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Household Environmental Health Hazards and Childhood Mortality among Nigerian Ethnic Groups

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HOUSEHOLD ENVIRONMENTAL HEALTH HAZARDS AND CHILDHOOD MORTALITY AMONG NIGERIAN ETHNIC GROUPS

BY

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ABSTRACT

Health hazards, such as poor air quality, contamination of water and inadequate sanitary facilities, are prevalent in household environment. Children are most vulnerable to these health hazards because of their unique physical and biological characteristics. Unlike in developed countries, where health hazards from household environment constitute little risks, most under-five deaths in Nigeria and other developing countries have been linked to childhood morbidity induced from the household environment. It was hypothesized that household environments and specific socio-cultural practices vary among different ethnic groups and could affect childhood mortality. This study, therefore, examined the effect of household environmental health hazards on childhood mortality among Nigerian ethnic groups.

Mosley and Chen analytical framework and Ecological System Theory served as the theoretical framework for the study. Secondary data from Nigeria Demographic and Health Survey (NDHS) 2003 were complemented with 40 focus group discussions and 40 in-depth interviews among selected ethnic groups in Nigeria. A retrospective child file was generated from NDHS 2003 and live births within five years preceeding the survey were selected for the study, which gave a total of 5,531children. Ethnic membership was broadly categorized into Hausa-Fulani, Igbo, Yoruba, Southern minorities (SM) and Northern minorities (NM). Qualitative data were collected among these ethnic groups, with the Ijaw and Tiv representing SM and NM respectively. The quantitative data were analyzed using multivariational regressions while content analysis was utilized for qualitative data.

There were disparities in the household environment of children among Nigerian ethnic groups; ethnic groups in the northern part were at relative disadvantage on basic household environmental variables that affect hygiene. There were about 74.3% of NM, 72.4% of Hausa-Fulani, 67.8% of SM and 57.9% of Igbo children constantly exposed to household health hazards. Yoruba children were least exposed (36.4%). An examination of the Direct Estimates and Cox regression on childhood mortality indicate significant difference (χ^2 =11.8, $p<0.05$,df=4) with ethnic groups in the northern part of Nigeria having the highest risk to childhood mortality based on household environmental health hazard. There are also significant (χ^2 =166.9, $p<0.05$, df= 31) mediating effect of demographic and socio-economic variables on household environmental health hazards and under five mortality in Nigeria. The values placed on children among all ethnic groups were reflected in different socio-cultural beliefs and practices with significant influence of urban residence and education of mothers. However, some ethnic specific socio-cultural beliefs that exposed children to health hazards within the household were still being practiced especially among the groups in the northern part of Nigeria.

Household environment and specific socio-cultural practices were salient to the exposure of under-five children to health hazards within the household and childhood mortality. However, the differences observed were more of a reflection of mother's socio-economic variables. Therefore, women should have more access to education and information on best childcare practices in the household environments. People's belief should be taken into cognizance when developing policy on child health.

Keywords: Health hazards, Childhood mortality, Ethnic groups, Household environment

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CERTIFICATION

I certify that this work was carried out by Mrs. OLUFUNKE ADEKEMI FAYEHUN in the Department of Sociology, University of Ibadan.

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
ARI	Acute Respiratory Infection
BFHI	Baby-Friendly Hospital Initiatives
CEB	Children Ever Born
CISRR	Carnelian International Security and Risk Resources
EST	Ecological System Theory
FGD	Focus Group Discussion
HIV	Human Immunodeficiency Virus
IDD	Iodine Deficiency Disorders
IDI	In-depth Interview
IGME	Inter-agency Group for Child Mortality Estimation
IMCI	Integrated Management of Childhood Illness
MDG	Millennium Development Goals
NACA	National AIDS Control Agency
NDHS	Nigeria Demographic and Health Survey
NM	Northern Minorities
NPC	National Population Commission
NPI	National Programme on Immunisation
NPH	Non-potential Health Hazard
OVC	Orphans and Vulnerable Children
PHH	Potential Health Hazard
PMTCT	Prevention of Mother-To-Child Transmission
PRB	Population Reference Bureau
RBM	Roll Back Malaria
SSA	Sub Saharan Africa
SM	Southern Minorities
UNICEF	United Nations Children's Fund
VAD	Vitamin-A Deficiency
VPD	Vaccine Preventable Diseases
WHO	World Health Organisation

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

In Africa, decline in childhood mortality has been slow despite broad approaches to improving child's health (WHO, 2005). Although, about nine million infants and children under-five years of age die each year with variations across regions and countries in the developing world, mortality rates among children under five years in African countries are higher when compared with other developing countries. Out of 20 countries identified as having high under-five mortality, 19 are in Sub-Saharan Africa (SSA) and majority of these countries made no progress in reducing childhood mortality in recent years (United Nations, 2002; Balk, Pullum, Storeygard, Greenwell and Neuman 2004; Mason 2004; WHO, 2005; Mutunga, 2007; Verdier-Chouchane, 2008)

Childhood mortality, an indicator of health status of a country is very important and researchers have tried to identify factors that contribute to high childhood mortality in developing countries. Factors such as maternal, demographic and socio-economic are found to be important determinants of childhood mortality. Nutritional deficiencies, illness such as malaria, diarrhea, acute respiratory infection and vaccine preventable diseases are also recognised as causes of under-five mortality in most countries in SSA (Caldwell, 1979; Boerma and Bicego, 1992; Mosley and Chen, 1984; Rutstein, 2000; Gyimah, 2002b; UNICEF, 2006). Although disease oriented intervening programmes are often put in place to enhance child survival, it has been observed that these programmes have not been effective (Claeson and Waldman, 2000; Policy Project/Nigeria, 2002; Murray, Laako, Shibuya, Hill and Lopez 2007). There are increased incidences of childhood morbidity which lead to childhood mortality. Studies have shown that some of these childhood diseases which result in childhood mortality can be explained by well-known health hazards in the household environment of a child (Rutstein, 2000; United Nations, 2001).

Environmental health hazards are threats to the health of the people that might be present in their environment (World Bank, 2000; UNICEF, 2001). Health

hazards such as indoor air pollution, noise pollution and contamination of water are present in the household environment. Studies in developing countries have found that there is significant incidence of diarrhea diseases because of water shortage and contamination, early exposure to measles infections because of household crowding and high risks of accidents or injury because of poor housing. Vector borne illness is widespread in situation of unsanitary refuse, improper excreta disposal and unsafe drinking water, increasing prevalence of diarrhea, cholera and typhoid (Brockerhoff, 1995; Yassin, 2000; Macassa, Ghilagaber, Benrhardt and Burstrom, 2004; Murray *et al*, 2007).

Although these health hazards in the household environment of a child are known to affect child's health, difficulties have been experienced in disentangling household environmental factors from maternal situation (Romania and Anderson 2002). Studies have found that household environmental health factors such as sources of water, waste disposal, cooking fuel, type of flooring materials, the use of treated net and household room density are correlated with health status and indicators of socio-economic status of the household (Iyun, 2000; Policy Project/Nigeria, 2002; NPC, 2004). Further, maternal beliefs and attitude that could affect exposure of children to health hazards are dictated by some cultural practices acquired within the family setting. This varies greatly from one society to another because societal norms, values and beliefs which tend to shape the decisions of individual members, differ within and across communities. Ethnicity is an important maternal characteristic; it is the basis of social organisation in the traditional setting. Ethnic groups are identified based on language and similarities in social systems and cultural practices, thus, various attitudes and behavioural practices towards childhood morbidity and mortality. (Yinger, 1985; Schaefer, Smith and Grekul, 2009)

For instance, in Cameroon, ethnic membership is the strongest predictor of child survival chances; Hauossa-Foulbe (ethnic group) children have higher neonatal mortality than others because of a high incidence of veneral disease among their parents and some combinations of dietary factors and exposure to acute disease which are related to their household environment (DefoKuarte, 1992). Therefore, this study seeks to understand how the health hazards from household environment affect childhood morbidity and mortality among different ethnic groups in Nigeria.

1.2 Statement of the problem

Hazards present in environmental setting where people live are called environmental health hazards. This includes inadequate and unimproved sanitary facilities, air pollution, noise pollution and contaminated drinking water. Studies have shown that sanitation, water supply and hygiene are poor in developing countries. More than 1 billion people in developing countries live without adequate shelters, more than 1.4 billion lack accesses to safe water and over 2.9 billion people have no access to adequate sanitation (World Resources Institute, 1999; Rutstein, 2000; WHO, 2005). Children, especially under-five years of age, are most vulnerable to health hazards from their household environments because of their unique physical and biological characteristics; more so, their immune system is just developing. Unlike developed countries where health hazards from the household environment of a child constitute little risks and hence low childhood mortality, developing countries still experience high childhood mortality because of diseases associated with poor water supply, sanitation, personal and household hygiene (Rutstein, 2000).

Nigerian children are also vulnerable to these health hazards from their household environment. According to Policy Project/Nigeria (2002), Nigeria is one of the least successful African countries in achieving pertinent improvement in child survival in the past few decades despite advances in universal immunisation and other health intervention programmes. More than 50% of deaths of children under age five occurred in just five countries, of which Nigeria is one (WHO, 2005). One in seven of Nigerian children die before his or her fifth birthday; a baby born in Nigeria is 30 times more likely to die before age five than one born in an industrialised country (UNICEF, 2001). The recent 2009 World Health Statistics further showed that Nigeria is among the five highest under-five mortality rate country in SSA with an estimate of 178 per 1000 live births. This estimate is still far from reaching the Millennium Development Goal Four (MDG4) of reducing child mortality by two-third between 1990 and 2015.

In seeking for ways to achieve the MDG4, studies have found that treated water and proper handling of sanitary facilities by mothers are essential in reducing the risk of childhood morbidity and mortality (Iyun, 2000; Rustein, 2000; Gyimah, 2002b). Further, in a study of two Yoruba towns in Nigeria, Iyun (2000) finds that

apart from household environmental factor, maternal social characteristic is important to child's health. Hazards from the household environment often mediate through the mother's situation, resources, network and culture. Childcare practices of mother which could be traced to her ethnic membership can affect the way in which children are exposed to the contaminants in the household environment. Ethnicity is an important maternal characteristic that has been neglected as an influence on childhood mortality in light of the countless studies that have emphasized the central importance of maternal characteristics and behaviour for child survival in Africa (Brockerhoff and Hewett, 1998; Ogunjuyigbe, 2004; Wahab, 2004; Teerawichitchainan and Phillips, 2008). In Nigeria, there are diverse ethnic groups with peculiar culture and housing environment, consequently various adaptive mechanism on childhood morbidity and mortality.

