.9	
Log-likelihood	**-8155.0025**	**-7591.7326**	**-7480.585**	**-6636.2953**
Model fit statistics				
AIC	16316.0	15215.5	14997.2	13336.6
BIC	16339.2	15339.0	15136.1	13581.4

The empty model contains no variables but partitions the variance into two component parts. SE = Standard error, VPC= Variance Partition Coefficient, PCV = Proportional change in variance, AIC=Akaike information criterion, BIC = Bayesian information criterion Significance level *p<0.05.

Model 1, which is the empty model, examined the intercept of the model and the variance component of the intercept. As indicated in the model, there is a significant variation in antenatal care attendance across communities ($\tau = 11.071$, p = 0.001). The intra-community correlation was 77%.

The results of the effects of community variables were presented in model 2. As indicated, all the community variables were positively and significantly associated with antenatal care visits. In line with expectations, the likelihood of having four or more antenatal care visits was 7.8 times higher among women who resided in South West and 1.9 times among women who lived in South East relative to those who resided in North Central region. Meanwhile, living in North East and North West was associated with 41 percent and 84 percent lower odds. Results further showed that women who lived in communities with a high proportion of women with secondary and higher education, a high proportion of women who delivered in a health facility, and a high proportion of women who were exposed to mass media were 3.4 times, 5.8 times and 3.9 times respectively more likely to attend antenatal care at least four times relative to those living in disadvantaged communities with a low proportion of educated women, those that delivered in a health facility and low proportion of women who were exposed to mass media. Community poverty was significantly associated with the number of antenatal care visits. Living in communities with a high proportion of women from poor households was associated with 91% lower odds of attending four or more antenatal care visits. Compared to model 1, the variation in antenatal care visits across communities remained significant ($\tau = 2.550$, $p = 0.001$). The intra-community correlation was 43.6 % and the proportional change in variance was 76.9%, indicating that the clustering of antenatal care visits between communities is the result of the composition of communities by community characteristics. Inclusion of community level factors in the model helped to achieve a better model for antenatal care visits, because it helped reduce the community variance from 11.071 ($p = 0.001$) to 2.550 ($p = 0.001$). The model fit statistics (AIC and BIC) suggest that model 2 provides a significant improvement over model 1 because of the smaller values.

In model 3, both community and enabling variables were included. Results indicated that all the community variables remained significant after controlling for enabling variables although the odds of having four or more antenatal care visits slightly decreased for all categories of some community variables (that is community hospital delivery and community media exposure variables). However, such odds increased for some categories of region of residence, community women's education and community poverty. Relative to women living in North Central, the odds of having four or more antenatal care visits remained lower for those living in North East and North West as observed in model 2. Meanwhile, the likelihood of making four or more antenatal care visits was higher for women living in South East (Odds ratio = 2.232; p<0.001) and South West (Odds ratio = 7.209; p<0.001). Compared to disadvantaged communities, living in communities with a high proportion of educated women, high proportion of hospital delivery and high proportion of women who were exposed to mass media increased the odds of making four or more antenatal care visits. Women who resided in communities with a high level of poverty had about 88% lower odds in this respect. Women who reported that money and distance were a problem in accessing health care had 55% and 27% lower odds of making four or more antenatal care visits respectively.

In comparison to model 2, this model showed that the variations in making four or more antenatal care visits across communities was significant (τ =2.438, p = 0.001) and the estimation for the intra-community correlation decreased to 42.5%. This result indicated that the clustering of the outcome variable (antenatal care visits) at the community level is mainly the result of the composition of communities by community characteristics. However, adding the enabling variables (perceived problem of money and distance) helped to achieve a better model for antenatal care visits. This is because it enabled the reduction of the community variance from 2.550 (p = 0.001) to 2.438 (p = 0.001). The smaller values of AIC and BIC in

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model 3 is also an indication that the addition of the enabling variables increased the predictive power of the model.

Model 4 is the final model for antenatal care visits and contained both the individual/household and community variables. Results in the final model showed that maternal age at last delivery was not statistically and significantly associated with antenatal care visits. However, individual/household level variables such as education, occupation, ethnic origin, women's autonomy and household wealth index remained significantly associated with antenatal care visits. The odds of having four or more antenatal care visits was 5.8 times higher for women with secondary/higher education, 2.9 times for Igbo women, 4.5 times for women from the Yoruba ethnic group and 2.5 times for those from Northern/Southern minority ethnic groups. Relative to women from the poorest wealth quintiles, those from the richest wealth quintiles were 15.5 times more likely to have four or more antenatal care visits, whereas those from middle wealth quintiles were 3.1 times more likely to make four or more visits. Women in formal employment and those who made joint decisions with their husbands on health care were 1.6 times and 2 times respectively more likely to attend four antenatal care visits. Whereas the likelihood of having four or more antenatal care visits was 67% lower for women from North West and 39% lower for those from South South, the odds were higher for women from South West (Odds ratio = 4.096; p<0.001) compared to North Central. The difference, however, was not statistically significant for South East.

Results showed that community factors had independent effects on antenatal care visits. Four significant community factors in the final model for antenatal care visits were the region of residence, community hospital delivery, and community poverty and community mass media exposure. Specifically, the results indicated that living in communities with a high proportion

of women who had hospital delivery and a high proportion of women exposed to mass media was associated with a higher likelihood of having four or more antenatal care visits, 4.2 times and 3.1 times respectively. In line with expectations, living in communities with a high proportion of women from poor households decreased the odds by 64%. An intriguing finding is that there was no significant association between community women's education and the number of antenatal care visits. Interestingly, results showed that community variables had moderating effects on the association between individual/household factors and antenatal care attendance. For instance, with the introduction of community variables, the significance of maternal age at last delivery as observed in Chapter five (Table 5.1, model 2) disappeared in the final model (Table 6.1)

Comparatively, the variance at the community level in model 4 remained significant across communities (τ = 2.149; p<0.001). The intra-community correlation decreased to 39.5 percent. The proportional change in variance of 80.6 % indicates that the clustering of the outcome variable (antenatal care visits) at the community level is the result of the composition of the communities by community characteristics. Furthermore, it also indicates that part of the clustering in antenatal care visits between communities is due to the composition of communities by individual characteristics. The result generally confirms that the inclusion of community variables in model 4 was important for obtaining a better explanatory model for antenatal care visits, because the variance at the community level decreased from 2.438 (p = 0.001) to 2.149 (p = 0.001). The smaller values of AIC and BIC observed in model 4 at the end of Table 6.1 revealed that the model is an improvement on the previous model (model 3). Thus the lower values indicate the goodness of fit of the multilevel model.

6.2 Independent Effects of Community Factors and Moderating Effects on the Association between Individual/household Factors and Skilled Antenatal Care

This sub-section examined the independent effects of community factors on skilled antenatal care. In addition, the moderating effects of community factors on the association between individual/household-level factors were presented in Table 6.2.

Table 6.2 Multilevel logistic regression odds ratio of the effects of community factors on skilled antenatal care for the most recent birth in the five years preceding the survey, Nigeria 2008 DHS

Variable	Model 1 Empty model	Model 2 Community variables Odds Ratio	Model 3 Community/ Enabling variables Odds Ratio	Model 4 Individual/ community variables Odds Ratio
Fixed effects				
Individual characteristics				
Maternal age at last birth				1.000
				1.027
15-24		-	-	0.933
25-34				
35-49				
Educational attainment				
No education				1.000
Primary		-	-	1.991*
Secondary/Higher				3.640*
Religion				
Muslim		-	-	1.000
Christian				0.899
Traditional/Others				0.519*
Ethnic Origin				
Hausa				1.000
Igbo		-	-	3.377*
Yoruba				1.728*
North/South minority				1.979*
Occupation				
Unemployed				1.000
Formal employment		-	-	1.355*
Agricultural employment				1.012
Skilled manual workers				1.533*

Women's autonomy			
Wife alone	-	-	1.000
Wife/Husband			1.441*
Husband alone/Others			1.171
Household wealth index			
Poorest			1.000
Poorer			1.337*
Middle	-	-	1.978*
Richer			2.727*
Richest			5.236*
Need money			
Not a big problem	-	1.000	-
A big problem		0.792*	
Transport			
Not a big problem		1.000	
A big problem	-	0.608*	-
Place of residence			
Urban	1.000	1.000	1.000
Rural	0.800	0.824	0.822
Region of residence			
South West	1.000	1.000	1.000
North Central	0.851	0.893	1.071
North East	0.525*	0.522*	1.005
North West	0.228*	0.209*	0.452*
South East	1.462	1.755*	0.843
South South	0.392*	0.397*	0.349*
Community women's education			
Low	1.000	1.000	1.000
Medium	2.372*	2.494*	1.296
High	2.583*	2.648*	0.939
Community hospital delivery			
Low	1.000	1.000	1.000
Medium	3.201*	3.299*	2.857*
High	4.106*	4.277*	3.754*
Community poverty			
Low	1.000	1.000	1.000
Medium	0.513*	0.543*	0.888
High	0.234*	0.253*	0.544*
Community mass media exposure			
Low	1.000	1.000	1.000
Medium	2.018*	2.061*	1.999*
High	2.484*	2.506*	2.225*

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Random effects parameters	Empty	Community	Community/ Enabling	Individual/ Community
Variance	6.290*	1.568*	1.639*	1.446*
(SE)	(0.417)	(0.413)	(0.500)	(0.331)
(VPC)=ICC (%)	65.6	32.2	33.2	30.5
PCV (%)	Reference	75.1	73.9	77
Log-likelihood	**-8221.3601**	**-7741.1444**	**-7644.3732**	**-6722.5575**
Model fit statistics				
AIC	16448.7	15516.3	15326.8	13515.1
BIC	16472.1	15648.8	15474.8	13785.3

The empty model contains no variables but partitions the variance into two component parts
SE = Standard error, VPC= Variance Partition Coefficient, PCV = Proportional Change in Variance
AIC=Akaike information criterion, BIC = Bayesian information criterion
Significance level *p<0.05.

The result in the empty model as shown in Table 6.2 indicated a significant variation in receiving skilled antenatal care across communities (τ = 6.290, p = 0.001). The intra-community correlation was 65.6%. Controlling for only community variables in model 2, results showed that all the community variables were significantly associated with skilled antenatal care with the exception of place of residence. As expected, living in North East and North West remained significantly associated with 48 percent and 78 percent lower odds of receiving skilled antenatal care respectively, compared to living in South West. Results also showed that the odds of receiving antenatal care are higher for women residing in communities with a high proportion of educated women (Odds ratio = 2.583; p<0.001), a high proportion of health facility delivery, (Odds ratio = 4.106; p<0.001) and a high proportion of women who were exposed to mass media (Odds ratio = 2.484; p<0.001). Meanwhile, the odds were lower for those who lived in high poverty communities. In comparison to model 1 the community variance remained significant (τ = 1.568, p = 0.001). The intra-community correlation was 32.2 %. The proportional change in variance of 75% in the likelihood of receiving antenatal care was explained by community compositional factors. Including community level factors in this model was necessary to achieve a better model for skilled antenatal care as it helped reduce the community variance from 6.290 (p = 0.001) to 1.568 (p

= 0.001). The smaller values of AIC and BIC in the model is an indication that model 2 provides a significant improvement over model 1.

With the inclusion of both community and enabling variables in model 3, the effects of community variables remained significant, but the odds of receiving antenatal care increased across respective variable categories. Independent of other factors, compared to women living in South West, those living in North Central, North East, North West and South South were less likely to receive antenatal care. Surprisingly, women living in South East had significantly higher odds (Odds ratio = 1.755; p<0.05) of receiving antenatal care. On the other hand, higher odds of receiving antenatal care, 2.6 times, 4.2 times and 2.5 times, were observed among women living in communities with a high proportion of educated women, a high proportion of those who had delivered in a health facility and a high proportion of women exposed to mass media respectively, compared to women living in disadvantaged communities. Similarly, the odds were 75 percent lower for women who lived in communities with a high proportion of women from poor households. Women who reported that money and transport were big problems in accessing health care had a decline of 21% and 39% respectively in the odds of receiving skilled antenatal care compared to those who reported that money and transport were not big problems.

In comparison to model 2, the variations in receiving skilled antenatal care remained significant (τ =1.639, p = 0.001) across communities and the intra-community correlation is estimated at 33.2%. The proportional change in variance of 73.9% was explained by the composition of communities by community characteristics. It is obvious from the results that enabling variables had minimal effects on the contributions of the community variables to the receipt of skilled antenatal care. Thus the addition of these variables (money and transport) provided no real improvement over model 2 as the community variance increased from 1.568

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(p = 0.001) to 1.639 (p = 0.001). However, the overall model performance measures as indicated by the smaller values of AIC and BIC are strong.

Model 4 included the individual and community characteristics. Results showed that maternal age was not significantly associated with antenatal care. Meanwhile, the effect of education, religion, occupation, ethnic origin, women's autonomy and household wealth index on antenatal care was significant. Women with primary and secondary/higher education were 1.9 times and 3.4 times respectively more likely to receive skilled antenatal care than those who had no education. Receiving antenatal care was 3.4 times higher for women of Igbo ethnic origin, 1.7 times for Yoruba women and 1.9 times higher for women from Northern/Southern minority ethnic groups compared to Hausa women. Similarly, women from the richest, richer and middle households had higher odds, 5.2 times and 1.9 times respectively. On the other hand, the odds of receiving skilled antenatal care were 1.4 times and 1.5 times higher for women who were in formal employment and skilled manual workers respectively compared to the unemployed. Women who made joint decisions with their husbands regarding their own health care were 1.4 times more likely to receive skilled ANC compared to those who made decisions alone.

With respect to community variables, the results showed that women from North West and South South were 55% and 66% respectively less likely to receive skilled antenatal care compared to women from the South Western region. However, the differences were not statistically significant for women from North Central, North East and South East. Furthermore, place of residence and community women's education were not significantly associated with antenatal care. Results further showed that living in communities with a high proportion of women who had had health facility delivery, and those who had mass media exposure was associated with odds of receiving antenatal care that were 3.7 times and 2 times

higher respectively, relative to women living in disadvantaged communities. Meanwhile, living in communities with a high level of poverty was associated with 46 percent lower odds.

When compared with model 3, the variation in receiving skilled antenatal care remained significant across communities (τ = 1.446; p<0.001). The intra-community correlation decreased to 30.5 percent. The proportional change in variance of 77% of the odds of receiving skilled antenatal care was explained by community characteristics, indicating that part of the clustering in receiving antenatal care across communities is the result of the composition of communities by individual characteristics. Furthermore, results showed that community variables did not have any moderating effect on the association between individual/household variables and skilled antenatal care. The addition of the community variables in this model, however, helped to achieve a better model for antenatal care. This is because the community variance reduced from 1.639 (p = 0.001) to 1.446 (p = 0.001).

The goodness of fit statistics shown at the bottom of Table 6.2 reveal that the community compositional factors increased the ability of the multilevel model in explaining the variation in the likelihood of receiving antenatal care. The model represents a significant improvement of the previous model as indicated by the lower values of the AIC and BIC.

6.3 Independent Effects of Community Factors and Moderating Effects on the Association between Individual/Household Factors and Place of Delivery

In this sub-section, the independent effects of community factors on place of delivery were presented and their moderating effects on the relationship between individual/household factors and place of delivery were also examined. The variance component of the intercept was presented in the empty model in Table 6.3 below. The result indicated that the variation in place of delivery across communities was significant ($\tau = 7.467$, $p = 0.001$).

Table 6.3 Multilevel logistic regression odds ratio for the effects of community factors on place of delivery for the most recent birth in the five years preceding the survey, Nigeria 2008 DHS

Characteristics	Model 1 Empty model	Model 2 Community variables	Model 3 Community/ Enabling variables	Model 4 Individual/ Community variables
		Odds Ratio	Odds Ratio	Odds Ratio
Fixed effects				
Individual characteristics				
Maternal age at last birth				
15-24				1.000
25-34				1.096
35-49		-	-	1.292*
Educational attainment				
No education				1.000
Primary		-	-	1.473*
Secondary/Higher				2.827*
Religion				
Muslim		-	-	1.000
Christian				0.974
Traditional/Others				0.473*
Ethnic Origin				
Hausa		-	-	1.000
Igbo				4.479*
Yoruba				2.759*
North/South minority				2.153*

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Occupation			
Unemployed	-	-	1.000
Formal employment			1.179*
Agricultural employment			1.021
Manual workers			1.057
Women's autonomy			
Wife alone	-	-	1.000
Wife/Husband			1.204*
Husband alone/Others			1.039
Parity			
1-2	-		1.000
3-4			0.732*
5+			0.697*
Household wealth index			
Poorest			1.000
Poorer	-	-	1.373*
Middle			1.845*
Richer			2.797*
Richest			5.194*
Need money			
Not a big problem	-	1.000	-
A big problem		0.795*	
Transport			
Not a big problem	-	1.000	-
A big problem		0.704*	
Place of residence			
Urban	1.000	1.000	1.000
Rural	0.684*	0.733*	1.004
Region of residence			
North Central	1.000	1.000	1.000
North East	0.375 *	0.383 *	0.706*
North West	0.280 *	0.275 *	0.527*
South East	1.618*	1.877*	0.733
South South	0.880	0.878	0.696*
South West	1.793*	1.765*	1.157
Community women's education			
Low	1.000	1.000	1.000
Medium	2.339*	2.234*	1.139
High	4.939*	4.441*	1.392*
Community hospital delivery			
Low	1.000	1.000	1.000

			Community/	Individual/
Medium		7.115*	6.779*	5.907*
High		21.327*	20.156*	17.273*
Ethnic diversity				
Low		1.000	1.000	1.000
Medium		0.672*	0.707*	0 .664*
High		0.466*	0 .507*	0.504*
Random effects parameters	*Empty*	*Community*	*Community/ Enabling*	*Individual/ Community*
Variance	7.467*	0.504*	0.467*	0.356*
(SE)	(0.492)	(0.054)	(0.052)	(0.047)
(VPC) =ICC (%)	69.4	13.2	12.4	9.8
(PCV) (%)	Reference	93.3	93.7	95.2
Log-likelihood	**-7376.9092**	**-6621.2366**	**-6554.4653**	**-5615.8334**
Model fit statistics				
AIC	14759.8	13272.5	13142.9	11301.7
BIC	14783.2	13389.4	13275.4	11571.8

The empty model contains no variables but partitions the variance into two component parts
SE = Standard error, VPC= Variance Partition Coefficient, PCV = Proportional Change in
Variance. AIC=Akaike information criterion, BIC = Bayesian information criterion
Significance level *p<0.05

The effects of community variables were examined in model 2, and results showed that all the
community variables were significantly associated with place of delivery. For instance, rural
women were 31% less likely to have a health facility delivery than their urban counterparts.
Interestingly, the odds of having a health facility delivery was 1.8 times higher for women
from South West and 1.6 times for those from South East compared to those from North
Central. Relative to women from North Central region, those from North East and North
West were 62% and 72% respectively less likely to deliver in a health facility. Among women
from communities with a high proportion of women with secondary and higher education, the
odds of having a health facility delivery was 4.9 times higher compared to women from
communities with a low proportion of educated women.

Similarly, the odds of having a health facility delivery were 21.2 times higher among women from communities with a high proportion of women who delivered in a health facility, relative to those from communities with a low proportion of women who had had a health facility delivery. Surprisingly, women who lived in communities with a high proportion of women from different ethnic groups were 64 percent less likely to have a health facility delivery, compared to those who resided in communities with a low proportion of women from different ethnic groups.

In comparison to model 1, the variation in the odds of having a health facility delivery across communities was significant ($\tau = 0.504$, $p = 0.001$). The intra-community correlation estimate was 13.2 %. This indicates that the clustering in the odds of having a baby delivered in a health facility was explained by community characteristics. In addition, results indicated that the community factors were necessary to achieve a better explanatory model for place of delivery, because the inclusion of these variables drastically reduced the community variance from 7.467 ($p = 0.001$) to 0.504 ($p = 0.001$). The lower values of AIC and BIC in the model suggest that the model is a good fit for the data.

Controlling for enabling variables in model 3, results showed that the strong significant association between community variables and place of delivery remained. The odds of having a health facility delivery remained lower for women residing in rural areas in North East, North West and South East compared to North Central. Meanwhile, the odds were higher for women from South West and South East, but with a slight reduction. In the same direction, there was a significant reduction in the odds of having a health facility delivery for women living in communities with a high proportion of educated women and a high proportion of those that had health facility delivery, though the odds remained higher. On the other hand,

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the odds of having a health facility delivery were attenuated, for women living in high and medium ethnic diversity areas, by 49 percent and 29 percent respectively.

Perception that money is a big problem in obtaining health care was found to be significantly associated with health facility delivery. Women who reported that money was a big problem in seeking health care were 21% less likely to deliver in a health facility than those who reported it was not a big problem. Similarly, women who reported that transport constituted a barrier to accessing health care had a 30% lower likelihood of delivering a baby in a health facility. Compared to model 2, the observed variation in the outcome variable (place of delivery) remained significant (τ =0.467, p = 0.001) between communities and the intra-community correlation was estimated at 12.4%. The proportional change in variance of 93.7% of the likelihood of having a health facility delivery between communities was explained by community compositional characteristics. The inclusion of the enabling variables reduced the level 2 variance in model 2, though only minimally. For instance, the variance reduced from 0.504 (p = 0.001) to 0.467 (p = 0.001). The values of AIC and BIC as shown at the bottom of Table 6.3 indicate that model 3 provides no real improvement over model 2.

In model 4, both individual/household and community variables were included. Results showed that maternal age, education, ethnic origin, religion, occupation, women's autonomy, parity, and household wealth index were significantly associated with the place of delivery. Older women, aged 35-49, were 1.3 times more likely to deliver in a health facility than younger women (15-24). Women who had primary education and secondary/higher education were almost twice and three times respectively more likely to have had institutional delivery than those who had no schooling. The odds of having a baby in a health facility were 4.5 times higher among Igbo women, 2.8 times for women from the Yoruba ethnic group and 2.2 times for those from Northern/Southern minority ethnic groups compared to Hausa women.

Women who were affiliated to traditional religion had 53 percent lower odds of having a health facility delivery. Surprisingly, being a Christian was not significantly associated with health facility delivery. Christian women were 3 percent less likely to deliver in a health facility than Muslims. Women who worked in the formal sector and those who made joint decisions with their husbands regarding health care were each 1.2 times more likely to deliver in a health facility than the unemployed and those who made decisions alone respectively. Meanwhile, women of higher parity (3-4 and 5 or more) were 27 percent and 31 percent respectively less likely to deliver a baby in a health facility relative to those of lower parity (1-2). The odds of having an institutional delivery were 5.2 times higher for women who belong to the richest wealth quintile and 1.8 times for those from middle wealth quintile.

The association between community variables and place of delivery yielded interesting results. Rural residence was not associated with place of delivery. The odds of having a health facility delivery were significantly lower for women from North East, North West and South South by 29 percent, 47 percent and 31 percent respectively, compared to North Central. However, the odds were not statistically significant for women from South West and South East. Meanwhile, women from communities that have a high proportion of educated women were 1.3 times more likely to deliver in a health facility than women from communities that have a low proportion of educated women. Similarly, women living in communities with a high proportion and a medium proportion of women who delivered in a health facility had higher odds of health facility delivery that were 17.3 times and 5.9 times respectively, compared to those living in communities where the proportion of women that had health facility delivery was low. Women living in communities with a high and a medium proportion of women from different ethnic groups exhibited 50% and 34% lower odds of having a baby in a health facility respectively, relative to those from communities with a low concentration of women from different ethnic groups. Results also showed that the inclusion

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community variables in this model slightly decreased the odds of health facility delivery across most categories of the individual/household variables. Results further indicated that community variables have both independent impact and moderating effects on the association between women's autonomy and place of delivery. For instance, with the introduction of the community variables in the model, the association between women's autonomy and health facility delivery which was not statistically significant in Chapter 5 (model 2) disappeared.

Comparing the final model (model 4) to model 3, the variation in the odds of health facility delivery was significant across communities ($\tau = 0.356$; $p<0.001$). The intra-community correlation decreased to 9.8%. The 95.2% proportional change in variance of the odds of having a health facility delivery across communities was explained by community compositional factors indicating that part of the clustering in health facility delivery is due to the composition of communities by individual characteristics. The intra-community correlation in model 4 was smaller (9.8%) and the variance at the community level decreased from 0.467 ($p = 0.001$) to 0.356 ($p = 0.001$), indicating that community level variables in studies of place of delivery are useful in obtaining a better explanatory model.

The AIC and BIC showed that community compositional factors enhanced the predictive power of the multilevel models in explaining the variation in having a health facility delivery across communities. The smaller values of the AIC and BIC suggest the goodness of fit of the models used in the analysis.

6.4 Independent Effects of Community Factors and Moderating Effects on the Association between Individual/Household Factors and Skilled Postnatal Care

The independent effects and moderating effects of community factors on the association between individual/household factors and postnatal care are presented in this sub-section, and the variance component of the intercept was examined in model 1 of Table 6.4.

Table 6.4 Multilevel logistic regression odds ratio of the effects of community factors on skilled postnatal care for the most recent birth in the five years preceding the survey, Nigeria, 2008 DHS

Variables	Model 1 Empty model	Model 2 Community variables Odds Ratio	Model 3 Community/ Enabling variables Odds Ratio	Model 4 Individual / Community variables Odds Ratio
Fixed effects				
Individual characteristics				
Maternal age at last birth				
15-24				1.000
25-34				1.063
35-49		-	-	1.185
Educational attainment				
No education				1.000
Primary		-	-	2.204*
Secondary/Higher				5.110*
Religion				
Muslim		-	-	1.000
Christian				0.544*
Traditional/Others				0.273*
Ethnic Origin				
Hausa		-	-	1.000
Igbo				5.791*
Yoruba				2.859*
North/South minority				3.182*
Occupation				
Unemployed		-	-	1.000
Formal employment				1.236*
Agricultural employment				1.062
Manual workers				1.230
Women's autonomy				
Wife alone		-	-	1.000
Wife/Husband				1.236
Husband alone/Others				0.975
Household wealth index				
Poorest				1.000
Poorer		-	-	2.191*
Middle				3.844*
Richer				6.154*

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Richest			15.341*
Household size			
Small (<5members)	-	-	1.000
Large (5 or more)			0.741*
Distance			
Not a big problem	-	1.000	-
A big problem		0.827	
Transport			
Not a big problem	-	1.000	-
A big problem		0.509*	
Place of residence			
Urban	1.000	1.000	1.000
Rural	0.668*	0.711*	0.817
Region of residence			
North Central	1.000	1.000	1.000
North East	0.503*	0.522*	0.842
North West	0.370*	0.362*	0.613*
South East	0.392*	0.493*	0.182*
South South	0.491*	0.510*	0.417*
South West	1.845*	1.861*	1.455
Community women's education			
Low	1.000	1.000	1.000
Medium	2.681*	2.527*	1.254
High	5.175*	4.627*	1.693*
Community hospital delivery			
Low	1.000	1.000	1.000
Medium	7.340*	7.091*	6.908*
High	15.851*	15.307*	15.419*
Community poverty			
Low	1.000	1.000	1.000
Medium	0.439*	0.481*	0.998
High	0.149*	0.179*	0.645*
Ethnic diversity			
Low	1.000	1.000	1.000
Medium	1.449	1.551*	1.163
High	1.424	1.556*	1.028

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Random effects parameters	Empty	Community	Community/ Enabling	Individual/ Community
Variance	10.352*	1.109*	1.045*	0.910*
(SE)	(2.924)	(0.317)	(0.297)	(0.249)
(VPC) = ICC (%)	75.8	25.2	24.1	21.6
(PCV) (%)	Reference	89.3	89.9	91.2
Log-likelihood Model fit statistics	-8232.0508	-7581.8067	-7499.3902	-6595.9992
AIC	16470.1	15198	15036.8	13264
BIC	16493.5	15330	15184.7	13542

The empty model contains no variables but partitions the variance into two component parts. SE = Standard Error, VPC= Variance Partition Coefficient. PCV = Proportional Change in Variance, AIC = Akaike Information Criterion, BIC = Bayesian Information Criterion. Significance level *p<0.05.

Results showed that the variance in receiving skilled postnatal care across communities was significant (τ = 10.352, p = 0.001). Model 2 contained only community contextual variables. Results revealed that type of place of residence was significantly associated with postnatal care. As expected, women who resided in rural areas had a 33% lower likelihood of receiving postnatal care than urban women. Residing in the South Western region was associated with higher odds of receiving postnatal care, and the difference was significant (Odds ratio = 1.980; p<0.01). However, the odds were 30% lower for women who resided in North East, 63% for those from North West, 51% for those who lived in South South and 61% for women from the South Eastern region compared to women from North Central.

Results also indicated that women who lived in communities with a high proportion of women who had secondary and higher education were 5.2 times more likely to seek postnatal care relative to those who resided in disadvantaged communities; whereas those who lived in communities with a medium proportion of educated women had odds that were 2.7 times higher. Community hospital delivery was significantly associated with postnatal care. Women living in communities with a high proportion of women who delivered in a health facility

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were 16 times more likely to receive postnatal care, while those living in communities with a medium proportion of women who had health facility delivery were 7.3 times more likely to seek postnatal care, compared to women who lived in communities with a low proportion of women who delivered in a health facility. Community poverty was negatively and significantly related to skilled postnatal care. Women living in high and medium poverty communities were 85% and 56% respectively less likely to seek postnatal care relative to women who resided in communities with a low proportion of women from poor households. The relationship between ethnic diversity and postnatal care was insignificant.

In comparison to model 1, the variation in postnatal care between communities was significant (τ =1.109; p = 0.001). The intra-community correlation was 25.2%. The subsequent proportional change in variance of 89.3% was explained by community level characteristics, indicating that the variations in the odds of receiving postnatal care between communities is the result of the composition of communities by community characteristics, including the region of residence, rural residence, proportion of educated women, proportion of women that had health facility delivery, and the proportion of those from poor households. The addition of the community variables into the model was important to achieve a better explanatory model for postnatal care, because it helped reduce the community variance substantially from 10.352 (p = 0.001) to 1.109 (0.001). The model fit statistics showed that the values of AIC and BIC were smaller in this model than in model 1, indicating an improvement over the previous model.

Controlling for enabling variables in model 3, the effects of region of residence, rural residence, community women's education, community hospital delivery, community poverty and ethnic diversity on postnatal care remained robust and significant. Observably, the odds of receiving postnatal care for women living in South West, communities with a high

proportion of women with secondary and higher education and health facility delivery decreased slightly. However, the odds remained higher compared to those of women living in North Central region and disadvantaged communities respectively. Similar to the pattern of association observed in model 2, results showed that women from North West, North East, South East and South South had lower odds of receiving postnatal care (48%, 64%, 51% and 49% lower respectively). On the other hand, living in high poverty communities and rural areas was associated with 83% and 29% lower odds respectively. Notably, ethnic diversity was significantly associated with postnatal care in this model. Women who resided in communities with a high proportion of women from different ethnic groups were 1.5 times more likely to receive postnatal care than those who lived in low ethnic diversity communities. Women who perceived that transport was a big problem in obtaining health care were 50% less likely to receive postnatal care than those who did not perceive them as obstacles to obtaining maternal health care. However, the association between distance and postnatal care was not significant.

In comparison to model 2, the community variance in postnatal care across communities in this model remained significant (τ =1.045, p = 0.001), while the intra-community correlation reduced to 24.1%. The proportional change in variance of 89.9% in the odds of receiving postnatal care was explained by community characteristics, suggesting that part of the community variance could be attributed to the composition of communities by enabling characteristics like transportation. However, adding transport in the model helped to achieve a better model for postnatal care because it helped to reduce the variance at the community level from 1. 109 (p =0.001) to 1.045 (0.001). As shown by the lower values of AIC and BIC, model 3 provides some improvement over model 2.

Model 4 included both the individual and community variables. Results indicated that individual/household variables were associated with skilled postnatal care. Specifically, education, religion, ethnic origin, occupation, household wealth index and household size were significantly associated with the likelihood of receiving postnatal care. The pattern of relationship between individual/household variables and postnatal care was consistent with that observed in Chapter 5 (model 2). Women with a higher education and those from the richest households had a higher likelihood of receiving postnatal care, 5.1 times and 15.3 times compared to women with no education and those from poor households respectively. Women from the Igbo, Yoruba and Northern/Southern minority ethnic groups were 5.7 times, 2.8 times and three times respectively more likely to receive postnatal care compared to the Hausa. The odds of receiving postnatal care were 46 percent lower for Christian women and 73 percent for women who were affiliated to traditional and other religions. Women who were in formal employment were 1.2 times more likely to receive postnatal care relative to those who were unemployed. Women from households with five or more members had a 26 percent lower likelihood of receiving postnatal care than women from households with fewer than five members.