As Gaisie (1990) asserts on African cultures, ethnic frameworks are the most important determinants of adaptation to modern conditions including changes in health behaviour. It has been observed that data on childhood mortality in Nigeria are scarce because of poor record systems; the recent available data that capture the whole country are from the 2003 Nigeria Demographic and Health Survey (NDHS). The NDHS though asked questions on ethnic origin of mothers; the summary report did not show the ethnic differences on childhood mortality in Nigeria. There are imprecise accounts of childhood mortality among ethnic groups and a systematic examination of ethnicity as it affects child survival chances across Nigeria has not been made to date. This study will therefore provide detailed ethnic differential on childhood mortality in Nigeria using the NDHS 2003 data. This information on childhood mortality would also serve the needs of health ministry by identifying sectors of the population that are at high risk (NPC, 2004).

It is therefore pertinent to understand how ethnic membership of mothers can affect the exposure to health hazards from the household environment which can lead to childhood morbidity and mortality.

1.3 Research Questions

1. What is the pattern of household environmental health hazards among Nigerian ethnic groups?
2. What are the differences in childhood mortality among Nigeria ethnic groups?
3. What are the ethnic perceptions towards childhood morbidity and mortality in Nigeria?
4. What are the differences in risks to childhood mortality based on the household environmental hazards among ethnic groups in Nigeria?
5. How do the socio-economic, demographic factors and household environment affect childhood mortality among Nigerian ethnic groups?

1.4 Study Objectives

The overall objective of the study is to understand how the household environmental health hazards affect childhood mortality in Nigeria giving particular attention to ethnic differences. The following specific objectives are pursued in order to achieve this:

1. Examine the pattern of household environmental health hazards among Nigerian ethnic groups;
2. Examine the differences in childhood mortality among Nigerian ethnic groups;
3. Determine the risk of household environmental health hazards on childhood mortality among Nigerian ethnic groups;
4. Investigate ethnic perception towards childhood morbidity and mortality in Nigeria; and
5. Examine the mediating effects of socio-economic, demographic factors and household environment on childhood mortality among Nigerian ethnic groups

1.5 Significance of the Study

Reducing child mortality rate is one of the eight Millennium Development Goals. The goal 4 target is to reduce under-five mortality rate by two thirds between 1990 and 2015 (Policy Project/Nigeria, 2002). Also, excessive loss of life during the early years is a major setback to the development of any country. This justifies the efforts of Nigeria government and non-governmental agencies on the prevention and reduction of childhood mortality in every region of the country. However, dearth of information on childhood mortality, especially the complex interaction of socio-economic, environmental and socio-cultural factors could negatively affect the focus of the various interventions. This study on household environmental health hazards and childhood mortality among Nigerian ethnic groups therefore seeks to carry-out an in-depth study of childhood mortality; taking into cognisance the interplay of factors such as household environment and ethnicity. The empirical information on differentials in childhood mortality would also be useful to design programme and monitor progress towards the MDG4.

Studies carried out in Nigeria have also not been able to capture the effects of the health hazards which arise from the household environment on childhood morbidity and mortality. The factors found in repeated Demographic and Health Surveys across SSA are categorised into fertility behaviour, nutritional status, breastfeeding and infant feeding, health services and socio-economic status (Rutstein, 2000). The findings from this study will be relevant to the demographic assessment of the population and to health policies and programme. Estimates of infant and child mortality based on household environmental health hazards and ethnicity may be input into population projections, particularly if adult mortality of such ethnic group is known from another source or be inferred with reasonable confidence (NPC, 2004). The knowledge of household environmental health hazards among Nigerian ethnic groups is not only of academic interest, it has important public health implications; preventive actions can be more effective if the group with greater household health hazard is identified. Policy related programme would be more effective on under-five mortality in Nigeria if based on risk factor that arises out of individual level and community in which mother and children live.

This study also seeks to address one of the goals set out by the Federal Government of Nigeria to increase understanding and awareness of the interrelationship between population factors, social and economic development and

the environment and their mutual import to the long-term sustainable development of the country (NPC, 2004). The reasons above justify the study as a research endeavour that will help in explaining the differentials and variations as well as the perceptions and attitudes of members of different ethnic groups to environmental health hazards as well as child health care in order to enhance good measures to combat excessive loss of children lives.

1.6 Operational Definitions of Concepts

Some concepts that will be used in this study are clarified below:

Childhood mortality is the death that occurs between births and fifth birthday.

Under-five mortality rate is the measure of childhood mortality; it comprises infant and child mortality. It is the probability of dying between birth and fifth birthday.

Under-five mortality rate =

$$\frac{\text{Number of deaths of children less than 5 years old}}{\text{Number of children less than 5 years old}} \times 1000$$

Infant mortality rate is the probability of dying before the first birthday.

$$\frac{\text{Number of deaths of children less than 1 year old during a year}}{\text{Number of live births in the same year}} \times 1000$$

Neonatal mortality rate is the probability of a child born dying within the first month of life. The death that occurs within the first 28 days after a child is born.

$$\frac{\text{Number of deaths of infant less than 28 days old during a year}}{\text{Number of live births in the same year}} \times 1000$$

Postneonatal mortality rate is the difference between infant and neonatal mortality that is the death that occurs between the first 28- 365 days of children that are born alive.

$$\frac{\text{Number of deaths of infant between 4 and 51weeks old during a year}}{\text{Number of live births in the same year}} \times 1000$$

Child mortality rate is the probability of dying between the first and fifth birthday

$$\frac{\text{Number of deaths of children between 1and 5 years old}}{\text{Number of children less than 5 years old}} \times 1000$$

Ethnic group refers to a group of people that are distinguished for historical reasons and have come to be seen as distinctive by themselves and others on the basis of

locational origins and series of cultural markers. Their sense of belonging may center on nation of origin, distinctive foods, clothing, language, music, religion, or family names and relationships (Henslin, 2007).

Environmental Health hazards: These are threats to the health of people that may be present in environmental settings where they live; it includes poor air quality, contamination of water, unsafe building standards and noise. Environmental health hazards are divided into two broad categories: traditional and modern (World Bank, 2000). Traditional health hazards are associated with lack of development and poverty such as lack of safe water, inadequate sanitation and waste disposal, indoor air pollution and vector borne diseases. The modern hazards are associated with development that lacks environmental-health safeguards such as urban air pollution, water pollution from populated areas, poor control of solid and hazards waste materials, chemical and radiation hazards and other problems related to ecological and climate change (UNICEF, 2001). The environmental health hazards that will be considered in the study are those that relate to the household of a child.

1.7 Summary of Chapters

This study on household environmental health hazards and childhood mortality among Nigerian ethnic groups is organised into five chapters. Chapter one deals with general background, statement of the problem, research questions, objectives and significance of the study as well as operational definitions of concepts. Chapter two focuses on the review of literature in thematic style and theoretical framework for this study. Chapter three covers the detail of study area, sampling procedure for qualitative and quantitative data, methods of data collections, data analysis and limitations of the study. The findings from the fieldwork are presented in chapter four in sections containing the background profile of the mother and child, pattern of household environmental health hazards, ethnic differentials in childhood mortality, risks of household environmental health hazards on childhood mortality among Nigerian ethnic groups, and the mediating effects of socio-economic and demographic variables on childhood mortality in Nigeria. Chapter five, the last chapter, summarises the findings according to stated objectives. Recommendations and conclusion are also captured in this chapter.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This section reviews literature on overview of childhood morbidity and mortality globally, in Africa Nigeria, factors affecting childhood mortality, environmental health hazards and child's health, as well as ethnicity and childhood mortality.

2.1 Childhood morbidity and mortality

The first five years of life are the most crucial to the physical and intellectual development of children and can determine their potential to learn and thrive for a lifetime (Policy Project/Nigeria, 2002; NPC, 2004). It can also determine the future of any country since undue loss of life during the early years is a major hindrance to the country's development.

2.1.1 Global Overview

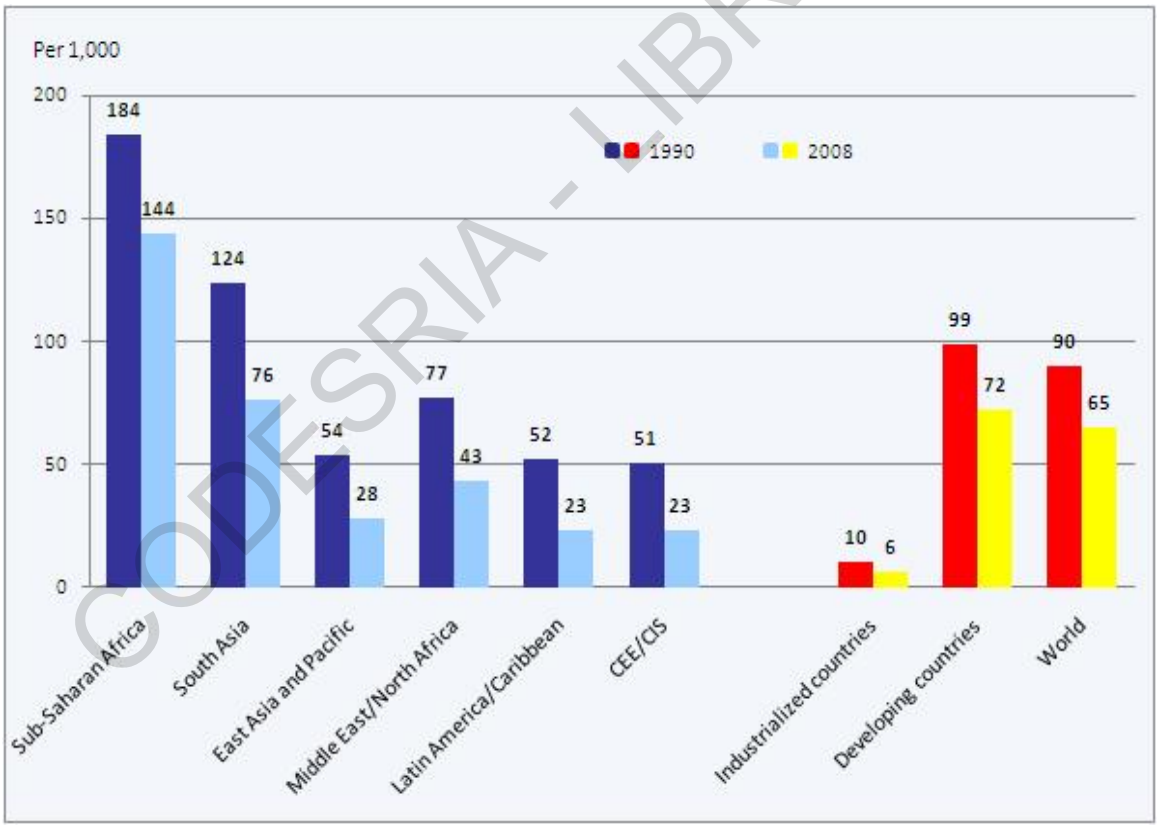
Childhood morbidities are predictor of infant and child mortality which are basic indicators of a country's health status, socio-economic situation and quality of life (WHO, 2005). The burden of childhood diseases globally, though reduced when compared to 1990, is yet to reach the desired state of total health for children under-five in all the region of the world. Recent estimates from 2009 World Health Statistics reveal that distribution of causes of death among children under-five varies across regions. Table 2.1 shows that highest proportion of under-five deaths occurred in the first month of life due neonatal related illness across all regions of the world. Others include diarrhea, HIV/AIDS, measles, pneumonia and injuries.

Further, an overview of childhood mortality in the world in 2008 revealed that about nine million children born across the world died before their fifth birthday; this is about 27 percent decline from 12.5million estimated in 1999 (WHO, 2009). According to estimate from Inter-agency Group for Child Mortality Estimation (IGME), 10,000 fewer children in 2008 under age five died every day than in 1990. This gradual decline as shown in Figure 2.1 is an indicator of progress towards achieving Millennium Development Goal Four to reduce under-five mortality by two-third by year 2015.

Table 2.1: Percentage distribution of causes of death among under five children

WHO Region	Neonatal	HIV/AIDS	Diarrhea	Measles	Malaria	Pneumonia	Injuries	Others
Africa	21.0	5.0	16.3	3.9	15.6	20.4	2.4	15.4
Americas	37.7	0.7	12.7	0.0	0.2	12.7	5.9	30.0
South-East Asia	39.0	0.4	19.5	5.5	0.4	13.7	5.3	16.2
Europe	37.8	0.7	14.0	0.1	0.0	14.9	5.7	26.7
Eastern Mediterranean	32.6	0.3	16.7	3.0	2.3	19.6	3.5	21.9
Western Pacific	46.2	0.3	12.0	0.8	0.3	9.8	7.5	23.1

Source: World Health Organization (2009)



Source: UNICEF/Child info (2009)

Figure 2.1:Under-five Mortality Rates: Levels and Trends, 1990 to 2008

The reduction in under-five deaths is as a result of efforts of national governments, non-governmental organisations and international health community shifting emphasis from curative to preventive and promotive health care. Such efforts include increased immunization against vaccine preventable diseases (VPD), provision of integrated services at all levels of health system and increased awareness on adoption of six months exclusive breastfeeding by lactating mothers. Others are increased use of oral rehydration therapies, increased use of insecticide treated mosquito nets as well as improved access to water and basic sanitation (UNICEF, 2008; WHO, 2009).

Even though there has been remarkable decrease in infant and children mortality rate in developing countries since 1990s, statistic reveal that under-five mortality is still concentrated in some regions and countries of the world. Estimates from Inter-agency Group for Child Mortality Estimation (IGME) reveal that half of deaths in 2008 occurred in only five countries: India, Nigeria, Democratic Republic of the Congo, Pakistan and China. Nigeria and India together accounted for about one-third of total number of under-five death worldwide.

2.1.2 Africa Overview

Despite the twenty-seven percent decrease in under-five mortality between 1999 and 2008, the average annual rate of reduction in Sub-Saharan Africa (SSA) has been one percent according to estimate from the Inter-agency Group for Child Mortality Estimation in 2007. In Africa, the under-five mortality regional average (145 per 1000 live births) is about nine times higher than that of Europe (15 per 1000 live births) (WHO, 2009). While it is well known that developing countries are still lagging behind in achieving the MDG4, the prevalence situation of AIDS epidemic and social instability in some countries in Africa have made it difficult to meet the target. According to IGME, almost half of the world's under-five deaths took place in SSA in 2006, compared with about one-third in 1990. From the recent World Health Statistic in 2009, fourteen out of fifteen countries with under-five mortality rate above 150 are in Africa: Angola (158), Democratic Republic of Congo (161), Mozambique (168), Zambia (170), Central African Republic (172), Niger (176), Burundi (180), Rwanda (181), Nigeria (181), Burkina Faso (191), Mali (196), Guinea-Bissau (198); Chad (209), and Sierra Leone(262).

Variation in underfive mortality rates in Africa have shown large disparities within the region. For instance, West African countries experienced mortality up to two times higher than neighbouring countries in Northern and Southern Africa (Rutstein, 2000; Balk *et al*, 2004).

Studies in Africa have found that nutritional deficiencies, illnesses such as malaria, diarrhea and acute respiratory infection as well as vaccine preventable diseases are causes of under-five mortality in most countries (Caldwell, 1979; Boerma & Bicego, 1992, Rutstein 2000, Gyimah 2002). Adetunji (2000) also found reversed improvements in under-five mortality in countries with very high adult HIV prevalence (greater than 5%). Mortality rates for children of HIV-positive mothers are much higher by two to five times than children of HIV-negative.

2.1.3 Nigeria situation

In Nigeria, childhood mortality rates from 1989 to 2003 are shown in Table 2.1. In the early 1990 to 1998, the under-five mortality in Nigeria was estimated to be 234 deaths per 1000 live births. This dropped to 201 per 100 live births by 2003. Even though, there has been further decline by 2009 to 178 per 1000 live births as estimated by World Health Statistic 2009, this fell short of World Summit for Children national goal of reducing infant mortality rate to 50/60 per 1000 and under- five mortality rates to 70/80 per 1000. Comparison across countries in Africa shows that childhood mortality in Nigeria is among the highest. For example, Nigeria figure of 178 per 1000 live births in 2009 is much lower than the regional average of 145 per 1000 live births. Therefore, under-five morbidity and mortality have attracted the attention of government and non-governmental organisation. This is evidenced by the constant search for adequate measures to enhance child survival. The country has adopted and implemented to a certain extent some major global initiatives affecting children such as the Safe Motherhood Initiatives and its follow-ups, Making Pregnancy Safer, Baby-Friendly Hospital Initiatives (BFHI) and Integrated Management of Childhood Illness (IMCI). Others are Roll Back Malaria initiative (RBM), elimination of Iodine Deficiency Disorders (IDD), Vitamin-A Deficiency (VAD) control and National Programme on Immunisation (NPI).

Table 2.2: Early Childhood Mortality Rates: Nigeria 1990 to 2003

Calendar period	Neonatal mortality	Post neonatal mortality	Infant mortality	Child mortality	Under-five mortality
2003-2008	40	35	75	88	157
1999-2003	52	47	99	97	187
1994-1998	49	48	97	113	199
1989-1993	55	58	113	136	234

Source: NPC, 2004; NPC, 2009

The country also formed a stakeholder's task team headed by the Federal Ministry of Women Affairs and Youth Development to work on a country action plan for Orphans and Vulnerable Children (OVC). National AIDS Control Agency (NACA) also established prevention of Mother-to-Child Transmission (PMTCT) projects in 11 teaching hospitals (Policy Project/Nigeria, 2002).

In addition, UNICEF in 1982 started a program in Nigeria on child survival with focus on eliminating common infections using simple medical techniques such as growth monitoring, oral rehydration therapy, breastfeeding and immunization. According to UNICEF (2009) the plan of operation documents signed with the Federal Government of Nigeria reads: "The basic objective of the programme is to accelerate child survival through the introduction of immunization and oral rehydration therapy, promotion of greater access to and provision of potable water as well as improved sanitation and development of a community-based Primary Health Care model."

Despite these initiatives and programmes in Nigeria, the under-five mortality rate is still high. Breakdown of under-five mortality and morbidity in Nigeria in according to recent statistic by WHO (2009), 20.4 % of the deaths is caused by malaria; 3% to HIV/AIDS; 13.5% to diarrhea illness; 19.5% to neonatal deaths; 11% to measles; 17% to acute respiratory infection; 2% to injury and 13.6% to others not mentioned. Some of these causes are due to factors induced from the household environment.

Other factors affecting under-five mortality in Nigeria include some exogenous factor such as maternal education and household environment. Maternal education has been found to be a significant factor influencing child survival (Orubuloye and Caldwell, 1975; Tawiah, 1979; Caldwell, 1979; Meegama, 1980; Adewuyi and Feyisetan, 1988). Iyun (2000) in a study identified maternal factors and household environment conditions as factors affecting childhood mortality in southwestern Nigeria. Household environmental conditions were stronger predictors of childhood mortality in a more developed town (Ota) than the more traditional town (Iseyin). Various studies in Nigeria on childhood mortality have found that dirty feeding bottles and utensils, inadequate disposal of household refuse and poor storage of drinking water were significantly related to high incidence of childhood morbidity (Ayeni and Oduntan, 1980; Tankins, 1981; Jinadu, Olusi, Agun and Fabiyi 1991).

In a recent study carried out on under-five mortality among the Yoruba, the perception and attitude of this ethnic group on a phenomenon called "Abiku" was examined. The study revealed insight into beliefs and behavioural practices that have not been adequately integrated into health intervention programme through the study of Yoruba ethnic group (Ogunjuyigbe, 2004). In all these studies reviewed, the effects of the health hazards from household environment and socio-cultural practices with respect to childhood mortality have not been adequately researched for the whole country.

2.2 Factors affecting childhood mortality

The high rates in childhood mortality in developing countries, especially Sub-Saharan Africa, have attracted many researchers to study factors affecting it. Most of the factors identified from various studies on childhood mortality in developing countries followed Mosley and Chen (1984) findings on determinants of child mortality. They were among the first to study the intermediate factors affecting childhood mortality termed proximate determinants. These 14 proximate determinants were categorised into five groups: maternal factors; environmental sanitation factors; availability of nutrients to the fetus and infant; injuries; and personal illness control factors. Research further noted that there are distinctions between variables considered to be exogenous factors such as cultural, social, economic, community and regional factors. The endogenous or biomedical factors include breastfeeding patterns, hygiene, sanitary measures and nutrition. The effects of the exogenous variables are considered indirect because they operate through the endogenous variables (Mosley and Chen, 1984; Schultz, 1984; Mutunga, 2007).