With respect to community variables, region of residence, community women's education, community hospital delivery and community poverty were significantly associated with postnatal care. The likelihood of receiving postnatal care was 39% lower for women residing in North West, 82% for those living in South East and 59% for those residing in South South compared to North Central. Relative to North Central, residing in South West increased the likelihood of receiving postnatal care, but surprisingly the difference was not statistically significant. As expected, living in communities with a high proportion of women with secondary and higher education and a high proportion of women who had health facility delivery was associated with higher odds of receiving postnatal care, 1.7 times and 15.4 times

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respectively. However, the relationship between community poverty and postnatal care was negatively significant. As expected, women from communities with a high proportion of women from poor households had 36 percent lower odds of receiving postnatal care. Meanwhile, ethnic diversity showed no significant association with postnatal care. More interestingly, community variables acted as moderators on the association between individual/household variables and postnatal care. The results showed that after controlling for the individual/household and community variables, the association between maternal age and postnatal care was no longer significant, as previously observed in Chapter 5. Similarly the association with women's autonomy was not statistically significant.

Compared to model 3, the community level variance remained significant ($\tau = 0.910$, $p = 0.001$). The intra-community correlation reduced to 21.6%, while the proportional change in variance was 91.2%. This indicates that the odds of receiving postnatal care across communities were explained by community compositional characteristics. This also suggests that the observed variation in the odds of receiving postnatal care between communities is partly due to the composition of communities by individual characteristics. The reduction in the community variance from 1.045 ($p = 0.001$) to 0.910 indicates that the inclusion of the community variables in the model was important in obtaining a better explanatory model for postnatal care. The model fit statistics AIC and BIC revealed that the addition of community variables increased the predictive ability of the multilevel models for postnatal care.

To further estimate community variation in maternal health care-seeking behaviour, community level residuals, standard errors and ranking with 95% confidence intervals for a particular community were plotted for each maternal health care-seeking behaviour indicator. From the dataset, 886 residuals were plotted, one for each cluster or community according to their ranking with their confidence intervals. The vertical lines on the graphs below represent the confidence intervals; smaller communities tend to have wider confidence intervals. When the confidence intervals overlap the 0.0 line (zero horizontal line), it indicates that maternal health care-seeking behaviour (antenatal care visits, skilled antenatal care, place of delivery and postnatal care) in that particular community is not significantly different from the overall mean health care-seeking behaviour in the country (Nigeria). If the confidence interval is below the zero line, maternal health care-seeking behaviour is significantly lower for that community, and if the confidence interval is above the zero line, maternal health care-seeking behaviour is significantly higher for that community. However, if the confidence interval overlaps the zero line, it means that maternal health care-seeking behaviour for that community does not significantly differ from the mean maternal health care-seeking behaviour in the country.

The graph (caterpillar plot) for each of the maternal health care-seeking behaviour indicators are presented in Figures 6.1, 6.2, 6.3 and 6.4.

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In Figure 6.1, the confidence intervals for most communities overlapped the zero (0) red line, suggesting that ANC visits in these communities are not significantly different from the mean ANC visit in the country.
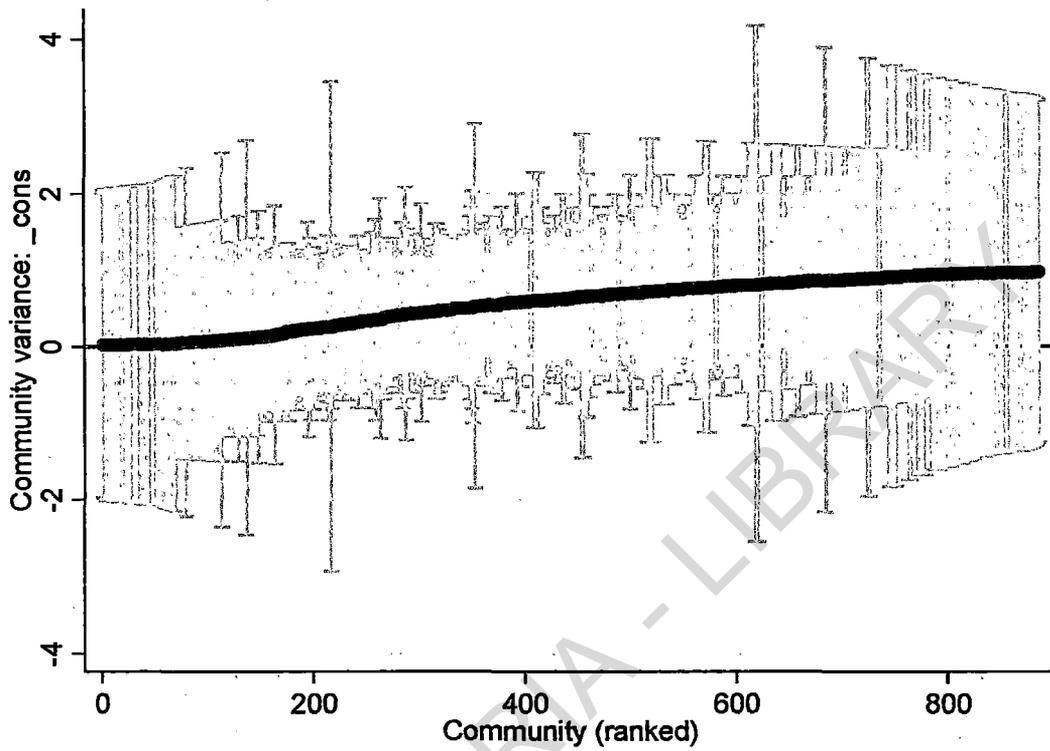
Figure 6.1 Caterpillar plot showing community variance (residual), standard error and ranking with 95% confidence interval for antenatal care visits

Figure 6.2 shows that most communities are small with wide confidence intervals overlapping the zero line. This indicates that the receipt of skilled ANC in most of the communities does not significantly differ from the mean ANC receipt in the country.
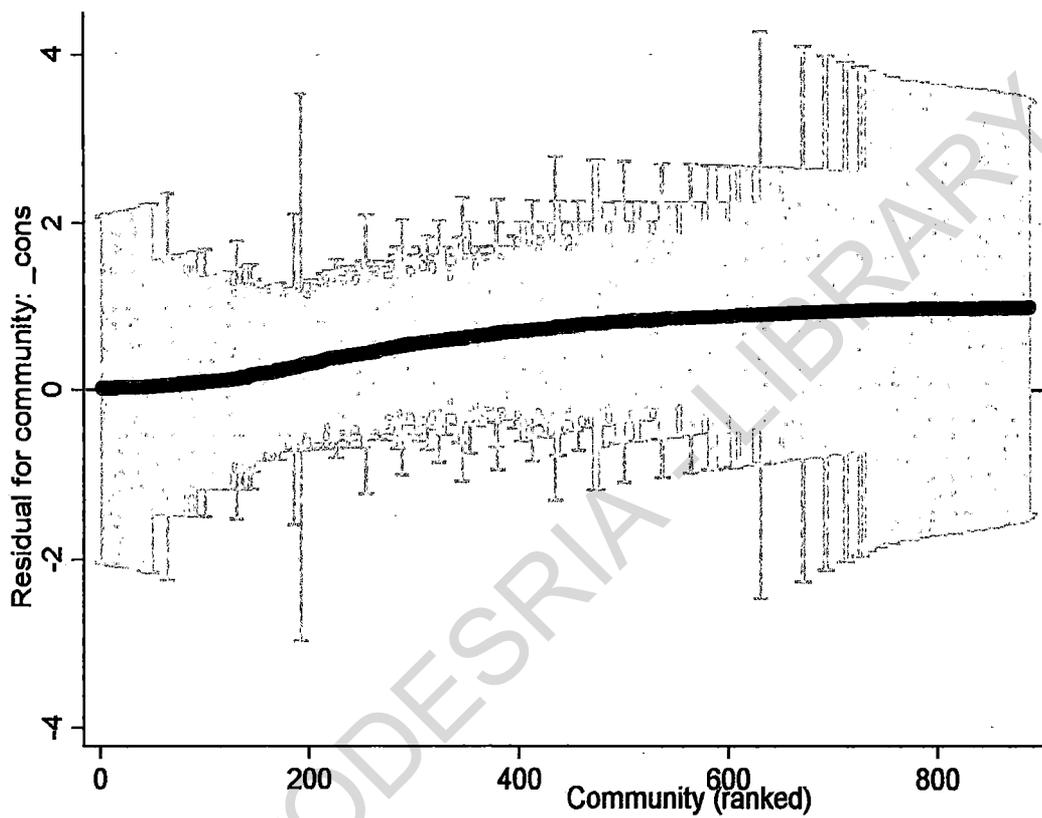
Figure 6.2 A Caterpillar plot showing community variance (residual), standard error and ranking with 95% confidence interval for skilled antenatal care

Figure 6.3 shows that the confidence interval for most communities overlapped the zero line, indicating that health facility delivery in these communities does not significantly differ from the mean facility delivery in the country.
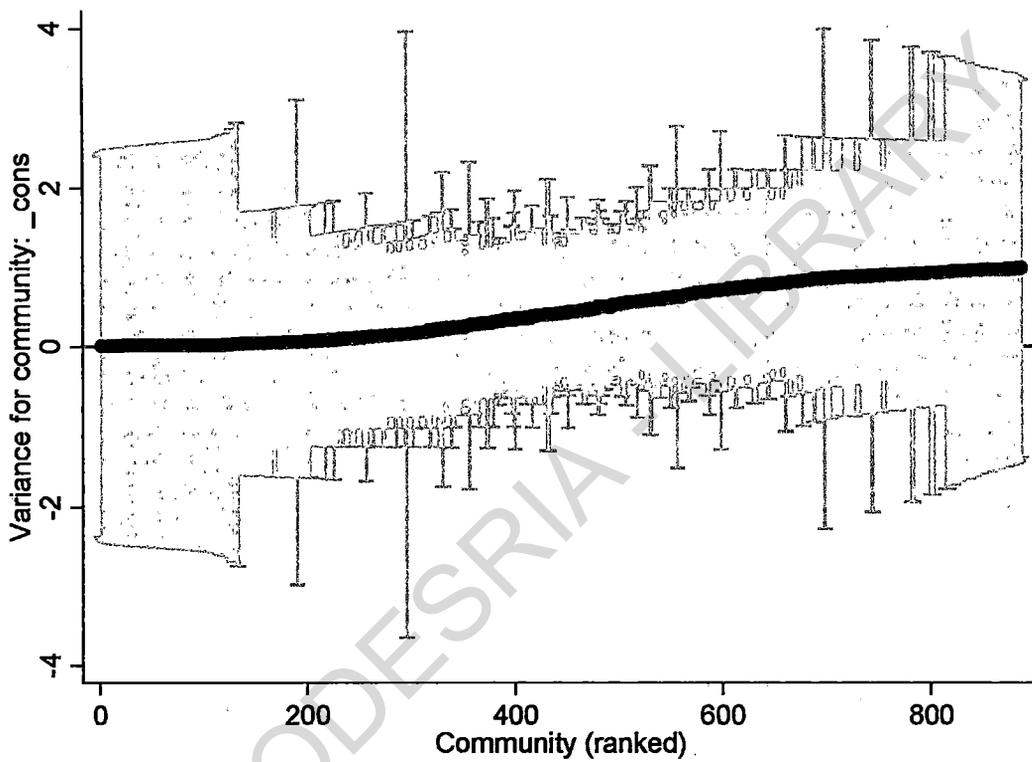
Figure 6.3 Caterpillar plot showing community residual, standard error and ranking with 95% confidence interval for place of delivery.

Figure 6.4 shows that smaller communities with wide confidence intervals are located around the residual and the confidence interval for the majority of the communities overlapped the zero line. This shows that postnatal care in most of the communities is not different from the mean postnatal care in the country.
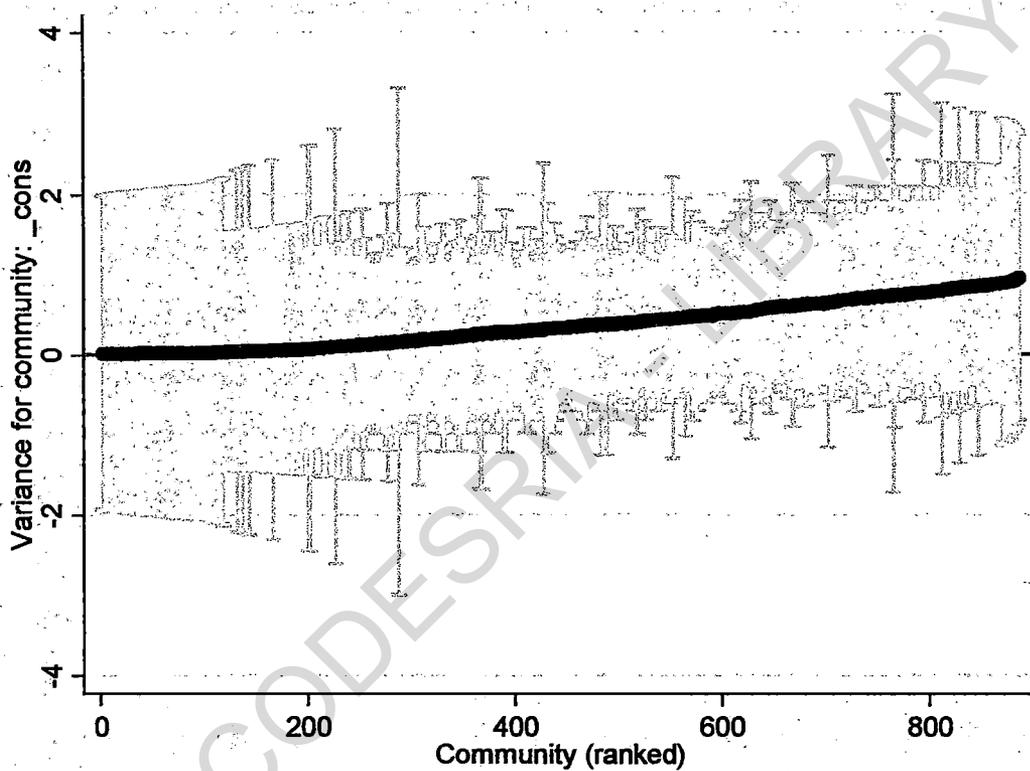
Figure 6.4 Caterpillar plot showing community variance (residual), standard error and ranking with 95% confidence interval for postnatal care

6.5   Discussion

The focus of this chapter was to examine the independent effects of community contextual factors on maternal health care-seeking behaviour and also to assess whether community factors moderated the association between individual/household factors and maternal health care-seeking behaviour. Results showed that the region of residence, community women's education, community hospital delivery, community poverty, and community mass media exposure had strong independent effects on maternal health care-seeking behaviour. This implies that including community level variables in studies of maternal health care behaviour was necessary in order to obtain a better explanatory model for maternal health care-seeking behaviour. Specifically, the indicator of region of residence was shown to have a positive association with maternal health care-seeking behaviour indicators (antenatal care visits, skilled antenatal care, place of delivery and postnatal care). The association between region of residence and maternal health care-seeking behaviour may suggest the influence of location (which could be a reflection of differences in socio-economic development) on a woman's decision to seek maternal health care.

Results indicated that maternal health care-seeking behaviour was variably distributed across regions, with a higher likelihood of having four or more antenatal care visits, receiving skilled antennal care, having a health facility delivery and receiving postnatal care observed among women residing in the South Western region. However, residing in South West was not significantly associated with place of delivery and postnatal care. Other findings confirmed that maternal health care-seeking behaviour was higher for women in South Western region (NPC & ICF Macro, 2009). This may be because South Western region of the country seemed to have higher levels of educational attainment than other regions. Thus, one can argue that

the higher levels of maternal health care-seeking behaviour found among women from South West may be attributed to high levels of education, which in turn creates a greater awareness of maternal health care services and use. In addition, living in North East and North West was negatively associated with maternal health care-seeking behaviour. This could be a reflection of the low socio-economic status of women in these regions, which is a deterrent to seeking maternal health care (Doctor, 2011).

Place of residence showed a negative association with maternal health care-seeking behaviour indicators. The indicator of place of residence was measured as urban or rural residence. Living in the urban or rural areas could encourage women to seek or restrain them from seeking maternal health care. For instance, rural residence decreased the likelihood of seeking skilled antenatal care, health facility delivery and postnatal care. This could be due to differences in socio-economic status between the rural and urban areas as well as the availability and accessibility of maternal health care facilities. Rural residence is often associated with a concentration of low income households and a population with low educational attainment. Besides, in most developing countries, maternal health care facilities are disproportionately distributed in favour of urban areas, making them more available and accessible to urban women than rural women (Adamu, 2011; Hotchkiss, 2001; Wong *et al.* 1987).

While it is true that some women in the rural areas can obtain health care services available in the urban areas, others might not have the resources or facilities to do so. For example, they may not own a vehicle, and public transportation may not be readily available or convenient. In view of this, health policy makers should take into consideration the importance of the availability and accessibility of maternal health care services in the rural areas when designing interventions to improve maternal health care-seeking behaviour. In sum, place of residence

may be associated with "education, ability to pay, parity, ethnicity/religion, beliefs, information availability, autonomy, availability and quality of services and accessibility of services" (Gabrysch & Campbell, 2009: 12-13). Therefore, its inclusion in this study raises question as to what the place of residence indicator is actually measuring.

Community women's education had a positive and significant association with place of delivery and postnatal care. Community women's education measures the proportion of women with secondary and higher education in the community. This result may imply that women in communities with a high proportion of women who had secondary and higher education may have more material resources, greater autonomy and therefore be more able to seek maternal health care services. Some studies have suggested that high levels of educational attainment tend to weaken cultural norms and beliefs in the community, and subsequently increase women's autonomy and decisions to seek maternal health care (Stephenson *et al.* 2007). Furthermore, the observed association between community women's education and maternal health care-seeking behaviour may be that communities with a high proportion of women with secondary and higher education are likely to attract resources necessary to develop and sustain high quality health care services, which is not always the case in disadvantaged communities (Sooman and Macintyre, 1995; Troutt, 1993).

The relationship between community women's education and maternal health care-seeking behaviour may be explained with respect to the improvements in status that accrue to all women as a result of mass education. Education, however, "impacts how women are viewed in society and how they view themselves" (Zerai, 1996: 20). The author argued that women who are educated thought about school as part of the whole modern system, health programmes, health centres, modern medicine as well as themselves. Therefore, the proportion of educated women in the community has an important influence on both the

individual and the community, which in turn influences health behaviour. Furthermore, communities with a high proportion of educated women could reflect highly educated communities which are capable of organising themselves and demanding better public health services (including maternal health care services) on the political agenda (Grosse & Auffrey, 1989).

More interestingly, living in communities with a high proportion of women who delivered in a hospital (health facility) was strongly associated with maternal health care-seeking behaviour. Community hospital delivery, however, is an indication of access to maternal health care and a reflection of the quality of care received during delivery, which in turn influences decisions to seek maternal health care. In addition, it is an example of "socio-economic position at the community level affecting health outcomes" (Antai, 2009: 10).

Community poverty had a negative association with maternal health care-seeking behaviour. Living in communities with a high proportion of women living in poor households was significantly associated with decreased odds of having four or more antenatal care visits and receiving skilled antenatal care. This could also be explained in terms of compositional effect, as women in high poverty communities tend to have limited resources and in most cases are unable to afford quality health care services. It is noteworthy that in this study, even after controlling for the effect of household wealth, the effect of community level poverty still shows a significant association with maternal health care-seeking behaviour Some studies have suggested that socio-economic characteristics of communities can affect the physical conditions of these communities (for example road condition) which may affect transportation and consequently the health and health behaviour of individuals (Robert, 1998; Evans & Kantrowitz, 2002).

The results of the study revealed a significant association between community mass media exposure and maternal health care-seeking behaviour. A community with a high proportion of women who were exposed to mass media is typical of a community that is well informed about maternal health care services. Residence in communities with a high proportion of women who were exposed to mass media (radio and television) was associated with four or more antenatal care attendances and receiving skilled antenatal care. This suggests that community mass media exposure may influence social attitudes towards maternal health care services, thus increasing the propensity to seek care.

Ethnic diversity showed a negative and significant association with the indicator of place of delivery, but the observed relationship is unclear. However, because of the high ethnic diversity in sub-Saharan Africa (Fearson, 2003), the effects of ethnic composition of the community on maternal and child health outcomes are complex and sometimes difficult to understand (Boco, 2010). Surprisingly, results indicated that living in communities with a high proportion of women from different ethnic groups was associated with decreased odds of delivering a baby in a health facility. This association, though unexpected, could reflect "the heterogeneity and social and ecological settings in Africa" (Brockerhoff and Hewett, 1998:5) which are barriers to seeking maternal health care.

Contrary to expectations, two community level variables (i.e. community women's education and ethnic diversity were not associated with antenatal care visits, skilled antenatal care and postnatal care. The non-significance of these variables might be the result of some inter-correlations between the individual and community level variables given the aggregation of the individual data at the community level.

An important and interesting aspect of the results is that community characteristics were not only associated with maternal health care-seeking behaviour, but also acted as moderators of the association between individual/household factors and maternal health care-seeking behaviour. Results indicated that the odds of seeking maternal health care attenuated across the individual level variable categories after controlling for community variables in the final models (i.e. model 4 of Tables 6.1, 6.2, 6.3 and 6.4). Specifically, the significant association observed between maternal age at last delivery and antenatal care visits and postnatal care in Chapter five disappeared when the community level variables were controlled for in the final models in Chapter 6 (Tables 6.1 and 6.4). Although the study has established the moderating effects of community level factors, the pathway through which the community level variables (community women's education, community hospital delivery, community poverty, community media exposure and ethnic concentration in the community) might interact to affect the association between maternal age and maternal health care-seeking behaviour remains unclear.

This study has indicated a robust impact of community factors on maternal health care-seeking behaviour, but raises questions as to whether this effect is due to selection bias or confounders. Selection bias refers to a situation where there may be unmeasured factors that might affect a woman's residential choice as well as her health outcome (health care-seeking behaviour) (Vu, 2005), resulting in a robust effect of community factors on maternal health care-seeking behaviour. On the other hand, it could also be that the community factors are capturing some unmeasured individual level factors not included in the analysis. However, controlling for other individual level variables in this study would help reduce this selection bias. Moreover, some researchers have argued that the unmeasured factors may have been shaped by the community environment (Vu, 2005), hence the inclusion of all the individual

factors is usually not possible, is redundant and could even be counterproductive for the identification of intervention points for public health policy and action (Pearce, 1996; Mackenbach, 1995). In sum, the results have demonstrated that the community factors have strong independent effects on maternal health care-seeking behaviour over and above the individual level factors.

CHAPTER 7

DISCUSSION OF STUDY HYPOTHESES

7.0   Introduction

This chapter discusses the proposed hypotheses based on the study findings. Each of the hypotheses was stated and discussed in relation to whether it was proven or not. Explanations for contrary results were given where necessary.

7.1   Hypothesis 1

The first hypothesis stated that 'maternal health care-seeking behaviour is lower among women from Northern region of Nigeria than among those from Southern region'. This is on the assumption that environmental settings have multiple, physical, social and cultural dimensions that can influence health outcomes/behaviour (Stokols, 1996). Environmental conditions such as low socio-economic development and consequent low socio-economic status and the location of more health care services in the Southern states than in the Northern states may constrain women in the North from seeking maternal health care (Adamu, 2011; NPC & ICF Macro, 2009).

The result of the study was consistent with this expectation, and indicated huge disparities in maternal health care-seeking behaviour between the Northern and Southern regions. This can be explained by the differences in socio-economic development between the northern and

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southern regions (NPC and ICF Macro, 2009). Overall, this hypothesis is confirmed by the results of the study.

7.2   Hypothesis 2

The second hypothesis proposes that 'maternal health care-seeking behaviour is lower for women in female headed households than for those from male headed households'. This is on the premise that the head of household is a determinant of family income and welfare (NPC & ICF Macro, 2009) and family resources determine the amount of funds available to the individual to cover healthcare and related costs (Andersen, 1995). Many poor households are headed by women, usually single mothers, widows, or women who have been abandoned (Rutstein & Johnson, 2004). In patriarchal societies including Nigeria, men have greater control over resources and women's reproductive behaviour (DeRose, 2003; Bankole & Sigh, 1998; DeRose, Nii-Amoo Dodoo and Patil, 2002). Therefore women from female headed households are more vulnerable and may lack economic resources to seek maternal health care.

Contrary to expectations, the results of the study (Tables 4.5, 4.6 and 4.7) showed that women from female headed households were more likely to seek maternal health care than women from male headed households. This result contrasts with previous studies (Jayaraman *et al.*, 2008; Ethiopian Society of Population Studies, 2005). Considering the fact that Nigeria is a patriarchal society and most households are male headed, this result could be due to the small

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number of female headed households in the data. However, the result does not confirm the second hypothesis.

7.3   Hypothesis 3

Hypothesis 3 states that 'community women's education is a significantly associated with maternal health care-seeking behaviour'. This assumes that education enhances female autonomy and creates a more egalitarian society where women can negotiate better quality maternal health care services (Gabrysch & Campbell. 2009; Zerai, 1996). Results from the bivariate statistics (Tables 4.5, 4.6 and 4.7) showed that community women's education was significantly associated with all indicators of maternal health care-seeking behaviour. Women from communities with a high proportion of educated women were more likely to attend four or more antenatal care visits, receive skilled antenatal care, deliver in a health facility and receive postnatal care. However, results from the multilevel analysis (Tables 6.3 and 6.4) indicated that community women's education was significantly associated with health facility delivery and postnatal care, but was not significantly associated with antenatal care visits and skilled antenatal care.

With respect to receiving skilled antenatal care and attending antenatal care visits, the result is not conclusive and therefore   does not confirm hypothesis 3. On the other hand, results indicated that community women's education was significantly associated with the place of delivery and postnatal care. Women from communities with a high proportion of educated women were more likely to receive postnatal care and have health facility delivery than those

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from disadvantaged communities with a low proportion of educated women. This result, however, is consistent with the proposed hypothesis.

7.4   Hypothesis 4

The fourth hypothesis is that 'maternal health care-seeking behaviour is higher among women living in communities with a high proportion of women who delivered in a health facility than among those living in communities with a low proportion of women that delivered in a health facility'. This is based on the assumption that a high proportion of delivery in a community is a proxy for the availability of maternal health care services and the interaction with health practices of others; which in turn has the potential to increase maternal health care-seeking behaviour (Antai, 2009; Stephenson *et al.*, 2006).   The findings of both bivariate and multivariate analyses in Chapters 4 and 6 respectively showed that community hospital delivery was consistently and strongly associated with all the indicators of maternal health care-seeking behaviour. The likelihood of receiving skilled antenatal care, postnatal care, having four or more antenatal care visits and having institutional delivery was higher for women who lived in communities with a high proportion of women who delivered in a health facility compared to women who lived in disadvantaged communities. This result confirms the fourth hypothesis of the study.

7.5   Hypothesis 5

The fifth hypothesis proposed that 'ethnic diversity is positively and significantly associated with maternal health care-seeking behaviour'. This is based on the premise that heterogeneity and social and ecological settings in Africa (Brockerhoff and Hewett, 1998) and in Nigeria in particular, may influence decisions to seek care. High ethnic diversity communities tend to be highly heterogeneous; women from such communities may be more exposed to the social norms and health practices of other ethnic groups which in turn could influence health care-seeking behaviour.

The bivariate results (Tables 4.5. 4.6 and 4.7) showed that ethnic diversity is significantly associated with all the indicators of maternal health care-seeking behaviour. Women from communities with a high concentration of women from different ethnic groups were more likely to seek maternal health care than those from communities with low ethnic diversity. However, the multilevel regression analysis showed discordant results. The association between ethnic diversity and postnatal care in Chapter 6 (Table 6.4) was not statistically significant, whereas the association with place of delivery (Table 6.3) was negative and significant. Interestingly, the results showed that women who resided in communities with a high proportion of women from different ethnic groups had lower odds of having a health facility delivery. The explanation may simply be that communities with a high concentration of different ethnic groups are usually heterogeneous and relationships tend to be more formal. In this kind of community setting, women may not be able to interact closely with each other

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and share their delivery experiences and health care practices. This could result in low maternal health- seeking behaviour. While this hypothesis holds for all the maternal health care-seeking behaviour indicators in the bivariate analysis, it could not be confirmed for place of delivery and postnatal care in the multilevel analysis. Thus, this hypothesis not confirmed in this study.

7.6   Hypothesis 6

The sixth hypothesis states that 'the association between individual/household factors and maternal health care-seeking behaviour will be moderated by community factors'. This is based on the assumption that the magnitude of some individual effects on maternal health outcome/behaviour variables changes as functions of some neighbourhood or community effects (Vu, 2005). Results of the multilevel analysis in Chapter 6 showed that community variables moderated the effects of the association between individual/household variables and maternal health care-seeking behaviour. The inclusion of the community variables in model 4 (Tables 6.1, 6.2, 6.3 and 6.4) resulted in the reduction of odds in seeking maternal health care across the categories of individual level variables compared to results in Chapter 5. In addition, the significant association between maternal age and the outcome variables (antenatal care visits and postnatal care) disappeared after controlling for community variables. The sixth hypothesis is therefore confirmed in the study.

CHAPTER 8

DISCUSSION, CONCLUSION AND RECOMMENDATION

This chapter presents the summary of major findings of the study. In presenting the discussion, the key findings of the study were brought together. The findings on each of the objectives were integrated and located within this discussion to provide a more comprehensive understanding of the findings. The research and policy implications of the study were also discussed.

8.1   Discussion of Major Findings

Following theoretical and empirical research on maternal health and associated factors, this thesis examined the determinants of maternal health care-seeking behaviour in Nigeria. The study focused primarily on community determinants of maternal health care-seeking behaviour. It specifically examined the patterns of and differences in antenatal care visits, skilled antenatal care, place of delivery and skilled postnatal care in Nigeria. The study also examined the impact of community factors on maternal health care-seeking behaviour and investigated whether community factors moderated the effects of the association between individual/household factors on maternal health care behaviour/outcomes.

In addition, this thesis develops a new empirical conceptualization of research on maternal health care-seeking behaviour by adopting a multilevel approach, to explain the variations in antenatal care, place of delivery and postnatal care across communities. Furthermore, the study systematically reviewed relevant theoretical and empirical research related to maternal health care-seeking behaviour and developed a study framework that incorporated individual, enabling and community level factors. The social ecological model of health promotion and the behaviour model of health services use were used to guide the study. The social ecological theory in particular emphasised the importance of social environmental factors (community factors) in

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studies of health and health behaviour as well as multiple levels of influence. These theories enabled a systematic organization of the variables used in the study and analysis at multiple levels (individual/household and community levels). Results of the study indicated substantial community level effects (i.e. the impact of community factors) on maternal health care-seeking behaviour in Nigeria, thus confirming to a large extent the relevance of the theories in explaining the phenomenon.

One important aspect of the findings of the study relates to the general level of maternal health care-seeking behaviour in the study population. Specifically, the results clearly showed that maternal health care-seeking behaviour in Nigeria is very poor. For instance, less than two thirds (54%) of the study population received skilled antenatal care; less than half (46.1%) had four or more antenatal care visits, about 34.4% had health facility delivery, and only 30.1% received postnatal care. The poor maternal health care-seeking behaviour in the country has been documented by other studies (Adelaja, 2011, Babalola & Fatusi, 2009; Osubor *et al.*, 2005). Babalola and Fatusi (2009) found that the utilization of maternal health services in Nigeria was lower than in other countries in sub-Saharan Africa. For example, while they found that about 60.3% of Nigerian women utilized antenatal care in their study, they observed that the figures were as high as 88% for Benin, 72.8% for Burkina Faso, 83.4% for Cameroun and or 91.9% for Ghana. Similarly, the authors noted that postnatal care was considerably lower in Nigeria than in most African countries. In addition Adelaja (2011) in a similar study in Sagamu, western Nigeria, found that planned home delivery accounted for about 66.7% of the total delivery in their study population.

With respect to the patterns of and differences in maternal health care-seeking behaviour, the findings revealed that educational attainment, occupation, ethnic origin, household wealth index, household size, parity, occupation, perceived problems of transport, money and distance were

significantly associated with maternal health care-seeking behaviour. These results were expected and consistent with studies in Indonesia, Bangladesh, Palestine and Guatemala (Islam & Odland 2011; Kistiana, 2009; Dhaher *et al.*, 2008; Pebley *et al.*, 1996).