Sex of child, multiple births, birth order, birth interval, age at first birth and age at marriage are among demographic variables identified to affect childhood mortality (Rutstein, 2000; Gyimah 2002a). NDHS 2003 result shows variations among these variables on infant and child mortality in Nigeria. The pace of childbearing is important; short preceding birth intervals are believed to increase an infant's risk of mortality. This is because the mother's nutritional reserves have not fully recovered from previous birth. Mother's age at birth and birth order are also important in determining the risk of childhood mortality. In SSA where women marry at early age, first births are associated with young mothers; these women's

children carry a higher risk of death because young mothers may not have reached their full physical and reproductive maturity (Zenger, 1992; Balk *et al*, 2004; NPC, 2004). Nutrition, illness and injury are also common proximate determinants of childhood deaths; mother and child nutritional status have direct or indirect cause of infant and child deaths through their relationship with specific diseases (Rutstein, 2000; NPC, 2004).

Balk *et al* (2004) in a study estimated that the risk of infant and child death in ten West African countries is attributable to individual, household and spatially explicit geographical factors. The study observed that spatial variables explain away much of the country specific variations in mortality and what they are associated with may be mediated by the household characteristics. In the study of risk, amenities and child mortality in rural South Africa by Argeseanu (2004), the most significant predictors of characteristics of childhood mortality identified are of the mother, especially her birth history, marital status and education. Evidences presented show that Acquired Immune Deficiency Syndrome (AIDS) childhood mortality follows a different distribution from overall mortality and this could be changing the distribution of deaths among households (Argeseanu, 2004)

Adetunji (2000) also reported reversed improvements in under-five mortality in countries with very high adult HIV prevalence (greater than 5%). Mortality rates for children of HIV-positive mothers are much higher by two to five times than children of HIV-negative mothers. The rate of mother to child transmission of HIV is estimated to vary from 15 to 35 %, with a range of 15 to 20% in developed countries where most infants are formula-fed while increasing to as high as 39% in developing countries such as Nigeria because of mixed feeding (Policy Project/Nigeria 2002). Although, precise effects of HIV/AIDS on childhood mortality levels are difficult to capture because of poor record system, by the end of 2000, an estimated 200,000 children under five years had died from HIV/AIDS acquired through mother to child transmission and it is projected to reach 700,000 by 2010 if action is not taken (UNICEF, 2001; NPC, 2004).

The effects of socio-economic factor are enhanced, as the child gets older; a greater proportion of child deaths between one and four years of age are due to exogenous factors over which parents potentially have control (Manda, 1999). Improved socio-economic status can lead to improvement in childcare environmental conditions. Maternal education has consistently been observed to

have a strong positive impact on child survival. Educated women are less likely to experience childhood deaths because they supposedly have better understanding and appreciation for health related matters. They are also less subservient to norms and practices that can adversely affect the health of their children. Maternal education has also been found to be positively correlated with using modern health services including prenatal and antenatal care (Caldwell, 1979; Boerma and Bicego, 1992; Sharkhatreh, Abbas and Issa, 1996; Gyimah, 2003).

Residence is another commonly identified factor in childhood mortality variation; urban residents have greater access than their rural counterpart to resources such as health services. The general presumption in literature is that urban-rural residence distinguishes clearly between poor and good sanitation, housing structure and availability of health resources. Urban residents are also more likely to flout customs and taboos that could negatively affect the child survival (Woldemicael, 2000; Balk *et al*, 2004). Although, public health care facilities are supposed to provide basic preventive and health promotion services that include immunisation, health education, promotion of adequate nutrition and management of malaria, diarrhea, acute respiratory infection and other common illness, timely access to these facilities are crucial than the facilities on ground.(Policy Project/Nigeria, 2002). The NDHS 2003 measured these constraints to use of health care services. More than half of the respondents cited some barriers to the primary health care: 30% had financial problem, 24% cited distance to the facility and 24% mentioned transportation problem (NPC, 2004).

2.3 Environmental Health Hazards and Child's Health

Environmental health hazards are categorised into two: traditional and modern (World Bank, 2000). Traditional health hazards are generally associated with lack of development and poverty such as lack of safe water, inadequate sanitation and waste disposal, indoor air pollution and vector borne diseases. The modern hazards are associated with development that lacks environmental-health safeguards such as urban air pollution, water pollution from populated areas, poor control of solid and hazards waste materials, chemical and radiation hazards and other problems related to ecological and climate change (UNICEF, 2001).

Environmental health hazards/threats account for about one-fifth of the total burden of disease in low-income countries according to estimates from World Bank

(World Bank, 2001). Reports from the World Health Organisation (2002) revealed that among the ten identified leading mortality risks in high mortality developing countries, unsafe water, sanitation and hygiene ranked second while indoor air smoke from solid fuels ranked fourth.

Children are most susceptible to the harmful effects of chemical, biological and physical threats in their environment. They are in a dynamic state of growth and their nervous, immune and respiratory, endocrine reproductive and digestive systems are still developing. They breathe faster, eat and drink more in proportion to their body and weight than adults and they are always closer to the ground where many contaminants settle and young children commonly put their hands into their mouths (United Nations, 2001; WHO, 2003).

WHO (2003) pointed out that infants and young children are up to 10 times more sensitive to traditional environmental health hazards than adults; 75% of deaths from acute respiratory infections occur before the first birthday and one quarter of deaths among children under-five are estimated to be due to diarrhea. Women and young children are at high risk of exposure to the smoke emitted from burning of coals, firewood and other source of fuel because of their traditional role in the preparation. Rapid urban growth has often outpaced the provision of safe water and sanitation. Crowded living conditions facilitate the spread of diseases such as measles, chicken pox and tuberculosis that can affect child survival (Rutstein, 2000; Mishra and Retherford, 2007).

Many of these diseases that lead to increased mortality of children under-five are largely related to the conditions of their household environment. Poor access to safe drinking water encourages the spread of certain vector-borne illnesses such as cholera and typhoid. Increased prevalence of diarrhea is seen in situation of unsanitary refuse, excreta disposal and unsafe drinking water (Policy Project/Nigeria 2002). The household environmental health factors such as sources of water, waste disposal, cooking fuel, flooring materials, the use of treated net and the number of persons sleeping per room (household room density) are all correlated with health (NPC, 2004).

In developed countries, much of the decline in childhood mortality has come about through public health measures such as water purification, sanitary sewage and trash and garbage collection that have reduced the environmental health hazards (Rutstein, 2000). Improvement in the provision of sanitation facilities and

quality of water is important for the health of children as they may prevent the spread of diseases like cholera, typhoid and diarrhea. Environmental health factors are important not only for their direct effect on child survival but they also indicate the overall resource of a child's family. They are usually strong indicators to socio-economic status of the household. Timaeus and Lush (1995) observed that child morbidity and mortality have been strongly associated with household environmental conditions in urban areas of Ghana, Egypt, Brazil and Thailand. After socio-economic status was controlled for, environmental conditions of household were strongly related to mortality in Egypt and Brazil and to diarrhea prevalence in Brazil, Thailand and Ghana.

Iyun (2000) found that childhood mortality rate in two towns of south western Nigerian continued to be a function of environmental factor, especially environment close to the household. Although other studies buttressed this finding in developing countries (Woldemicael, 2000; Balk *et al*, 2004), there are variations on the impact of these health hazards from household environment on childhood mortality. One possible reason for this is the lack of understanding of certain behavioural characteristics. The effect of household environment is conditioned by several other characteristics and behaviour of the household and community such as cultural belief and practices which varies (Tagoe, 1995; Iyun, 2000). The need therefore arises to understand how these health hazards that arise from household environment, conditioned by ethnic beliefs and practices affect childhood mortality in Nigeria.

2.4 Ethnicity and Childhood Mortality

2.4.1 Ethnicity in Nigeria

The history of Nigeria as a political state dates from the completion of British conquest in 1903 and the amalgamation of northern and southern Nigeria into the Colony and Protectorate of Nigeria in 1914. Review of Metz (1991) shows that Nigeria as a fragmented society of about 374 identifiable ethnic groups evolved from a variety of tradition and culture. Evidences from the literature show that post-independence era experiences linked modern ethnicity with individual life chances. National policies in Nigeria encouraged tolerance and appreciation of cultural differences. Ethnicity is the basis of social organisation in the traditional context of any society. It encompasses a mosaic of observable and unobservable norms,

beliefs and rituals that govern various life events (Gyimah, 2002b). It distinguished groupings of people who for historical reasons have come to be seen as distinctive by themselves and other on the basis of location origins and series of cultural markers (Otite, 1990). The most widely used markers is language; people who speak distinct language having separate terms for that language saw themselves or were viewed by others as ethnically different (CISRR, 2004). Ethnicity is one of the keys to understanding Nigeria's pluralistic society. In Nigeria, there are many social groups with distinct cultural traits which are reflected in the diverse behaviour of the people. There are more than 300 identifiable ethnic groups with the broadest groupings of linked ethnic units by regions.

According to Metz (1991), the ethnic groupings evolved from the rule of Nigeria as two protectorates by the British from 1900 to 1914; the southern and northern protectorates each having separate regional administrations. Within each of the major northern and southern regions, there were significant sub regions that combined ethnicity, geography, and history. The three major ethnic groups are Hausa-Fulani, Igbo and Yoruba. The southern part comprised Yoruba speaking area with similar culture, and eastern Igbo speaking area of like culture and related but different groups of Niger Delta peoples living in the Eastern and Central coastal area. The northern region is often associated with Hausa speaking groups that occupied most of the region, the pastoral group called Fulani that spread over the region, the Kanuri in the northeast and Tiv in the middle belt among others.

The Hausa are the best known of the northern peoples. The term refers also to a language spoken indigenously by savanna peoples spread across the far north from Nigeria's western boundary eastward to Borno State and into much of the territory of southern Niger. It includes a common set of cultural practices and Islamic emirates that originally comprised a series of centralised governments and their surrounding subject towns and villages. These precolonial emirates were still major features of the northern part. Each had a central citadel town that housed its ruling group of nobles and royalty served as the administrative, judicial, and military organisation of these states. Throughout the north, especially in the Hausa areas, over the past several centuries Fulani cattle-raising nomads have migrated westward, sometimes settling into semi sedentary villages. The migration by twentieths caused intermarriage between the Fulani and Hausa, adoption and acculturation of both groups resulted to Hausa-Fulani. Kanuri is another major

ethnic group in the northeast of Nigeria. They are mostly found in Borno State of Nigeria. Although, their language and history are different, they have similar culture to the Hausa. By 1990 Kanuri women were adopting Hausa dress and hairstyles, and all schoolchildren learned to speak Hausa. There are other ethnic groups in the middle belt region of the country are often categorized with the northern ethnic groupings include Nupe and Tiv.

The southern part of Nigeria has two major ethnic groups based on their linguistic classification: Yoruba and Igbo. The Yoruba are one of the most urbanized sub-Saharan Africans with a history of town-dwelling that goes back to 500 A.D as their wealth came from controlling the important trade routes between the coast and the hinterland (Mertz 1991). Westernization has positively influence most of Yoruba major town; evident in the provision of some basic amenities. Further, the Yoruba had a strong sense of ethnic identity and of region, history, and leadership among Nigeria's peoples. Igbo as other major ethnic group in southern Nigeria has ethnic tradition which fostered individual contributions to collective achievement within close-knit kin and patron-client groups that were more hierarchically arranged. Igbo culture have organised local and regional society stratified into more and less affluent and successful groups, families, individuals and neighbourhood (Mertz, 1991).

Further, in the southern part of Nigeria, there are groups that are linguistically and culturally related to the Igbo living in the Niger River delta and Atlantic Coast. However, there was resistance of Igbo leadership because of the ethnic differences produced by ecological demands of coastal life, and the separate history of contact with coastal trade and its effects. These ethnic groups, including Ijaw, Ibibio, Anang, as well as Efik lived partly from agriculture, fishing and shrimping in the coastal waters. Religion, social Organisation, village life, local leadership, and gender relations were deeply affected by this ecology-based differentiation.

There are some well-known cultural practices among ethnic groups in Nigeria which could affect the health of the adherent positively or negatively. For instance, breastfeeding for two years can prolong postpartum amenorrhea; hence encourage adequate spacing of births. This prolong breastfeeding also encourages birth spacing through sexual abstinence among some ethnic groups because of the belief that sexual activity while breastfeeding could contaminate the breast milk.

However, Ajala (2002) pointed out that there are some other constraints on full implementation of breastfeeding by mothers which have some cultural undertone. He stated that constraint on breastfeeding include strenuous work undertaken by mothers, poor feeding habits of the mother and poor supportive roles of men. Even though, older women in most of the ethnic groups cook and provide adequate care for mother after the delivery for 40 days with the belief that variety of food will restore the lost nutrient during pregnancy, restriction on some certain food for mothers can cause malnutrition to the mother and child. Further, among some groups in Nigeria, traditional breastfeeding weaning practices can be detrimental to the health of children. Weaning is the time when food other than milk is successfully introduced into an infant's diet (Louise Ross, 1981). In Nigeria the usual first weaning food is called pap, akamu, ogi, or koko and is made from maize, millet or guinea corn which are low in protein content. Children are thereafter introduced to adult solid food which may be too heavy to take the needed quantity. This has been a major cause of malnutrition which increases susceptibility to infectious diseases and affects child mortality from diseases such as diarrhoea, whooping cough, and acute respiratory infection (Onofiok and Nnanyelugo, 1988; WHO/UNICEF, 1988).

Early marriages among ethnic groups in the northern part of the country have not been healthy for the young women involved. Incidences of vesicovaginal fistula (VVF) are prevalent in such situations. Likewise, adherence to circumcision rite of passage otherwise known as Female Genital Mutilation has resulted in several medical complications and higher risk of HIV infection for such young women. Further, the belief that infant should be purged after delivery to rid them of impurities swallowed in the uterus is another dangerous practices among some ethnic groups in Nigeria (Alabi, 1990; Oyekanmi, 1998; Onyeabochukwu, 2007).

2.4.2 Ethnicity and Under-five Mortality

Ethnicity as a factor can create differences in under-five mortality. According to Alter (1997), the low infant mortality rates among the Jewish in developed country such as Canada and United States in the 19th Century were less than one-third of the rates in children from families of French origin probably because of differing childrearing practice. Also, studies from different parts of Africa have shown that the risk of child mortality differs between ethnic groups

(Brokerhoff and Hewett, 2000; Maccassa *et al* 2006). It is generally believed that variations in mortality across ethnic groups are as a result of differences in socio-economic status, accessibility to health care facilities and services and socio-cultural practices. Although the way in which children are exposed to the contaminants has great implication for the well-being of children in the years to come and is first step in a sequence of environmentally related health effects, the exposure could be greatly influenced by various cultural norms and child care practices (Bearer, 1995; Wahab, 2004; Mulholland *et al*, 2008).

Brockerhoff and Hewett (1998) in their political economic framework noted that where heads of state since independence have come from one or two ethnic groups as in Côte d'Ivoire, Kenya and Niger. There is favouritism in the provision of basic infrastructure which could be attributable to low child mortality in such groups. In other countries where there have been several transitions in state control, as in Ghana and Uganda, descendants of precolonial kingdoms such as Ashanti and Buganda have experienced much lower mortality than others. In most countries, the lower mortality of ethnic groups who typically represent small proportions of national populations is strongly related to economic privilege. Gyimah (2002b) also observed that ethnic differences in infant mortality in Ghana mainly reflect socio-economic disparities among groups rather than intrinsic cultural norms; each ethnic group has its own corpus of knowledge and practices in the sphere of health and child care. In Kenya, Venkatacharya (1991) found that association between ethnicity and infant mortality is considerable and significant. He observed that children of the Luo group had the highest mortality risks while those of the Kikuyu group had the lowest mortality risks.

In Nigeria, findings by Brockerhoff and Hewett (1998) revealed that children of the Hausa, Fulani, Tiv, and northern plateau groups of Nigeria have had greatly elevated child mortality odds as compared to other children in the country. There is increasing disadvantage with age from 29% higher mortality during infancy to 73% higher mortality among children under age five points to an accumulation of disease assaults and nutritional deficiencies over time resulting from the harsh epidemiological environment of Hausaland and other parts of northern Nigeria. However, the assumption that there are ethnic differentials in under-five morbidity and mortality in Nigeria has not been empirically demonstrated in light of countless studies on under-five mortality. It therefore

becomes pertinent to empirically demonstrate the ethnic differential in childhood morbidity and mortality and further examine how household environmental health hazards affect childhood mortality among Nigerian ethnic groups.

2.5 Theoretical and Conceptual Framework

The ecological system theory proposed by Bronfenbrenner and Mosley and Chen analytical framework for the study of child survival in developing countries were used for this study.

2.5.1 Ecological System Theory

The ecological system theory proposed by Bronfenbrenner focuses on the quality and context of child's environment. The theory examines child's development within the system of relationships that form his or her environment. It defines complex "layers" of environment, each having an effect on a child's development. For a child to develop, he/she must survive some stages in life and thus, child survival is embedded in child development. This ecological system theory answers the question of how a child's surrounding hinders or helped the survival of a child (Bronfenbrenner, 1979).

The interaction between factors in the child's maturing biology, their immediate family/community environment, and the societal landscape guides their development. Therefore, to study a child's development cum survival, the child and her immediate environment must not only be looked at but also the interaction of the larger environment as well which brings in the issue of social environment.

Microsystem, mesosystem, exosystem and *macrosystem* were the terms used in explaining this theory. The layer closest to the child is the *microsystem,* it reflects the outcome of the relationships and interactions a child has with her immediate surroundings (Berk, 2000). This could be health outcome, cognitive systems and emotional behaviour. Structure that influences the outcome at this level includes family, school, neighbourhood, or childcare environments.

The mesosystem layer shows the interaction between structures of the child's immediate environment as it relates to the microsystem. It implies that, interactions at this outer level can impact the inner structures (Berk, 2000). In this

study, the mesosystem will be the household environment of a child which has an influence on the child's health outcome, thus the child's survival. At this level, the influence from the household environment has a great impact on child's morbidity, mortality, survival and development.

The *exosystem* layer defines the larger social system in which the child does not function directly. The structures in this layer impact the child's survival hence development by interacting with some structure in her microsystem (Berk, 2000). Although, a child may not be directly involved at the exosystem level, the negative or positive force which involves interaction within his/her system is felt. Factors such as socio-economic, maternal and demographic are at this level.

The *macrosystem* layer is considered to be the outermost layer in the child's environment; it comprises cultural values, customs, and laws (Berk, 2000). The effects of larger principles defined by the macrosystem have cascading influence throughout the interactions of all other layers. For example, if it is the belief of the culture that women should marry early, hence begin childbearing early; the culture is indirectly affecting the survival of such a child. The parents' ability or inability to carry out that responsibility towards their child within the context of the child's microsystem is also affected. This brings in the ethnic group of a parent; it has an overall effect on the survival of a child (Bronfenbrenner, 1979).

2.5.2 Mosley and Chen Framework

The Mosley and Chen model seeks to create multivariate model for studying childhood mortality in developing countries. It is comprehensive and an improvement on past models from a variety of disciplines; it is, in itself, a multidisciplinary model. This is because past models in the social sciences have been lacking because of a narrow focus on the relationship between socio-economic status and mortality while medical research models have been lacking because of a narrow focus on biological processes and overall-specific focus on the disease and nutritional status of survivors. The Mosley and Chen analytical model alleviates the common problem of looking at mortality from a single factor conceptualisation to a multifactorial causality (Mosley and Chen, 1984).

The basic framework of Mosley and Chen's model is based on the idea that the factors that affect childhood mortality work through a set of "proximate determinants." Five other premises were also suggested that lay the background for

the model along with the basic premises. These premises are: (i) Under optimal conditions, child survivability rates for newborn infants can be expected to reach 97%. (ii) In the real world, this rate is lowered by social, economic, biological and environmental factors. (iii) Socio-economic determinants must operate through the "proximate determinants" in order to influence disease and its processes. (iv) The proximate determinants can be indicated by the diseases and deficiencies of surviving population; and (v) Child mortality is the result of the cumulative consequences of multiple disease processes. Proximate determinants, as defined by Mosley and Chen, are divided into five categories: maternal and demographic factors, environmental health factors, nutrient deficiency, injury and personal illness control. Maternal factors include age of the mother, parity and birth interval. The demographic factors include sex of child, multiple births, and previous child death.