The finding that maternal health care-seeking behaviour was higher for women with higher education, those in formal employment and those from rich households is consistent with studies in Nigeria (Aremu *et al.* 2011; Adamu, 2011) and elsewhere (Titaley *et al*, 2010; Amin *et al.*, 2010; Forte *et al.* 2006; Dhakal, 2009). The significant effects of education, occupation and household wealth index could suggest higher socio-economic status, which is an important determinant of maternal health care-seeking behaviour. An individual's social and economic conditions (for instance education, occupation, and wealth) have been observed to have a strong influence on health care-seeking behaviour. Educational attainment and occupation are sources of economic resources which empower women to take control of their own health and facilitate easy access to quality maternal health care. This supports the notion that higher socio-economic status is associated with better health outcomes (Antai, 2009), pointing to the need to empower women educationally and economically.

Ethnic origin was found to be strongly and significantly associated with all the indicators of maternal health care-seeking behaviour examined in the study. Specifically, the study indicated that the majority of deliveries took place at home and mostly among Hausa women. Other studies in Nigeria have also shown that the majority of deliveries among Hausa-Fulani women, in particular, took place at home (Wall, 1998; Galadanci, 2007; Oguntunde, 2010). The finding that women from the Igbo, Yoruba, and Northern/Southern minority ethnic groups have a higher likelihood of seeking maternal health care compared to Hausa women underscores the complexity of forces in operation among the different ethnic groups in a culturally diverse society like Nigeria. The ethnic variation in maternal health care-seeking behaviour could reflect

cultural differences, social identity, attitudes and the socio-economic position of women from different ethnic groups (Antai, 2009), which could explain disparities in maternal health care-seeking behaviour. This finding lends strong support to the observation that the poor maternal health conditions experienced by Hausa women are exacerbated by women's position in Hausa society, hence Wall stated: "Cut off from formal education, undervalued in the eyes of the law, exhorted to assume a subordinate and servile position in life by their religion, regarded primarily as vehicles for the production of children often married without choice at an extremely early age and forced to begin childbearing before they are physically mature enough to do so easily, restricted in their movement by wife seclusion, devoid of personal autonomy, and tightly controlled by a social structure that requires the permission of a male authority figure before action can be taken even in life threatening circumstances, Hausa women are trapped behind social barriers that prevent easy access to life-saving medical care when they are pregnant or when they develop a catastrophic complication in childbirth" (Wall, 1998: 355).

This finding that Hausa women have a lower propensity to seek maternal health care is very important and is relevant to policies and programmes that seek to encourage maternal health care-seeking behaviour in Northern Nigeria.

A major, important finding of this thesis relates to the community level effects on maternal health care-seeking behaviour. The results showed appreciable, large and statistically significant community level random effects on maternal health care-seeking behaviour. Even after controlling for the effects of individual and community level variables, results indicated that the differences between communities were highly significant for all maternal health care-seeking behaviour indicators examined. As shown in Table 6.1 (empty model), about 77% of the total variance (11.071) in antenatal care visits was attributable to differences across communities; whereas the variability in skilled antenatal care, health facility delivery and postnatal care, attributable to the community level were 65.6%, 69.4% and 75.8% respectively. The finding

suggests that residing in particular communities is an important determinant of maternal health care-seeking behaviour. The relative importance of community-level random effects observed in this study is in line with expectation, and reinforces previous findings of other studies in maternal health research (Tiwari 2010; Kruk *et al.* 2010, Babalola & Fatusi, 2009; Mistry *et al.*, 2009; Do, 2008). For example, Babalola and Fatusi (2009) in their study of the utilization of maternal health services in Nigeria estimated intra-state level correlation to be about 36.8% for each of the maternal health care indicators examined.

Substantively, the findings of the present study imply that there are unmeasured or unobserved factors (other than those examined in this study) operating at the community level that are associated with maternal health care-seeking behaviour or causing the clustering in the outcome variables in some communities. As noted by other studies (Boco, 2010; Omariba *et al.* 2007; Sastry 1997) unobserved effects generally could reflect a wide range of factors that can be classified as genetic, behavioural, and environmental, occurring at individual, and community levels. Particularly in this study, the unmeasured factors may include influences on maternal health care-seeking behaviour that are difficult to quantify through large scale surveys such as the DHS, for example cultural practices and beliefs regarding maternal health care.

More importantly, results indicated that community factors had strong independent effects on maternal health care-seeking behaviour. A range of community factors associated with maternal health care-seeking behaviour was identified; these include the region of residence, community women's education, community hospital delivery, community mass media exposure, community poverty and ethnic diversity. Another important finding is that community factors acted as moderators on the association between individual/household factors and maternal health care-seeking behaviour. Noteworthy is the finding relating to the association between region of residence and maternal health care-seeking behaviour. Specifically, results showed that women

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from North Eastern and North Western regions were significantly less likely to attend four or more antenatal care visits, receive skilled antenatal and postnatal care and have a health facility delivery compared to those from North Central and the Southern regions of the country. This finding is consistent with other findings in Nigeria (Doctor, 2011; Galadanci *et al*, 2007; Adamu & Salihu, 2002). Regional differences in maternal health care-seeking behaviour could reflect disparities in socio-economic development as more health care services are located in the Southern states than in the Northern states (NPC & ICF Macro, 2009).

The effect of community women's education on maternal health care-seeking behaviour is one of the findings worthy of note. The likelihood of delivering a baby in a health facility and receiving postnatal care was higher among women from communities with a high proportion of women with secondary education and higher relative to those from communities with a low proportion of educated women. This finding is expected and lends credence to the findings of some studies in African countries and Asia (Stephenson *et al.*, 2006; Gage, 2007; Stephenson and Tsui, 2002). Higher educational attainment in most societies has often been associated with higher socio-economic status. Communities with a high proportion of women with secondary and higher education could represent communities with a higher proportion of socio-economically advantaged households (Stephenson *et al.*, 2006). It is logical and consistent with empirical research that greater household wealth enables women to seek maternal health care; whereas for women in poor households, a financial constraint is an important barrier to seeking care (Stephenson *et al.*, 2006).

The result also points to a greater awareness of care during pregnancy, childbirth and postnatal period as higher levels of education may create greater awareness of maternal health care services and the need for them (Stephenson *et al.*, 2006). This is reiterated in a study in Mali which emphasized the importance of social networks as a mechanism through which community

women's education can influence maternal health care-seeking behaviour (Gage, 2007). The author argued that in communities with a high percentage of educated women, social networks may provide women with access to contacts and information on safe motherhood. More interestingly, the finding implies that even the uneducated women in such communities are likely to benefit from the wealth of experience and awareness of maternal health care services of their educated counterparts, thus enhancing their maternal health care-seeking behaviour. Similarly, skilled antenatal care and antenatal care visits were higher for women from communities with a high proportion of women who were exposed to mass media, suggesting a greater awareness of maternal health services in the community. In addition, it is possible that women with greater media exposure feel more confident in using modern maternal health care services.

Another important finding relates to the significant effect of community hospital delivery. The finding that women living in communities with a high proportion of women who had health facility delivery were more likely to receive skilled antenatal and postnatal care, have four or more antenatal care visits, and have a health facility delivery could reflect the presence and availability of maternal health care services in the community. However, due to limited data, the actual availability of maternal health care services in the community was not examined in this study. Thus, this variable can be used as a proxy for the availability of maternal health care services in this case. This finding reiterates the notion that it is not only the neighbourhood in which women reside that influences their maternal health care-seeking behaviour; who their neighbours are is equally important. This result lends support to the findings of previous studies that women's decisions to seek maternal health care are strongly influenced by the health practices of others in the community (Stephenson *et al.*, 2006). Therefore, in a community in which a high percentage of women are using maternal health services, the practice will be regarded as a norm, influencing individual health behaviour (Stephenson *et al.*, 2006). Living in communities with a high proportion of women residing in poor households was associated with a

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lower likelihood of having a health facility delivery and attending postnatal care. This finding may suggest a lack of resources, low financial autonomy and consequently lack of access to maternal health care services.

Some aspects of the results, however, throw up challenges to the findings of some previous studies on reproductive health. The most intriguing finding is that ethnic diversity is negatively and significantly associated with health facility delivery in the multilevel analysis (Table 6.3). Women from communities with a high proportion of women from different ethnic groups had consistent and significant lower odds of having a health facility delivery; while the association with postnatal care was not significant. The negative association of ethnic diversity and maternal health care-seeking behaviour is contrary to the hypothetical expectation at the beginning of this thesis, but lends support to the findings of a study in Mali (Gage, 2007). The low maternal health care-seeking behaviour found among women living in high ethnic diversity areas could reflect the formal relationships prevalent in these community settings. It is expected, however, that communities with a high composition of women from different ethnic groups would have a better reproductive health outcome as observed in studies elsewhere (Uthman, 2010; Boco, 2010). Following the observation that the effects of ethnic composition on maternal and child health are complex and sometimes very difficult to understand (Boco, 2010), it is important to explore this result further.

The association between community women's education and maternal health care-seeking behaviour (antenatal care and antenatal care visits) was not statistically significant in this study. However, this result is contrary to expectations and inconsistent with empirical literature on reproductive health (Stephenson & Tsui, 2002). This inconsistency underscores the need for further investigation to arrive at a more certain conclusion of the mechanisms in operation here.

Another discordant result is the association between religion and maternal health care-seeking behaviour. The bivariate results in Chapter 4 indicated that Christian women were more likely to seek maternal health care than Muslims. Meanwhile, results from model 4 of the multilevel models (Tables 6.2, 6.3, and 6.4) showed a consistently lower likelihood of having four or more antenatal care visits, receiving skilled antenatal care, postnatal care and having a health facility delivery among Christian women. The differences, however, were not significant. The inconsistent association between religion and maternal health care-seeking behaviour is observed in other studies (Adamu, 2011). These inconsistencies in the results could be attributed to the small number of Christians in the sample population and should be interpreted with caution. This result, however, is inconclusive. For more insight and a clearer understanding of the mechanisms in operation, there is a need to examine the nuances of other factors.

Women's autonomy also showed an inconsistent association with maternal health care-seeking behaviour. While the association with all the maternal health care-seeking behaviour indicators was positive and significant in the bivariate analysis, the relationship was only statistically significant for antenatal care visits and skilled antenatal care in the multilevel regression models. The results showed that women who made joint decisions with their husbands regarding their own health care were significantly more likely to attend four or more antenatal care visits and receive skilled antenatal care than those who made decisions alone. The inconsistencies notwithstanding, this result is important as it highlights women's low autonomy, which is a critical barrier to seeking maternal health care in developing countries. This finding lends support to other studies which confirm that in Africa and Nigeria in particular, patriarchy and cultural norms give men the right to control women's sexual and reproductive health, including maternal health care-seeking behaviour (Isiugo-Abanihe, 1994; Odimegwu, 2005).

8.2   Conclusion

The findings of this study have demonstrated that community factors are important predictors of maternal health care-seeking behaviour. Besides, they moderated the association between individual/household factors and maternal health care-seeking behaviour. The effect of community factors on maternal health care-seeking behaviour is quite substantial. The findings suggest that future interventions aimed at improving maternal health care-seeking behaviour may be enhanced by targeting not only the disadvantaged individuals, but also disadvantaged communities in which people live. However, the community variations in maternal health care-seeking behaviour found in this study can be changed through policy, reforms and efforts of individuals. To close the gap in maternal health care-seeking behaviour between communities, interventions should aim at poverty reduction, increasing women's education and hospital delivery in disadvantaged communities. Improvement in maternal health care-seeking behaviour cannot be fully achieved without a coherent policy at the community context.

8.3   Implications for Research

The findings of this study indicated substantial significant variations in maternal health care-seeking behaviour across communities, even after controlling for individual/household and community level variables. The significance of the random intercept implies that the multilevel models did not fully explain the variations in antenatal care visits, skilled antenatal care, health facility delivery and postnatal care across communities. Invariably, this significant variation may be due to unmeasured factors such as variables that are difficult to measure in large surveys (for example DHS) and those that were omitted from the models used in this analysis. These factors include perceptions and views on maternal health care service use, as well as quality of care, which includes the availability of drugs, staff and equipment and effectiveness of trained medical personnel (Stephenson *et al.* 2006). The omitted factors include the presence of a health facility

and maternal health services in the community, actual distance to the health facility, means of transport available in the community, types of roads to an urban area and telephone services in the community, which have been demonstrated in previous research to represent important influences on maternal health care utilization (Do, 2008; Mistry *et al.*, 2009; Islam & Odland, 2011). Unfortunately, this research could not address the effects of these variables because they were not included in the Nigeria 2008 DHS.

Therefore, there is a need for further research to investigate these unobserved factors that may account for the unexplained community variations in the outcome variables in this study. Observably, research on community influences has been hampered by the absence of data combining information on individual, family and community levels (Vu, 2005). In order to study community influences on maternal health care-seeking behaviour effectively, projects should be designed to collect data at multiple levels (i.e. individual, household and community levels). In addition, other datasets (for instance census data) should be utilized for future research. Further, there is a need for Measure DHS and other agencies responsible for data collection to improve the quality of community level data collection.

The definition of relevant groups or neighbourhoods (communities) has been one of the major challenges in multilevel research, including the present study. The study used the PSU as a proxy for community; this is often associated with a selection bias. Future research should therefore focus on identifying the appropriate boundaries for communities, characterizing community attributes and developing techniques to measure these attributes (Vu, 2005). Though it has been observed that census data is a more appropriate unit to accommodate the measurements of a physical or service environment, they do not necessarily correspond with the self-defined communities of individual respondents; thus the social patterns of individuals do not often correspond with census data (Vu, 2005).

Most multilevel studies on reproductive health behaviour, including the present study, have focused on socio-economic attributes of communities (for example Gage, 2007; Stephenson *et al.* 2006; Stephenson and Tsui, 2002). In order to understand and evaluate fully the community effects on maternal health, future studies need to take into consideration all community factors relevant to one or more theories to explain the association between community and maternal health care-seeking behaviour. This would help to examine the moderating effects among community variables and suggest which aspects of the community are potential targets for policy interventions. Furthermore, the community effects found in this study are compositional effects (i.e. the aggregation of individual characteristics to the community level) rather than true contextual effects (i.e. social environmental experience of residents). Thus future research needs to take into account physical environmental factors associated with maternal health care-seeking behaviour.

Maternal health care-seeking behaviour indicators such as timing and content (quality) of antenatal care, and delivery assisted by skilled medical personnel were not considered in this study. Information on these indicators is important for a better understanding of maternal health care behaviour. Furthermore, an exploration of the relationship between ethnic diversity and maternal health care will be a worthwhile aspect of future research in this area in Nigeria. Similarly, useful information will be elucidated if attempts are made to further investigate the effect of community women's education on skilled antenatal care and antenatal care visits. An understanding of further contextual nuances and operational mechanisms through which community factors moderate the effects of the association between individual factors and maternal health care behaviour is important. Further research in this respect will be a worthwhile venture.

Future research combining both quantitative and qualitative approaches should be considered. Qualitative research to study community influences will offer the "advantage of grounding neighbourhood processes within a historical context" (Vu, 2005:230). Such research often provides insight into issues that elude statistical measurement such as women's perceptions, cultural practices and views on maternal health care, which are not covered in the present study. Qualitative research is very effective in communicating to policy makers a coherent and convincing story about how places can influence people's hopes, aspirations, opportunities and wellbeing (Kawachi & Berkman, 2003). Therefore, a combination of both quantitative and qualitative approaches and methodologies in a study will provide convincing evidence of how community factors operate to affect maternal health care-seeking behaviour.

8.4   Policy Implications

This study set out to examine three overall research questions. These were answered by addressing specific research objectives. In summary, analytical results for the research objectives indicated that (a) community factors have a significant impact on maternal health care-seeking behaviour, (b) community factors moderated the association between individual/household factors and maternal health care-seeking behaviour and that (c) the effects of community factors are strong enough to call for policy interventions targeted at the community context in addition to those directed at individuals. This section therefore highlights the study policy implications of the major findings.