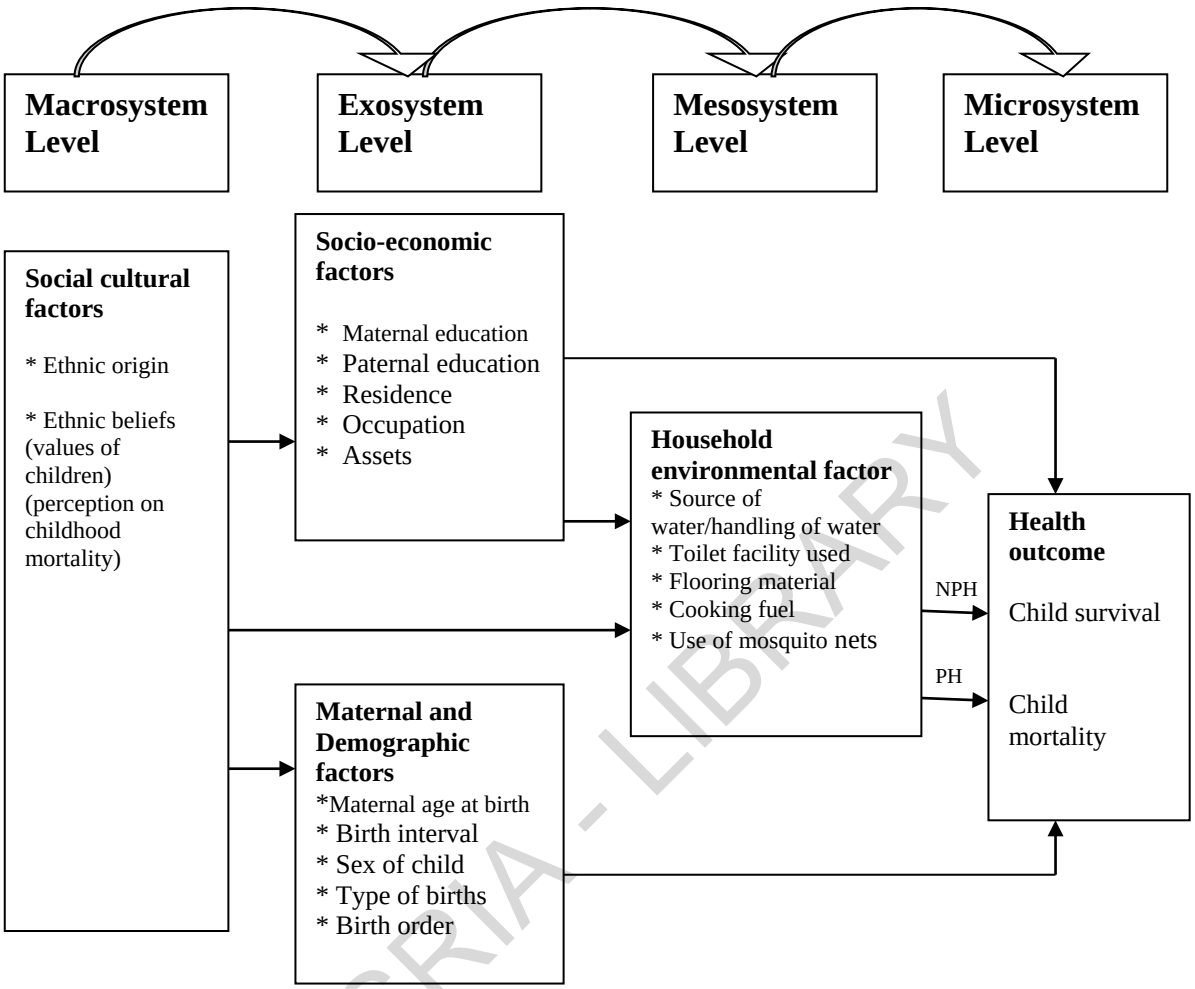
Household environmental factors include the materials of household construction, sources of water and presence/types of toilet facilities as well as type of cooking facilities. Environmental contaminations which are routes of infection include a multitude of factors, such as air, food, water, fingers, skin, soil, inanimate objects and insects. There are myriad of infectious agents whose transmission to infants and children are facilitated by unsanitary household conditions, overcrowding, and poor personal hygienic practices. Indicators of hygiene determining the transmission of infections can involve the use of soap, food handling practices and defecation habits. Environmental health factors will be measured in this study as it relates to household of a child. Variables such as source of water, toilet facilities, household density, flooring material and cooking fuel are all environmentally induced and could be routes of infection to a child. This could also increase the risk to mortality.

Nutrient deficiency comes from different sources: calories, protein and micronutrients are the major sources. The injury category includes both accidental and intentional injuries as well as burns and poisoning. Physical injuries in younger children are typically due to burns, falls and poisoning, often related to household hazards. Among older children, outdoor injuries including motor vehicle accidents; more common with higher frequencies among boys compared to girls. Personal illness control entails personal preventative measures taken and medical treatment. The preventive measures are taken to avoid disease from traditional practices like

observing taboos, as well as modern practices such as seeking qualified antenatal and childbirth care, receiving maternal tetanus toxoid immunization, and immunizing the children. The medical treatment comprises both the use of traditional medical practices as well as acceptance of modern medicine like oral rehydration therapy and antibiotics.

In addition to proximate determinants, Mosley and Chen (1984) observed that socio-economic determinants affect childhood mortality. They divided socio-economic determinants into three major categories: individual-level, household level and community level. The effects of socio-economic variables are enhanced as the child gets older (Manda, 1999). Variables such as maternal education, paternal education, residence, occupation and assets are good measure of socio-economic factors. This study adopts maternal, demographic, environmental health and socio-economic factors from Mosley and Chen framework. The diagram below shows how the two theories are merged.

For this study, the Mosley and Chen analytical framework identify factors that affect childhood mortality while the ecological system theory categorize the factors into appropriate level as it affects child's health. The ethnic origin and beliefs of parents fall into what Bronfenbrenner categorised as macrosystem level of child's development cum survival. It influences through the interaction of other levels on child's development, survival and health outcome. The next layer in the ecological system theory as it affects child survival is the exosystem, a child cannot function directly on the factors at this level but the impact of such factors affects the child positively or negatively; these are the socio-economic, maternal and demographic factors as defined in Mosley and Chen's framework. Variables such as maternal education, occupation, maternal age at first birth, sex of child have an impact at this level on the health outcome of a child. The environmental health factor as another determinant of childhood mortality in Mosley and Chen's framework, has a close effect on the health outcome and development of a child. In this study, this factor falls into the mesosystem level of Bronfenbrenner's ecological system theory. Child survival and mortality reflect the outcome of interaction a child has with his/her surroundings categorised in ecological system theory as microsystem level.



NPH- Non potential health hazards
PH- Potential health hazards

Figure 2.2: Conceptual Framework
(Adapted from Ecological System Theory and Mosley and Chen Analytical Framework)

2.6 Research Hypotheses

Four major hypotheses are derived to guide the conduct of this study. They are:

1. *There is a significant relationship between childhood mortality and maternal ethnic membership in Nigeria.*

2. *Household environment of a child affects childhood mortality among ethnic groups in Nigeria*
   (a) Source of water in the household affects childhood mortality among Nigerian ethnic group
   (b) Toilet facility used in the household affects childhood mortality among Nigerian ethnic group
   (c) Cooking fuel used in the household affects childhood mortality among Nigerian ethnic group
   (d) Flooring material in the household affects childhood mortality among Nigerian ethnic group
   (e) The use of treated mosquito nets affects childhood mortality among Nigerian ethnic group
   (f) Place for hand washing affect childhood mortality among Nigerian ethnic group

3. *There is significant relationship between household environment, demographic variables and childhood mortality*

   (a) There is significant relationship between maternal age at birth, household environment of a child and childhood mortality.
   (b) There is significant relationship between birth interval, household environment of a child and childhood mortality.
   (c) There is significant relationship between sex of child, household environment of a child and affects childhood mortality.
   (d) There is significant relationship between type of birth and household environment of a child and childhood mortality.
   (e) There is significant relationship between birth order and household environment of a child and childhood mortality.

4. *There is significant relationship between socio-economic status of the parents, household environment of a child and childhood mortality.*
   (a) There is significant relationship between maternal education and household environment of a child, which affects childhood mortality.
   (c) There is significant relationship between maternal wealth index and household environment of a child, which affects childhood mortality.
   (d) There is significant relationship between household residence and household environment of a child, which affects childhood mortality.

CHAPTER THREE
METHODOLOGY

3.1 Introduction

Methodology is concerned about the systematic and scientific ways of producing knowledge in order to make conclusion about social phenomenon. The need to select appropriate methods in answering challenges poised by social problems is pertinent for the collection of accurate data for any research endeavour. This study therefore adopts a multimethod approach in which the variable of interest is investigated using multiple research procedures. Triangulation of quantitative and qualitative methods through primary and secondary sources of data collection for complementary purposes was utilised for this study.

Quantitative methods focus on numbers, frequencies and making statistical inferences while the qualitative methods collect data that are concerned with describing meaning and experience. Quantitative data obtained from secondary source provides a solid background for understanding of childhood mortality among Nigerian ethnic groups while the qualitative method from primary source was used as a complementary research to understand ethnic perception towards childhood morbidity and mortality. A combination of quantitative and qualitative approaches allow statistically reliable information to be obtained from numerical measurement and backed up and enriched by information about the research participants' in-depth and rich description of social phenomenon.

3.2 Research Design

The research design for this study involves the integration of qualitative method and secondary data from field survey. The survey based secondary data was complemented with focus group discussion (FGD) and in-depth interview (IDI) methods. The aim of the quantitative method in this study is to classify features and construct statistical models in an attempt to explain household environmental health hazards and childhood mortality among Nigerian ethnic groups. The qualitative method is however to provide detailed description of ethnic perception towards childhood morbidity and mortality in Nigeria. Population-based quantitative data obtained from Nigeria Demographic and Health Survey 2003 (NDHS 2003) was utilised to answer the stated research questions for this study.

The third in a series under the worldwide Demographic and Health Surveys Programme, NDHS 2003 is a nationally representative, stratified, self-weighting probability sample of women in the reproductive ages of 15 to 49 years. It has a wider scope and geo-referenced, making the findings to be more comprehensive than the two previous surveys (1990 and 1999) in Nigeria. The basic rationale of survey method measure variables by asking people questions and examines the relationship among the variables. The structured interview method adopted in the NDHS 2003 used standardized individual and household questionnaires that facilitate cross-country comparison. Information on fertility, fertility preferences, use and knowledge of family planning methods, maternal and childhood health, maternal and childhood mortality, breastfeeding practices, nutrition, knowledge of HIV/AIDS and other health issues were obtained in the survey (NPC, 2004). This study was able to extract information on maternal and childhood health and mortality that covers the whole country from the NDHS 2003. Ethnic membership of mothers was broadly categorised into Hausa-Fulani, Igbo, Yoruba, Southern and Northern minorities' ethnic groups. The Hausa-Fulani, Igbo and Yoruba are the three largest and dominant ethnic groups in the Nigeria. The other ethnic groups fall under the broadest groupings of linked ethnic unit by region and geo-political zoning of the country: Northern and Southern minorities (Otite, 1990; NPC, 2004).

The qualitative data, though less able to generalize, provided rich, in-depth, complete and detailed description on childhood morbidity and mortality among Nigerian ethnic groups. It aims to provide illumination and understanding of complex social issues and are most useful for answering 'why' and 'how' questions (Marshall, 1996). It specifically describes how individuals and groups view and understand phenomena and construct meaning out of their experiences. Therefore, the attitudes, beliefs and perceptions of three major ethnic groups of the country (Hausa-Fulani, Igbo and Yoruba), southern minorities and northern minorities' ethnic groups were investigated through focus group discussion (FGD) and in-depth interview (IDI). This was to ascertain whether there are socio-cultural practices that enhance exposure of children to household environmental health hazards, hence childhood mortality. The combination of the survey based secondary data with primary data collected through FGD and IDI ensured that valid and reliable information were obtained from the findings of this study.

3.3 Study Area

Nigeria is a West African country situated along the eastern coast of the Gulf of Guinea and north of the equator. Nigeria, the fourth largest country in Africa, covers an area of 923,768 square kilometers and is made up of 36 states and a Federal capital territory (FCT) comprising 774 Local Government Areas (LGAs). These states are grouped into six geopolitical regions: North Central, North East, North West, South East, South South and South West.

There are many social groups within the boundary of Nigeria with distinct cultural traits which are reflected in the diverse behaviour of the people with over three hundred ethnic groups. Figure 3.1 shows a map of Nigeria by distribution and location of major language ethnic groupings for this study. There is overlapping in the distribution because of the clustering of some ethnic groups in some states. For instance, ethnic groups in Borno State include Kanuri, Hausa-Fulani, Babur, Shuwa and Marghi. Also Zamfara State being predominantly Hausa-Fulani group has Nupe, Tiv, Kanuri and Gwami Kamuku, Kambari, Dukawa, Bussawa and Zabarma dominant in the state.

According to the Population Reference Bureau (PRB) estimate of 2008, the population of Nigeria is about 148 million with annual growth rate of 2.5%. Nigeria has the largest population of any African country at about 160 people per square kilometer making it the most densely populated country in Africa. The Nigerian population is very young with about 45% of its people under age fifteen (PRB, 2008)

3.4 Study Population

The study population for quantitative data is women of reproductive age 15 to 49 years in Nigeria from who birth history information were obtained. In the 2003 NDHS, questionnaires were administered to 7,620 eligible women from 7,864 households. The sample was representatively selected from the six geopolitical regions of the country. The retrospective child record from NDHS 2003 constitutes the basic analytical sample for this study.

The qualitative data were collected from various ethnic locations in Nigeria. Forty FGDs and forty IDIs were conducted accordingly among the targeted population who are women of reproductive age that has given birth to children. The grouping of ethnic membership follows the pattern used in quantitative method.

However, Ijaw and Tiv were selected as the southern and northern minorities' ethnic groups respectively because they are the dominant minorities' ethnic groups in the Northern and Southern Nigeria from the 2003 NDHS data which the study utilised. Apart from the fact that the geo-reference report of the NDHS 2003 revealed that majority of the women interviewed in the survey for various ethnic groups in Nigeria clusters around some particular states and locations, the ethnic groups studied were purposively selected in the specified states for convenience reason.

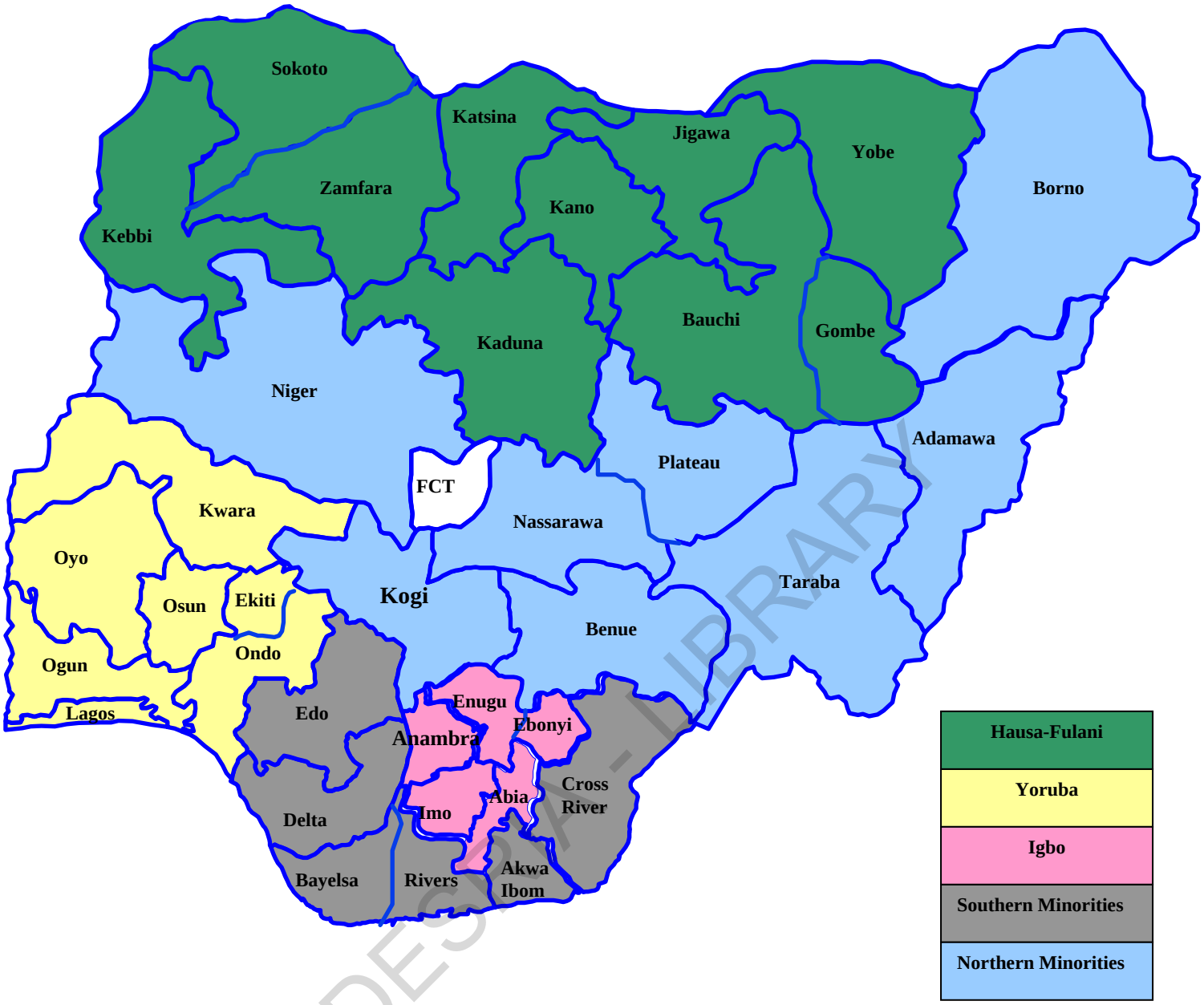


Figure 3.1: A map of Nigeria showing the distribution and location of major language ethnic groupings for this study

3.5 Sample Design

3.5.1 Sample Design for Quantitative Data

The aim of all quantitative sampling approaches is to draw a representative sample from the population such that the result of studying the sample can then be generalised back to the population (Marshal, 1996). Thus, the 2003 NDHS was based on a two-stage cluster design. In the first stage of sampling, 365 clusters were selected from a list of enumeration areas developed from the 1991 population census; 165 clusters in urban and 200 clusters in rural areas. Appendix 4 shows the distribution of cluster selected for the 2003 NDHS. At the second stage, complete listings of household were carried out in each selected clusters and systematically selected to achieve a fixed sample per clusters. The final sample therefore was weighted to adjust for disproportional in urban-rural area. All women age 15 to 49 who were either permanent resident or visitors present in the household before the survey were eligible to be interviewed. To account for possible non-response, 7,864 household were selected nationwide. Household interview were completed for the 99% of the occupied household. Thus, 7,985 eligible women were found in the household and 95% of them were successfully interviewed with overall response rate of 94%. For this study, child record constitutes the basic analytical sample; a retrospective child file consisting of all children born to sample women was generated from the data. Although there were 23,038 births recorded in the survey, the analysis was restricted to births within five years of the survey. This was to ensure that maternal characteristics relate to current situations. Hence, a total of 5,531 live births which occurred between 1999 and 2003 were used for this study.

Studies have further observed that the quality of recent births tend to be better than births that occurred years ago, associated with a higher likelihood of missing the age at birth (Rutstein, 2000). The Table 3.1 shows the distributions of births for the five years preceding the survey among Nigerian ethnic groups.

3.5.2 Sample Design for Qualitative Data

The essence of qualitative approach is its naturalistic feature; real people are studied in natural setting. Sampling therefore has to take account not only of the individual's characteristics but also spatial and situational influences among other things (Marshall, 1996). Hence, some states and locations were selected purposively for the FGDs and IDIs. This study developed a suitable sampling

framework for qualitative data based on variables that are pertinent for this study. The sampling selection strategy was based on ethnic membership, location, age and educational status of mothers.

The first stage was to purposively select one out of the states in the country where the ethnic groups clustered. Second, major towns were selected within each state. Third, focus group participants and IDI respondents for the study cut across rural, urban, educated and non-educated in the selected locations.

Hausa-Fulani people in the northern part of the Nigeria are found in Kebbi, Sokoto, Zamfara, Katsina, Kaduna, Kano, Jigawa, Bauchi, Yobe and Gombe. However, Zaria, a major city in Kaduna state, was purposively selected for the qualitative data collection. Zaria is also known as the capital of Hausa kingdom. The city with a population of 408,198 comprises areas namely: Samaru, Tudun Wada, Sabon Gari, Kofan Gayan, Danmagaji/Wusasa, Zaria-City, PZ, Kongo, GRA-Zaria, Hanwa, Shikka, Bomo (National Bureau of Statistics, NBS 2009). Bomo district was selected for rural area while Kofan Gayan was selected for urban area.