The study revealed that maternal health care-seeking behaviour in Nigeria is quite low. The poor maternal health care-seeking behaviour and the attendant high maternal mortality ratio in the country should be of great concern to policy makers. Specifically, the results showed that education is an important determinant of maternal health care-seeking behaviour. Higher education was associated with higher likelihood of receiving maternal health care. This has

implications for policy in terms of interventions that give emphasis to women's education. An increase in women's educational attainment increases women's social and economic status in the society, enhances their autonomy and ability to negotiate for better maternal health care services. Therefore, programmes to increase women's education may help reduce their dependence in matters relating to their health needs, especially during pregnancy, childbirth and in the postnatal period.

The results indicated that ethnic origin was associated with maternal health care-seeking behaviour. The low maternal health care-seeking behaviour observed among the Hausas of Northern Nigeria may be associated with conservative cultural norms and strict Islamic religious practices. However, there is a need for qualitative study to unpack what is categorized as ethnic origin, religion and region of residence (which represent cultural identity factors) before we can make reasonable policy recommendations to deal with perceived problems relating to cultural practices.

The results showed that maternal health care-seeking behaviour was relatively lower for women that were unemployed and those from poor households. Poor household is an indication of poverty which is a condition of not having enough income to meet basic needs such as food, clothing and shelter (Vu, 2005). Because women (especially the unemployed) are often dependent on their husbands or other family members, they experience poor maternal health outcomes by virtue of their household economic circumstances. Therefore, from policy making perspectives, women from poor households should be empowered economically. Policy and interventions to address the issue of household poverty should include strategies to promote economic growth in all sectors of the country, reduction in unemployment, wage increase, accessible and affordable high quality health care, and removal of other barriers that prevent economically disadvantaged groups from gaining employment (Shah, 1994). In addition, large

households, women of higher parity and those who perceived transport, money and distance as a barrier to seeking care, all point to the need for interventions that will ensure access to health services to the disadvantaged segment of the population. Programmes to empower women socially and economically will go a long way to securing their means of livelihood and enhance their maternal health care-seeking behaviour.

The finding that women's maternal health care-seeking behaviour increased only when women made joint decisions with their husbands on their health care suggests the need for programmes to improve women's status and autonomy, especially through education, employment and norm change. These factors have been found to improve the probability that women will seek maternal health care (Mistry *et al.*, 2009). In addition, there is a need to involve women's partners in maternal health programmes so as to educate them on issues regarding appropriate health care seeking during pregnancy. This will enable women to obtain permission to seek care during prenatal, delivery and postnatal periods (Gage, 2007).

More importantly, results indicated a strong association between community factors and maternal health care-seeking behaviour. The effects of community factors highlight several implications for policy and programmes on maternal health care. Region of residence and place of residence (urban and rural) were found to be significantly associated with maternal health care-seeking behaviour. The low maternal health care-seeking behaviour among women living in Northern Nigeria and rural areas is an indication of socio-economic differences. The fact that maternal health care-seeking behaviour is low in the Northern region of the country calls for policy interventions that allow better targeting of health policy and planning and enable need-based resources to be channelled appropriately. This finding also suggests the need for region-specific interventions aimed at improving maternal health care behaviour in disadvantaged regions. Particular attention should be paid to the health needs of the rural women in terms of

providing health care at relatively low cost and improving the state of public health care (PHC) in the rural areas.

The study found significant variations in maternal health care-seeking behaviour across communities and identified several other community factors influencing decisions to seek antenatal, delivery and postnatal care. The findings indicate the potential of these community factors to be harnessed for the development of maternal health interventions that aim to increase the use of maternal health services. In addition, the community factors identified in the study and their relative contributions to variations in maternal health care-seeking behaviour across communities demonstrates that maternal health interventions should be context specific. In other words, such interventions should take into consideration the characteristics and prevalent influences in the community.

Generally, the results indicated the need to continue to invest resources in health care services that are affordable and accessible, especially those that promote antenatal, delivery and postnatal care in disadvantaged communities. There is also a need to invest in women's education in the community, particularly at the secondary and higher level, increase hospital delivery and strengthen the health care system. The higher likelihood of seeking maternal health care found among women in communities with a high proportion of women who have been exposed to mass media strongly suggests the need for policy makers to use the most effective media to convey maternal health programmes and other health topics to various target groups, especially women living in disadvantaged communities. However, the rationale for targeting interventions in disadvantaged areas or communities is that it provides the most effective way of reaching the people who are most in need, especially in a multi-cultural and diverse country like Nigeria.

Manuscripts:

Major findings of this study are expected to be published in international peer-reviewed journals. In view of this, some manuscripts have been prepared out of this work and sent to related journals for publication. The titles of the manuscripts and the respective journals are as follows:

Table 8.1   Manuscripts submitted to Journals

S/N	Title of manuscript	Journal
1	Does it really matter where women live?: A multilevel analysis of postnatal care in Nigeria	*Maternal and Childhealth*
2	Contextual determinants of maternal health care services in Nigeria	*Women and Health*
3	Maternal Health Care in Nigeria: Do community factors moderate the association between individual factors and antenatal care?	*African Population Studies*
4	Multilevel Modelling of Determinants of Maternal Health Care Utilization in Nigeria	*Pan-African Medical Journal*

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Tabular Presentation of Literature Reviewed

Tabular Presentation of Relevant Literature Reviewed

S/N	Title	Author(s) & Year	Data Source	Method	Level of analysis	Findings	Missing Gaps
1	Antenatal care during pregnancy: A study on Naogoan district of Bangladesh	Abedine *et al.* (2008)	Community based survey	Logistic regression	Individual level	Husband's education and occupation and current use of contraception associated with antenatal care	Focused only on antenatal care
2	Utilization of maternal health care services in Nigeria: An analysis of regional differences in the patterns and determinants of maternal health care use	Adamu (2011)	2008 Nigeria Demographic and health Survey	Logistic regression	Individual	Education, family wealth index and place of residence are strong predictors of service utilization	Study did not consider antenatal care visits and community contextual determinants
3	Barriers to the use of antenatal and obstetric care services in rural Kano, Nigeria	Adamu & Salihu, (2002)	Community based study	Frequency distribution	Individual	Socio-cultural factors are barriers to antenatal care and hospital delivery	Study has limited coverage and is restricted to rural communities in Kano, north western Nigeria
4	Neighbourhood socio-economic disadvantage, individual wealth status	Aremu et al. (2011)	Community based study	Multilevel discrete choice	Individual and	Possession of health insurance, wealth status and living in highly	Study restricted to place of delivery and community socio-

				analysis	community	socio-economically disadvantaged neighbourhoods were associated with place of delivery	economic status
	and patterns of delivery care utilization in Nigeria: a multilevel discrete choice analysis						
5	Determinants of antenatal care services utilization in Emezor village, Nigeria	Awusi et al (2009)	Household survey	Frequency distribution	Individual	High parity associated with ANC	The study has limited coverage
6	Determinants of use of maternal health services in Nigeria - looking beyond the individual and household factors	Babalola & Fatusi (2009)	2005 National HIV/AIDS and Reproductive Health Survey	Multilevel logistic regression	Individual household community and state level	Education, and community media saturation are strong predictors of health service utilization	Study did not consider other important community level factors such as community poverty and community women's education
7	The impact of obstetric risk factors and socio-economic characteristics on utilization of antenatal care	Berlung & Lindmark, (1998)	Hospital based study	Multiple regression	Individual	Obstetric complications were important for antenatal care visits	Hospital based study and focused on obstetric risk factors
8	Dimensions of women's autonomy and the influence on maternal health care utilization in a North Indian city	Bloom et al. (2001)	Community based study	Logistic regression	Individual level	Strong relationship between women's autonomy and maternal health care utilization	Study focused on association between women's autonomy and antenatal and delivery care
9	Antenatal care and perinatal outcomes in Kwale district, Kenya	Brown et al. (2008)	Cohort survey	Logistic regression	Individual	Education and distance to dispensary were predictors of antenatal	Study is restricted to antenatal care visit.

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						care attendance	
10	Prospective study of determinants and costs of home births in Mumbai slums	Das et al. (2010)	Surveillance system	Principal components analysis	Individual	Custom, lack of time to reach health facility, poverty, poorer housing and hazardous location were associated with choice of place of delivery	Focus of the study was on home births
11	A Safe Motherhood project in Kenya: assessment of antenatal attendance, service provision and implications for PMTCT	Delva et al., (2010)	Clinical based study	Multiple and proportional odds logistic regression	Individual level	Urban setting and receiving iron sulphate were important determinants of frequent ANC visits	The study emphasised frequency and timing of ANC visits and HIV testing
12	Intergenerational differences in antenatal care and supervised deliveries in Nigeria.	Doctor, (2010)	Nigeria 2008 DHS	Logistic regression	Individual level	Parity, poor economic status and northern residence were determinants of antenatal care and supervised delivery	Study focused on antenatal care and supervised delivery. Postnatal care and antenatal care visits not considered
13	Utilization of antenatal care in Madhya Pradesh India	Dolla (2008)		Chi- square test of association	Individual level	Literacy, distance and service satisfaction were important determinants of antenatal care	Study restricted to demographic, accessibility and availability factors

14	Use of antenatal services and delivery care among women in rural western Kenya: a community based study	Eijk et al. (2006)	Community based study	Logistic regression	Individual level	Relationship between individual level characteristics and ANC and place of delivery	Postnatal care was not considered.
15	Barriers to Utilization of Prenatal Care Services in Turkey	Erci (2003)	Hospital based study	Chi- square test of association	individual	Low education of pregnant women and unwanted pregnancy were barriers to utilization of prenatal care services	Limited sample size and focus was on prenatal care
16	Maternal health care seeking behaviour in Ethiopia: Findings from EDHS 2005	Ethiopian Society of Population Studies (2005)	2005 Ethiopian Demographic and Health Survey	Logistic regression	Individual	Strong association between education, region, residence, wealth index and household decision and utilization of maternal health care services	Community contextual factors not included in the study
17	Maternal health in poor countries: the broader context and a call for action	Fillippi et al., (2006)	Systematic review	-	-	poverty reduction and women's empowerment are important strategies to improve maternal health	Emphasized economic and social vulnerability of pregnant women
18	Maternal health in resource-poor urban settings: how does women's autonomy influence the utilization of obstetric care services	Fotso et al. (2009)	Maternal and health study	Multivariate logistic regression	Individual and household level	Strong relationship between demographic and household covariates and utilization of obstetric care	Women's autonomy and urban poor were the focus of the study

19	Maternal health in Northern Nigeria—a far cry from ideal	Galadanci et al., (2007)	Community based study	Frequency distribution	Individual	Poor maternal health care uptake in	Study was restricted to north eastern Nigeria
20	Barriers to the utilization of maternal health care in rural Mali	Gage (2007)	2001 Mali Demographic and Health Survey	Multilevel logistic regression	Individual and community	Dearth of health facilities, transportation, living in close proximity to educated women, health practices of others and household poverty were strongly associated with the utilization of maternal health care services.	Study was restricted to prenatal and delivery assistance by trained medical personnel and health facility delivery. Postnatal care was not considered.
21	Effects of physical accessibility of maternal health services on their use in rural Haiti	Gage & Calixte (2006)	Haiti 2000 Demographic and Health Survey	Multilevel logistic regression	Individual and community	Poor roads and neighbourhood poverty were associated with timely and four or more ANC attendance, delivery assisted by health professional and institutional delivery were	Study focused on antenatal and delivery care
22	Sexual and reproductive health: a matter of life and death	Glasier et al (2006)	WHO report	-	-	High levels of unsafe abortion, maternal mortality and fertility in developing countries	Major focus of the report is maternal mortality

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23	Women's Reproductive Health in Slum Populations in India: Evidence From NFHS-3	Hazarika, (2009)	2005-2006 National Family Health Survey-3	Logistic regression	Individual level	Education, parity and knowledge of contraceptives were significantly related to reproductive health services	Focus was on contraceptives, antenatal care visits and use of skilled delivery
24	Choice of place for childbirth: prevalence and correlates of utilization of health facilities in Chongwe district, Zambia	Hazemba & Siziya, (2008)	Community based survey	Multiple logistic regression	Individual level	Place of last birth strongly associated with health facility delivery	Small sample size and study focused on place of delivery
25	Expansion of rural health care and the use of maternal services in Nepal	Hotchkiss, 2001	Nepal Living Standards Survey (1995-1996)	Bivariate probit model	Individual, household and community	Physical access to a health care facility was significantly associated with prenatal care and delivery assisted by health professional	The study was restricted to prenatal care services and use of trained practitioner during delivery
26	Maternal health utilization in Teso district	Ikamari, (2004)	Review of literature	Systematic review	_	Unavailability and inaccessibility of health facility and poverty are barriers to antenatal and delivery care	Postnatal care was not considered
27	Utilization of Antenatal care and Delivery services in Sagamu, South Western Nigeria	Iyaniwura and Yussuf (2009)	Community based study	Frequency distribution	Individual	Perceived quality of service and socioeconomic status were important major	Limited coverage and small sample size

#	Title	Author (Year)	Data Source	Method	Level	Findings	Limitations
						factors influencing decisions to seek maternal health care	
28	Socio-economic and demographic determinants of maternal health care utilization in Indonesia	Kistiana (2009)	2007 Indonesia Demographic and Health Survey	Logistic regression	Individual and household	Women's exposure to mass media, birth order and place of residence were significantly related to antenatal and delivery care	Postnatal care was not considered in this study
29	Maternal health and care-seeking behaviour in Bangladesh: Findings from a national survey	Koenig et al (2007)	2001 Bangladesh Maternal health and Maternal Mortality Survey	Frequency distribution	-	Low but increasing use of ANC and low rates of institutional delivery	The study focused more on obstetric complications
30	Utilization of maternal health services in the department of Matagalpa, Nicaragua	Lubbock & Stephenson (2008)	Qualitative data, using 37 semi structured in-depth interviews		Individual	Prenatal care influenced by poor access to care and economic barriers.	Sample size is small
31	A new measurement for optimal antenatal care: Determinants and outcomes in Cameroon	Mbuagbaw & Gofin (2010)	2004 Cameroon Demographic and Health Survey	Logistic regression	Individual and household	Education, wealth and urban residence were strongly associated with optimal antenatal care	Study was restricted to determinants of optimal antenatal care. Place of delivery and postnatal care were not considered.
32	The inequality of maternal health care in urban sub-Saharan Africa in the 1990's	Magadi et al. (2003)	DHS dataset from 23 countries	Logistic regression	Multilevel logistic regression	Association between urban residence and maternal health care	The study focused on urban poor and postnatal care was not also considered

33	A comparative analysis of the use of maternal health services between teenagers and older mothers in sub-Saharan Africa: Evidence from Demographic and Health Surveys (DHS)	Magadi et al. 2006	DHS dataset from 21 countries	Logistic regression	Multilevel logistic regression	Inadequate use of antenatal and delivery care by teenagers	The study did not examine postnatal care attendance
34	Women's status, Household structure and the utilization of Maternal health services in Nepal	Matsumura & Gubhaju (2001)	1996 Nepal Fertility and Health Survey	Logistic regression	Individual and household	Education and household economic status increases the utilization of health services.	Community factors were not considered
35	Contextual Influences on the use of antenatal care in Nepal	Matthews & Gubhaju, 2004	2001 Nepal Demographic and Health Survey (NDHS	Multilevel logistic regression	Individual and district level	Education, parity and living in districts with high gender development index were strongly associated with antenatal care	Focus of the study was on antenatal care visits.
36	Under-users of antenatal care: A comparison of non-attenders and late attenders for antenatal care, with early attenders	McCaw-Binns et al. 1995	Jamaican Perinatal Morbidity and Mortality Survey (1986-1987)	Multiple logistic regression	Individual	Under users of antenatal care tended to be women with poor social support and those living in poor environmental conditions	The study was restricted to antenatal care
37	Barriers in accessing maternal healthcare: evidence from low and	McNamee (2009)	Systematic review	-	-	Education, distance to health facility and wealth status were important barriers to use	Focused on education, economic status and distance barriers on

	middle-income countries					of maternal health care	service use.
38	Utilization of Health Care Services by Pregnant Mothers During Delivery: A community based study in Nigeria.	Moore et al., 2010	Community based study	Frequency distribution	Individual	Unfriendly attitude of staff, poor services and long waiting hours influence health care service utilization	Small sample size and scope is limited
39	Use pattern of maternal health services and determinants of skilled care during delivery in Southern Tanzania: implications for achievement of MDG-5 targets	Mpembeni et al. (2007)	Community based intervention study	Multiple logistic regression	Individual	Advice on pregnancy risk factors was strongly associated with skilled care at delivery	Focused on skilled care at delivery
40	Individual's Characteristics affecting maternal health services utilization: Married adolescents and their use of maternal health services in Bangladesh	Nuruzzaman & Hague (2009)	Bangladesh Demographic and Health Survey, 2004.	Logistic regression	Individual	Educational level increases the utilization of maternal health care services	Analysis restricted to individual characteristics
41	Maternal health care utilization in Jordan: A study of patterns and determinants	Obermeyer & Potter (1991)	Jordan Fertility and Family Health Survey (1983)	Logistic regression	Individual and household	Relationship between parity and standard of living and maternal health care utilization	The study focused on individual and household factors
42	Antenatal care and skilled	Oguntunde et al.	Community based	Chi-square test	Individual	Education was strongly	Limited coverage and

	birth attendance in three communities in Kaduna state, Nigeria	(2010)	study	of association	level	related to the use of maternal health care services	small sample size
43	Women's access to health care in developing countries	Ojanuga & Gilbert (1992)	Review of Literature	Systematic review	-	Access to health care increases with social status and income	Focused more on social cultural determinants
44	Women's and Health-Care Providers' Views of Maternal Practices and Services in Rural Nigeria	Okafor & Rizzuto	Qualitative data (FGDs)	-	Individual	Community perceptions, attitudes and beliefs were constraints to maternal health care	Focus was on community perception of health care. Other factors not considered
45	Social dimensions of the health behaviour of rural women: findings from focus group discussion research in Nigeria. In Measurement of maternal and child mortality, morbidity and health care Interdisciplinary approaches	Okojie, (1998)	Qualitative data and household survey (FGDs)	–	Individual and household	Most delivery occurred at home, women's status and rural residence were predictors of health-seeking behaviour	Study is limited to rural communities.
46	Factors associated with the use of maternity services in Enugu south-eastern Nigeria	Onah et al. (2006)	Community based study	Chi-square test	Individual, household and community	Social, economic and health system factors positively influence institutional delivery	Restricted to south-eastern Nigeria hence coverage is limited
47	Maternal health-seeking behaviour and associated factors in rural Nigerian	Osubor et al. (2005)	Community based survey and qualitative	Chi-square test of association	Individual	Significant association between education and maternal-health seeking	Study lacks national coverage and sample

					behaviour	size
	society		data (FGDs)			
48	Women's social position and health-seeking behaviours: is the health care system accessible and responsive in Pakistan?	Shaikh et al., (2008)	Household Survey	Frequency distribution	Individual	Utilization of health services is based on quality of services and availability of female staff	Major focus of the study is women's social position and health-seeking behaviour
49	Where do they go, whom do they consult, and why? Health-seeking behaviours in the northern areas of Pakistan	Shaikh & Hatcher (2008)	Ethnographic study	-	Individual	Cultural and environmental factors influence health-seeking behaviour	The study focused on health-seeking behaviour related to illnesses
50	Health-seeking behaviour and health service utilization in Pakistan: challenging the policy makers	Shaikh & Hatcher (2004)	Literature review on determinants of health-seeking behaviour	Systematic review	-	Education and women's autonomy associated with health-seeking behaviour	Health-seeking behaviour restricted to choice of health provider
51	The role of mothers-in-law in antenatal care decision-making in Nepal: a qualitative study	Simkhada et al. (2010)	Qualitative data (In-depth interviews)	_	Individual	Mothers-in-law play important role in decisions to seek antenatal care	Focus was on the role of mothers-in-laws on antenatal care-seeking behaviour
52	Contextual influences on the use of health facilities for child birth in Africa	Stephenson et al. (2006)	DHS dataset from 6 African countries	Multilevel logistic regression	Individual and community	Decision to deliver a child in a health facility was positively associated with percentage of educated women in the PSU.	The study's focus was on the use of health facility for childbirth

					Also, percentage of husbands in the PSU who approved of family planning was significantly associated with health facility delivery	
53	Contextual influences on reproductive health service use in Uttar Pradesh, India	Stephenson & Tsui (2002)	1995-1996 PERFORM System of Indicators Survey (PSIS)	Multilevel logistic regression	Individual and community	Strong community level influences on contraceptive use, antenatal care and health facility delivery	Study did not consider the use of postnatal care service
54	Utilization of maternal health services in Uttar Pradesh: A comparison between simple logistic and multilevel logistic regression analysis	Tiwari (2010)	2002-2004 Reproductive and Child health district level household survey	Simple and multilevel logistic regression	Individual household and community level	Individual and community factors are important in explaining maternal health services	Study restricted to ANC and delivery care
55	Determinants of antenatal care utilization in three rural areas of Vietnam	Trinh et al. 2007	The Vietnam-Australia PHC Project (1998-1999)	Logistic regression	Individual	External environment and predisposing factors were associated with use of ANC	The study is restricted to antenatal care
56	Women's autonomy and Maternal Health-seeking behaviour in Ethiopia	Woldemicael & Tenkorang (2009)	2005 Ethiopian Demographic and Health Survey	Multilevel regression	Individual and household	Relationship exists between women's autonomy and maternal health-seeking behaviour	The study focused on women's autonomy and health-seeking behaviour.

Appendix II

Stepwise Logistic Regression

Stepwise logistic regression odds ratio for the predictors of antenatal care from skilled providers for the most recent birth in the five years preceding the survey, Nigeria 2008 DHS

Variable	Odds ratio	P-value	95% CI
Educational attainment			
No education			
Primary	2.031	0.001	1.819 - 2.267
Secondary/Higher	3.129	0.001	2.707 – 3.618
Religion			
Muslim			
Christian	1.081	0.287	0.937 – 1.247
Traditional/Others	0.670	0.008	0.498 – 0.902
Ethnic Origin			
Hausa	3.730	0.001	2.459 – 5.657
Igbo	1.678	0.001	1.302 – 2.164
Yoruba	1.928	0.001	1.673 – 2.221
Others			
Occupation			
Unemployed			
Formal employment	1.220	0.001	1.101- 1.354
Agric employment/Manual workers	1.149	0.011	1.032- 1.281
Women's autonomy			
Wife alone	1.278	0.005	1.077 – 1.516
Wife/Husband	1.058	0.510	0.894 – 1.251
Husband alone/Others			
Household wealth index			
Poorest			
Poorer	1.454	0.001	1.300 – 1.627
Middle	1.930	0.001	1.691 – 2.202
Richer	2.415	0.001	2.030 – 2.873
Richest	4.181	0.001	3.221 – 5.426
Enabling variables			
Need Money			
A big problem			
Not a big problem	0.691	0.001	0.630 – 0.758
Transport			

A big problem			
Not a big problem	0.753	0.001	0.686 – 0.826
Community contextual variables			
Place of residence			
Urban			
Rural	0.811	0.001	0.714 – 0.921
Region of residence			
North Central			
North East	1.059	0.625	0.842 – 1.332
North West	1.127	0.345	0.880 – 1.443
South East	0.578	0.001	0.449 – 0.746
South South	0.653	0.068	0.413 – 1.031
South West	0.331	0.001	0.258 – 0.425
Community women's education			
Low	1.142	0.033	1.011 – 1.289
Medium	0.747	0.001	0.625 – 0.893
High			
Community hospital delivery			
Low	1.881	0.001	1.688 – 2.096
Medium	2.573	0.001	2.217 – 2.985
High			
Community poverty			
Low			
Medium	0.862	0.083	0.729 – 1.020
High	0.599	0.001	0.492 – 0.731
Community mass media			
Low			
Medium	1.760	0.001	1.589 – 1.950
High	2.210	0.001	1.940 – 2.519
Log-likelihood		-7275.9589	
Number of observations		16568	
Pseudo R2		0.3626	

Stepwise logistic regression odds ratio for the predictors of antenatal care visits for the most recent birth in the five years preceding the survey, Nigeria 2008 DHS

Variable	Odds ratio	P-value	95% CI
Maternal age at last birth			
15-24			
25-34	1.142	0.006	1.038 – 1.256
35-49	1.014	0.815	0.900 – 1.144
Educational attainment			
No education			
Primary	1.815	0.001	1.624 – 2.027
Secondary/Higher	2.491	0.001	2.170 – 2.859
Ethnic Origin			
Hausa			
Igbo	2.344	0.001	1.5980 – 3.437
Yoruba	2.584	0.001	1.984 – 3.367
Others	1.740	0.001	1.517 – 1.995
Occupation			
Unemployed			
Formal employment	1.231	0.001	1.105 - 1.371
Agric employment/Manual workers	1.079	0.176	0 .966 - 1.206
Women's autonomy			
Wife alone			
Wife/Husband	1.366	0.001	1.148 – 1.625
Husband alone/Others	1.087	0.341	0.916 – 1.290
Household wealth index			
Poorest			
Poorer	1.602	0.001	1.418 – 1.809
Middle	2.063	0.001	1.797 – 2.369
Richer	2.562	0.001	2.153 – 3.048
Richest	5.160	0.001	4.025 – 6.614
Enabling variables			
Need Money			
A big problem			
Not a big problem	0.653	0.001	0.594 – 0.718
Transport			
A big problem			
Not a big problem	0.832	0.001	0.755 – 0.917
Community contextual variables			

Region of residence			
North Central			
North East	0.477	0.001	0.377 – 0.603
North West	0.605	0.001	0.471 – 0.776
South East	0.278	0.001	0.214 – 0.361
South South	0.481	0.001	0.313 – 0.738
South West	0.327	0.001	0.252 – 0.424
Community women's education			
Low	1.056	0.381	0.934 – 1.194
Medium	0.789	0.007	0.664 – 0.939
High			
Community hospital delivery			
Low	1.829	0.001	1.635 – 2.046
Medium	1.882	0.001	1.626 – 2.179
High			
Community poverty			
Low			
Medium	0.892	0.152	0.763 – 1.043
High	0.581	0.001	0.484 – 0.698
Community mass media			
Low			
Medium	1.639	0.001	1.473 – 1.824
High	1.963	0.001	1.719 – 2.243
Log-likelihood	**-6848.0487**		
Number of observations	**15382**		
Pseudo R2	**0.3545**		

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Stepwise logistic regression models for the predictors of place of delivery for the most recent birth in the five years preceding the survey, Nigeria 2008 DHS

Variable	Odds ratio	P- value	95% CI
Maternal age at last birth			
15-24			
25-34	1.098	0.142	0.969 – 1.244
35-49	1.258	0.010	1.057 – 1.496
Educational attainment			
No education			
Primary	1.450	0.001	1.272 – 1.653
Secondary/Higher	2.735	0.001	2.360 – 3.169
Religion			
Muslim			
Christian	0.944	0.435	0.817 – 1.091
Traditional/Others	0.446	0.001	0.301 – 0.661
Ethnic Origin			
Hausa			
Igbo	4.658	0.001	3.250 – 6.677
Yoruba	2.779	0.001	2.142 – 3.605
Others	2.313	0.001	1.889 – 2.831
Occupation			
Unemployed			
Formal employment	1.221	0.002	0 .955- 1.239
Agric employment/Manual workers	1.088	0.203	0.948 - 1.268
Women's autonomy			
Wife alone			
Wife/Husband	1.122	0.186	0.946 – 1.329
Husband alone/Others	0.973	0.753	0.820 – 1.154
Household wealth index			
Poorest			
Poorer	1.283	0.003	1.087 – 1.514
Middle	1.643	0.001	1.391 – 1.941
Richer	2.276	0.001	1.896 – 2.733
Richest	3.944	0.001	3.168 – 4.909
Enabling variables			
Parity			
1-2			
3-4	0.747	0.001	0.660 – 0.846
5 or more	0.707	0.001	0.606 – 0.825

Need Money			
A big problem			
Not a big problem	0.889	0.029	0.800 – 0.988
Transport			
A big problem			
Not a big problem	0.769	0.001	0.686 – 0.861
Community contextual variables			
Region of residence			
North Central			
North East	0.812	0.043	0.663 – 0.994
North West	0.622	0.001	0.492 – 0.786
South East	0.486	0.001	0.374 – 0.631
South South	0.632	0.015	0.436 – 0.916
South West	0.593	0.001	0.474 – 0.741
Community women's education			
Low	1.097	0.214	0.948 – 1.268
Medium	1.323	0.003	1.100 – 1.591
High			
Community hospital delivery			
Low	5.207	0.001	4.462 – 6.076
Medium	15.614	0.001	13.11 – 18.59
High			
Ethnic diversity			
Low			
Medium	0.680	0.001	0.573 – 0.808
High	0.521	0.001	0.426 – 0.636
Log-likelihood	-5652.6316		
Number of observation	16550		
Pseudo R2	0.4678		

Stepwise logistic regression odds ratio for the predictors of postnatal care from skilled provider for the most recent birth in the five years preceding the 2008 Nigeria DHS

Variable	Odds ratio	P- Value	95% CI
Educational attainment			
No education			
Primary	1.584	0.001	1.398 – 1.796
Secondary/Higher	2.424	0.001	2.112 – 2.782
Religion			
Muslim			
Christian	0.709	0.001	0.622 – 0.809
Traditional/Others	0.528	0.001	0.358 – 0.778
Ethnic Origin			
Hausa			
Igbo	3.043	0.001	2.251 – 4.113
Yoruba	2.038	0.001	1.622 – 2.562
Others	2.033	0.001	1.724 – 2.398
Women's autonomy			
Wife alone			
Wife/Husband	1.110	0.181	0.953 – 1.294
Husband alone/Others	0.960	0.604	0.822 – 1.121
Household wealth index			
Poorest			
Poorer	1.644	0.001	1.394 - 1.937
Middle	2.165	0.001	1.821 – 2.573
Richer	2.768	0.001	2.278 – 3.364
Richest	4.803	0.001	3.835 – 6.017
Household size			
Small (<5 members)			
Large (5 or more)	0.869	0.004	0.790- 0.956
Enabling variables			
Distance			
A big problem			
Not a big problem	0.864	0.034	0.755 – 0.989
Transport			
A big problem			
Not a big problem	0.743	0.001	0.648 – 0.853
Community contextual variables			
Place of Residence			
Urban			
Rural	0.893	0.048	0.799 – 0.999

Region of residence			
North Central			
North East	0.754	0.003	0.626 – 0.908
North West	0.732	0.006	0.586 – 0.914
South East	0.593	0.001	0.465 – 0.756
South South	0.320	0.001	0.236 – 0.434
South West	0.504	0.001	0.409 – 0.620
Community women's education			
Low	1.142	0.056	0.997 – 1.309
Medium	1.343	0.001	1.139 – 1.583
High			
Community hospital delivery			
Low	3.190	0.001	2.769 – 3.675
Medium	5.263	0.001	4.479 – 6.183
High			
Community poverty			
Low			
Medium	1.084	0.232	0.950 – 1.238
High	0.920	0.369	0.767 – 1.104
Log-likelihood		-6628.5606	
Number of observation		16472	
Pseudo R2		0.3390	

Multilevel Logistic Regression Tables
Table 5.1 Multilevel logistic regression models for individual/household predictors of antenatal care visits, 2008 Nigeria DHS

Variable	Model 1 Individual/household variables	Model 2 Individual & Enabling variables
	95% CI	95% CI
Fixed effects		
Individual characteristics		
Maternal age at last birth		
15-24		
25-34	1.02 – 1.45	1.02 – 1.45
35-49	0.80 – 1.20	0.80 – 1.21
Educational attainment		
No education		
Primary	1.93 – 4.42	1.94 – 4.39
Secondary/Higher	3.10 – 11.14	2.99 – 10.20
Ethnic Origin		
Hausa		
Igbo	4.03 – 22.88	4.53 – 27.36
Yoruba	9.87 – 110.32	10.20 -112.94
Others	2.48 – 7.47	2.57 – 7.82
Occupation		
Unemployed		
Formal employment	1.24 – 2.02	1.23 – 1.99
Agric employment	0.74 – 1.22	0.79 – 1.31
Manual workers	1.18 – 2.27	1.19 – 2.28
Women's autonomy		
Wife alone		
Wife/Husband	1.30 – 2.70	1.28 – 2.65
Husband alone/Others	0.87 – 1.58	0.84 – 2.53
Household wealth index		
Poorest		
Poorer	1.59 – 3.19	1.57 – 3.13
Middle	2.70 – 9.33	2.65 – 8.36
Richer	4.76 – 27.19	4.36 – 22.40
Richest	12.42-171.32	11.17-133.89
Need Money		
A big problem		
Not a big problem		0.41 – 0.70
Distance		
A big problem		
Not a big problem		0.60 – 0.91

Table 5.2 Multilevel logistic regression models for the individual/household predictors of skilled antenatal care, 2008 Nigeria DHS

Characteristics	Model 1 Individual/household variables	Model 2 Individual/ & Enabling variables
	95% CI	95% CI
Fixed effects		
Individual characteristics		
Maternal age at last birth		
15-24		
25-34	0.94-1.16	0.94-1.17
35-49	0.84-1.09	0.84-1.10
Educational attainment		
No education		
Primary	1.82-2.35	1.71-2.60
Secondary/Higher	3.18-4.45	2.75-5.21
Religion		
Muslim		
Christian	0.81-1.21	0.81-1.23
Traditional/Others	0.37-0.77	0.34-0.77
Ethnic Origin		
Hausa		
Igbo	4.84-10.19	4.68-14.36
Yoruba	3.26-6.10	3.05-7.06
Others	2.09-3.15	2.00-3.61
Occupation		
Unemployed		
Formal employment	1.21-1.55	1.19-1.57
Agric employment	0.85-1.17	0.86-1.20
Manual workers	1.23-1.78	1.22-1.83
Women's autonomy		
Wife alone		
Wife/Husband	1.16-1.71	1.13-1.72
Husband alone/Others	0.91-1.33	0.89-1.31
Household wealth index		
Poorest		
Poorer	1.26-1.66	1.22-1.70
Middle	2.17-3.01	1.92-3.26
Richer	3.54-5.28	2.91-6.09
Richest	7.59-13.47	5.71-16.15

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Need Money		
A big problem		
Not a big problem	0.61-0.80	
Transport		
A big problem		
Not a big problem	0.71-0.91	

Table 5.3 Multilevel logistic regression models for the individual/household predictors of place of delivery, 2008 Nigeria DHS

Characteristics	Model 1 Individual/household variables 95% CI	Model 2 Individual & Enabling variables 95% CI
Fixed effects		
Individual characteristics		
Maternal age at last birth		
15-24		
25-34	0.96 – 1.34	0.96 – 1.34
35-49	1.08 – 1.79	1.07 – 1.77
Educational attainment		
No education		
Primary		
Secondary/Higher	1.39 – 2.55	1.40 – 2.49
	2.27 – 7.52	2.28 – 7.02
Religion		
Muslim		
Christian	0.98– 1.57	1.00– 1.60
Traditional/Others	0.23– 0.82	0.24 – 0.82
Ethnic Origin		
Hausa		
Igbo	6.16 – 72.13	6.88 – 77.14
Yoruba	4.72 - 39.08	4.97 – 37.95
Others	2.21 – 6.77	2.28 – 6.77
Occupation		
Unemployed		
Formal employment	1.01– 1.46	1.01 – 1.45
Agric employment	0.83 – 1.27	0.86 – 1.31
Manual workers	0.81 – 1.29	0.81– 1.29

Women's autonomy		
Wife alone		
Wife/Husband	0.96 – 1.56	0.95 – 1.53
Husband alone/Others	0.75 – 1.18	0.75– 1.19
Household wealth index		
Poorest		
Poorer	1.35 – 2.47	1.32 – 2.35
Middle	2.08 – 6.03	2.02 – 5.37
Richer	3.58 – 20.42	3.48 – 17.34
Richest	6.82 – 83.64	6.60 – 66.55
Parity		
1-2		
3-4	0.54-0.85	0.55 – 0.85
5 or more	0.49-0.84	0.50 – 0.84
Need Money		
A big problem		
Not a big problem		0.75 – 1.01
Transport		
A big problem		
Not a big problem		0.55 – 0.83

Table 5.4 Multilevel logistic regression models for the individual/household predictors of skilled postnatal care, 2008 Nigeria DHS

Variable	Model 1 Individual/household variables 95% CI	Model 2 Individual& Enabling variables 95% CI
Fixed effects		
Individual characteristics		
Maternal age at last birth		
15-24		
25-34	0.93- 1.36	0.92-1.34
35-49	0.99- 1.61	0 .97-1.580
Educational attainment		
No education		
Primary	2.04-3.87	2.02-3.84
Secondary/Higher	4.24-11.45	4.05-10.98
Religion		
Muslim		
Christian	0. 45-0.81	0.45-0.82
Traditional/Others	0.10- 0.49	0.10-0.48
Ethnic origin		
Hausa		
Igbo	4.35- 15.51	4.69-17.51
Yoruba	8.52- 37.46	8.29-37.19
North/South minority	4.09- 11.58	4.12-11.93
Occupation		
Unemployed		
Formal employment	1.01- 1.56	1.011.55
Agric employment	0.81- 1.41	0.85-1.48
Manual workers	0 .87- 1.59	0.87-1.60
Women's autonomy		
Wife alone		
Wife/Husband	0 .89-1.61	0.86-1.55
Husband alone/Others	0 .62-1.12	0.61-1.11
Household wealth index		
Poorest		
Poorer	2.04- 4.23	1.88-3.84
Middle	4.85-14.29	4.20-11.89
Richer	9.97-42.74	8.13-32.86
Richest	27.29-204.71	21.46-151.17

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Household size		
Small (<5members)		
Large (5 or more)	0 .58-0.87	0.59-0.88
Distance	-	
A big problem		
Not a big problem		0.62- 1.04
Transport		
A big problem	-	
Not a big problem		0 .37-0.67

Table 6.1 Multilevel logistic regression models for community predictors of antenatal care visits, 2008 Nigeria DHS

Variable	Model 2 Community variables 95% CI	Model 3 Community & Enabling 95% CI	Model 4 Individual & community 95% CI
Fixed effects			
Individual characteristics			
Maternal age at last birth			
15-24			
25-34			0.99-1.41
35-49			0.75-1.14
Educational attainment			
No education			
Primary			1.81-3.65
Secondary/Higher			2.98-8.91
Ethnic Origin			
Hausa			
Igbo			1.37-6.43
Yoruba			2.23-9.16
Others			1.61-3.60
Occupation			
Unemployed			
Formal employment			1.23-1.99
Agric employment			0.73-1.22
Manual workers			1.26-2.47
Women's autonomy			
Wife alone			
Wife/Husband			1.41-2.97
Husband alone/Others			1.02-1.95
Household wealth index			
Poorest			
Poorer			1.42-2.59
Middle			2.02-4.82
Richer			2.74-8.76
Richest			6.26-38.62
Need Money			
A big problem			
Not a big problem		0.34 – 0.58	

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Distance			
A big problem			
Not a big problem		0.60 – 0.89	
Region of residence			
North Central			
North East	0.37 – 0.96	0.35 – 0.89	0.78-1.93
North West	0.08 – 0.32	0.07 – 0.27	0.18-0.60
South East	1.12 – 3.34	1.28 – 3.88	0.53-2.55
South South	0.49 – 1.27	0.50 – 1.27	0.38-1.00
South West	3.76 – 16.23	3.59 – 14.46	2.02-8.32
Community women's education			
Low	1.81 – 4.97	1.87 – 5.05	0.87-1.99
Medium	1.85 - 6.39	1.87 – 6.30	0.51-1.46
High			
Community hospital delivery			
Low			
Medium			
High	2.79 – 9.19	2.74 – 8.55	2.30-7.09
	2.93 – 11.55	2.91 – 10.93	2..24-8.00
Community poverty			
Low			
Medium	0.22 – 0.57	0.26 – 0.63	0.56-1.28
High	0.04 – 0.20	0.06 – 0.24	0.20-0.64
Community mass media			
Low			
Medium	1.70 – 4.03	1.70 – 3.94	1.54-3.54
High	2.24 – 6.93	2.16 – 6.39	1.85-5.40

Table 6.2 Multilevel logistic regression models for community predictors of skilled antenatal care, 2008 Nigeria DHS

Characteristics	Model 2 Community variables 95% CI	Model 3 Community & Enabling 95% CI	Model 4 Individual & community 95% CI
Fixed effects			
Individual characteristics			
Maternal age at last birth			
15-24			
25-34			0.92-1.14
35-49			0.82-1.07
Educational attainment			
No education			
Primary			1.61-2.46
Secondary/Higher			2.60-5.10
Religion			
Muslim			
Christian			0.72-1.12
Traditional/Others			0.34-0.79
Ethnic Origin			
Hausa			
Igbo			1.88-6.08
Yoruba			1.17-2.55
Others			1.51-2.59
Occupation			
Unemployed			
Formal employment			1.18-1.56
Agric employment			0.86-1.19
Manual workers			1.25-1.89
Women's autonomy			
Wife alone			
Wife/Husband			1.17-1.78
Husband alone/Others			0.96-1.43
Household wealth index			
Poorest			
Poorer			1.14 - 1.57
Middle			1.56 - 2.51
Richer			1.98 - 3.76
Richest			3.29 - 8.34

Need Money			
A big problem			
Not a big problem		0.50-073	
Transport			
A big problem			
Not a big problem		0.69-0.91	
Place of residence			
Urban			
Rural	0.60-1.07	0.61-1.11	0.61-1.10
Region of residence			
South West			
North Central	0.58-1.23	0.61-1.30	0.69- 1.64
North East	0.34-0.80	0.33-0.81	0. 62 -1.62
North West	0.13-0.38	0.11-0.38	0.26-0.75
South East	0.93-2.28	1.08-2.84	0.43-1.62
South South	0.250.61	0.24-0.63	0.20-0.58
Community women's education			
Low			
Medium	1.61-3.49	1.63-3.81	0.94-1.78
High	1.62-4.12	1.60-4.38	0.62-1.42
Community hospital delivery			
Low			
Medium			
High	2.05-4.99	2.01-5.40	1.95-4.18
	2.41-6.98	2.37-7.73	2.35-5.99
Community poverty			
Low			
Medium	0.36-0.72	0.38-0.78	0.64-1.24
High	0.14-0.39	0.15-0.44	0.36-0.83
Community mass media			
Low			
Medium	1.47-2.77	1.47-2.90	1.48-2.69
High	1.67-3.70	1.63-3.85	1.54-3.22

Table 6.3 Multilevel logistic regression models for community predictors of place of delivery, 2008 Nigeria DHS

Characteristics	Model 4 Community variables 95% CI	Model 5 Community & Enabling 95% CI	Model 3 Individual & community 95% CI
Fixed effects			
Individual characteristics			
Maternal age at last birth			
15-24			
25-34			0.96 – 1.24
35-49			1.07 – 1.54
Educational attainment			
No education			
Primary			1.27 – 1.69
Secondary/Higher			2.41 – 3.31
Religion			
Muslim			
Christian			0.82 – 1.17
Traditional/Others			0.31– 0.72
Ethnic Origin			
Hausa			
Igbo			3.01 – 6.67
Yoruba			2.04 – 3.74
Others			1.71 – 2.71
Occupation			
Unemployed			
Formal employment			1.03– 1.34
Agric employment			0.86 – 1.20
Manual workers			0.87 – 1.27
Women's autonomy			
Wife alone			
Wife/Husband			1.01 - 1.44
Husband alone/Others			0.86 – 1.23

	Col 1	Col 2	Col 3
Household wealth index			
Poorest			
Poorer			1.15 – 1.65
Middle			1.52 – 2.23
Richer			2.25 – 3.47
Richest			4.01 – 6.72
Parity			
1-2			
3-4			0.64-0.83
5 or more			0.59-0.82
Need Money			
A big problem			-
Not a big problem		0.71-0.88	
Transport			
A big problem			-
Not a big problem		0.63-0.79	
Place of residence			
Urban			
Rural	0.58-0.81	0.62-0.86	0.84 – 1.18
Region of residence			
North Central			
North East	0.29-0.48	0.30-0.49	0.55 – 0.89
North West	0.21-0.37	0.21-0.37	0.39 – 0.70
South East	1.21-2.16	1.41-2.50	0.48– 1.12
South South	0.70-1.11	0.70-1.09	0.55 – 0.87
South West	1.41-2.28	1.39-2.23	0.88 – 1.52
Community women's education			
Low			
Medium	1.89-2.90	1.81-2.75	0.92 – 1.40
High	3.83-6.36	3.46-5.69	1.07 – 1.81
Community hospital delivery			
Low			
Medium	5.75-8.81	5.49-8.36	4.81 – 7.26
High	16.63-27.34	15.79-25.72	13.58-21.96
Ethnic diversity			
Low			
Medium	0.54-0.84	0.56-0.88	0.52 – 0.84
High	0.36-0.60	0.39-0.65	0.39 – 0.66

Table 6.4 Multilevel logistic regression models for community predictors of skilled postnatal care, 2008 Nigeria DHS

Variable	Model 4 Community variables 95% CI	Model 5 Community & Enabling 95% CI	Model 3 Individual & community 95% CI
Fixed effects			
Individual characteristics			
Maternal age at last birth			
15-24			
25-34			0.89-1.27
35-49	-	-	0.94-1.49
Educational attainment			
No education			
Primary	-	-	1.64-2.94
Secondary/Higher			3.20-8.15
Religion			
Muslim			
Christian	-	-	0.40-0.73
Traditional/Others			0.13-0.57
Ethnic origin			
Hausa			
Igbo	-	-	2.85-11.75
Yoruba			1.68-4.85
North/South minority			2.04-4.95
Occupation			
Unemployed			
Formal employment	-	-	1.01-1.51
Agric employment			0.82-1.37
Manual workers			0.92-1.63
Women's autonomy			
Wife alone			
Wife/Husband	-	-	0.93-1.62
Husband alone/Others			0.74-1.28
Household wealth index			
Poorest			
Poorer	-	-	1.57-3.04
Middle			2.48-5.93
Richer			3.54-10.68
Richest			7.10-33.12

Household size			
Small (<5members)	-	-	
Large (5 or more)			0.61-0.89
Distance			
A big problem	-		-
Not a big problem		0 .66-1.03	
Transport			
A big problem	-		-
Not a big problem		0 .38-0 .67	
Place of residence			
Urban			
Rural	0.50-0.88	0.54-0.93	0.62-1.07
Region of residence			
North Central			
North East	0.33-0.75	0.37-0.77	0.57-1.22
North West	0.22-0 .60	0.22-0.58	0.38-0.96
South East	0.24-0.64	0.31-0.78	0.08-0.38
South South	0.33-0.72	0.34-0.72	0.27-0 .63
South West	1.25-2.72	1.26-2.73	0.94-2.23
Community women's education			
Low	1.78-4.03	1.70-3.74	0.89-1.75
Medium	2.87-9.33	2.63-8.12	1.08-2.63
High			
Community hospital delivery			
Low			
Medium	4.09-13.16	4.01-12.55	4.02-11.88
High	7.12-35.27	6.98-33.53	7.31-32.51
Community poverty			
Low			
Medium	0.30-0.63	0.33-0.68	0.72-1.37
High	0.07-0.28	0.09-0.32	0.41-1.01
Ethnic diversity			
Low			
Medium	1.03-2.04	1.10-2.18	0.82-1.64
High	0.96-2.10	1.05-2.30	0.67- 1.56

Appendix IV

Multicollinearity Test

Women autonomy	Coefficient	SE	P-value	95% CI	
Education	-.0689873	.0076084	0,001	-.088	-.054
Occupation	-.1241445	.0111338	0.001	-.146	-.102
Religion	-.030773	.0048677	0.001	-.040	-.021
Ethnic origin	-.0716139	.0041656	0.001	-.079	-.063
Wealth index	-.0390807	.0042123	0.001	-.047	-.031
Money	-.0162352	.0095733	0.090	-.035	.003
Region	-.0486326	.0031608	0.001	-.054	-.042
_cons	2.220356	.0183099	0.001	2.184	2.256

Variable	VIF	1/VIF
Education	2.03	0.493827
Occupation	1.72	0.581147
Religion	1.65	0.604614
Ethnic origin	1.52	0.656065
Wealth index	1.26	0.792134
Money	1.07	0.933772
Region	1.05	0.953037
Mean VIF	1.47	

Pearson Correlation

	Women autonomy	education	Religion	occupation	Ethnic origin	Wealth index	Money	Region
Women autonomy	1							
Education	-0.3010	1						
Religion	-0.2942	0.4985	1					
Occupation	-0.0994	0.0365	0.1544	1				
Ethnic origin	-0.2781	0.4045	0.5473	0.1726	1			
Wealth index	-0.2382	0.5793	0.2351	-0.0302	0.2013	1		
Money	0.0229	-0.1320	0.0469	0.0541	0.0251	-0.2231	1	
Region	-0.2275	0.3730	0.2800	0.0232	0.0668	0.3548	0.1068	1

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