The Igbo are spread over five states in Nigeria namely: Enugu, Ebonyi, Imo, Anambra and Abia states. For this study, Igbo mothers interviewed were purposively selected from Awka town in Anambra State in order to understand the ethnic perception to child care and mortality because of its traditional Igbo setting. Anambra State is a highly densely populated area in the country with Igbo ethnic group being the dominant group in the state. Awka South Local Government Area was purposively selected because of indigeneous Igbo setting in the town. Awka South, a population of 189,049, is made up of nine communities namely Amansea, Amawbia, Awka, Ezinato, Isiagu, Mbaukwu, Nibo, Nise and Umuawulu (NBS, 2009).

The Yoruba are clustered in Lagos, Oyo, Ondo, Ogun, Osun and Kwara States while major Yoruba cities are Lagos, Ibadan, Abeokuta, Akure, Ilorin, Ijebu Ode, Ijebu-Igbo, Ogbomoso, Ondo, Ota,Ado-Ekiti, Shagamu, Ikenne, Iseyin, Osogbo, Ilesha, Oyo, Ilé-Ifè. For this study, Akure was purposively selected for the qualitative data collection of the Yoruba perceptions on child care, morbidity and mortality because of its traditional nature.

Table 3.1: Distribution of births by mothers among Nigerian ethnic groups

Ethnic group	Mothers	Births
Hausa-Fulani	1440	2233
Igbo	440	660
Yoruba	394	530
Southern Minorities	562	826
Northern Minorities	852	1282
Nigeria (total)	3688	5531

Source: NDHS 2003

Akure, the largest city and capital of Ondo State is in the southwestern region of Nigeria. The city has a population of about 484,789 with two LGAs: Akure South and Akure North (NBS 2009). Although, there has been influence of modernization on the city, it is still a traditional Yoruba city.

Ijaw ethnic group, the most populous indigenous inhabitants of the Niger Delta, was selected among the southern minorities ethnic group. This ethnic group is scattered across six states in Nigeria: Ondo, Edo, Delta, Bayelsa, Rivers and Akwa Ibom. The Ijaws are more than fourteen million people in the Niger Delta region of Nigeria. Sagbama, one of the towns in Bayelsa State, was purposively selected for this qualitative study. Sagbama town has a population of about 187,461 and is located in the heart of Sagbama local government; it comprises other towns such as Tungbo Ebe, Adagbabiri, Odi, and Kaiama (NBS, 2009). The local government, one of the three in the former Rivers State, is also one of the nine in the present Bayelsa state. It lies at the base of the state coming from Delta State and it is the first local government to be reached before traversing the state and going down South to Rivers. The selection of Sagbama is because of the clustering and high population of Ijaws in the town

The other minorities' ethnic group in the northern region of Nigeria selected for this study is the Tiv. The Tiv are located in the northern provinces of Nigeria, with the majority of them living in the Tiv Division of Benue Province. Benue, a state in the northern minorities' ethnic group region was purposively selected because 14 out of the 23 LGAs in the state belong to the territory of Tiv people. Gboko, a town in the Benue State of Nigeria was further selected for this study. The population of over 350,000 in Benue State is mostly Tiv people (NBS 2009). It is the traditional capital of the Tiv tribe and has the official residence of the Tor-Tiv, the paramount traditional ruler of the Tiv people spread in Benue, Taraba, Plateau and Nasarawa States. The above mentioned locations were thus selected for different ethnic groups in order to understand different ethnic perceptions towards childhood morbidity and mortality.

Focus group discussion (FGD)

The focus group discussants were homogeneous in characteristics. Eight FGDs were carried out in each ethnic group study location as shown in Table 3.2. Each FGD comprise eight discussants. For each location, there were four FGDs in rural area

and four in urban area. In each residence, two FGDs were conducted for educated women while another two FGD were conducted for non-educated women. A total of FGDs were conducted for this study

In-depth Interview (IDI)

Eight IDIs were carried out in each ethnic group's study location as shown in Table 3.3; informants were governed by the need to capture certain variables/characteristics that are considered important. These are- One, the sex of participants: women were interviewed, given that they are principal caregivers for children. Two, they were selected from both urban and rural areas; the justification is that child morbidity and mortality rate are unevenly distributed between urban and rural areas. Three, respondents were also selected from among two educational groups, namely, those without any formal education and those with secondary school or above educational level. Therefore, respondents in each ethnic location comprise four rural and four urban women. Further, rural and urban respondents comprise non-educated and educated women. Overall, forty IDIs were conducted for this study.

3.6 Method of Data Collection

This study triangulates quantitative and qualitative method of data collection: survey based secondary data, focus group discussions and in-depth interviews. The integration of data from these methods for this study takes care of various data collection shortcomings of individual methods.

3.6.1 Quantitative Data Collection- Secondary Data

Secondary data were extracted from 2003 Nigeria Demographic and Health Survey. The survey provides up-to-date information on the population and health situation in Nigeria. Three questionnaires were used for the 2003 NDHS: the household, women's and men's questionnaires. The 2003 NDHS data are highly interactive in the fact that every woman interviewed gave up to 287 pieces of information with a possibility for many responses.

Table 3.2: State and location of Focus Group Discussants

Ethnic group	Geo-political region	State	Location		No. of FGDs
Hausa-Fulani	North West	Kaduna	Zaria Urban	Kofan Giyan	4
			Zaria Rural	Bomo	4
Igbo	South East	Anambra	Awka Urban	Awka town	4
			Awka Rural	Nibo	4
Yoruba	South West	Ondo	Akure Urban	Oja-Oba	4
			Akure Rural	Odaro	4
Tiv	North Central	Benue	Gboko Urban	Gboko town	4
			Gboko Rural	Mkar	4
Ijaws	South South	Delta	Sagbama Urban	Sagbama	4
			Sagbama Rural	Tungbo	4
Total					40

Table 3.3: State and location of IDI respondents

Ethnic group	Geo-political region	State	Location		No. of IDIs
Hausa-Fulani	North West	Kaduna	Zaria Urban	Kofan Giyan	4
			Zaria Rural	Bomo	4
Igbo	South East	Anambra	Awka Urban	Awka town	4
			Awka Rural	Nibo	4
Yoruba	South West	Ondo	Akure Urban	Oja-Oba	4
			Akure Rural	Odaro	4
Tiv	North Central	Benue	Gboko Urban	Gboko town	4
			Gboko Rural	Mkar	4
Ijaws	South South	Delta	Sagbama Urban	Sagbama	4
			Sagbama Rural	Tungbo	4
Total					40

The women's questionnaire was used to collect information from all women age 15 to 49 on background characteristics, birth history and childhood mortality, fertility preferences, knowledge and use of family planning methods, antenatal and delivery care, breastfeeding and child feeding practices, vaccinations and childhood illnesses, marriage and sexual activity, women's work and husband's background characteristics, awareness and behaviour regarding AIDS and other sexually transmitted infection and female genital mutilation (NPC, 2004).

Variables for the household environmental factor include source of drinking water, time to water source, type of toilet facility, sharing of toilet facility, type of main flooring material of the household, type of cooking fuel and use of mosquito net for children under five years. Source of drinking water is categorised into piped water, open well, covered well/borehole and surface water (streams, rivers). Time to water source is categorised into on premises, less than 15 minutes and above 15 minutes. Toilet facilities are grouped into flush toilet, pit toilet and no facility while the toilet is either shared or not. Finished and natural/rudimentary are the categories of flooring materials. Finished materials comprised parquet, polished wood, vinyl/ asphalt strips, ceramic tiles, cement and carpet while natural/rudimentary flooring include wood plank, bamboo, earth, sand and dung. Type of cooking fuel is categorised into Electricity/LPG/Natural gas, Kerosene and Firewood/Charcoal/Straw. The use of mosquito nets for children under five in the household is grouped into yes or no. Responses for place for hand washing are nowhere, in-dwelling yard/plot or somewhere else and mothers either wash their hands before preparing last meals or not.

Status of household environment is derived from the responses on household environmental factors. The household environmental health hazard is thus categorised into two: potential health hazard and non-potential health hazard. The potential health hazard is defined by the following criteria: i) open well water and surface water as the source of drinking water; ii) above 15 minutes as time to get to water source; iii) type of toilet facility is either pit toilet latrine or no facility; iv)toilet facility is shared; v)main flooring material is natural/rudimentary; vi)type of cooking fuel is firewood/charcoal/straw vii)non-use of mosquito net by children under five; viii)having no place for hand washing in the household; and ix)not washing hands before preparing meals

Conversely, the non-potential health hazard is defined by i)piped water and covered well/borehole as the source of drinking water; ii)on premise and below 15 minutes as time to get to water source; iii)flush toilet facility; iv)toilet facility is not shared; v)main flooring material is finished; vi)type of cooking fuel is either electricity/gas/kerosene; vii)use of mosquito net by children under five; viii)having a place for hand washing in the household; and ix)washing hands before preparing meals.

Demographic variables in this study are maternal age at birth, birth interval, sex of child, type of birth and birth order. Maternal age at birth is grouped into the conventional categories of fertility age of women as follows 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49 years. Sex of child is either male or female while the type of birth could be single birth or multiple births as in the case of twins. Interval between births is grouped by months into, below 24, 24-36 and above 36 months while the birth order is from first born to fourth-born and above. The socio-economic factor is measured with variables such as maternal highest educational level, paternal highest educational level, residence, employment status of mothers and wealth index of the family. Maternal and paternal highest educational levels are grouped into No education, Primary, Secondary and Higher education while the residence is categorised into rural and urban. Employment status of mothers is categorised into working and not working. The wealth index, based on assets information and household ownership of consumer item, as categorised in the 2003 NDHS is used with a little modification in the category; poorest and poorer are regrouped into poor while middle and richer and richest are regrouped into rich.

3.6.2 Qualitative Data Collection

The qualitative fieldwork took place between February 2006 and June 2006. The ten research assistants for fieldwork are trained sociologists and demographers with diverse qualitative fieldwork experiences. They were recruited from the ethnic groups in this study in order to collect required information from the respondents. The correct interpretation of the IDI and FGD guide into the local language was done with the help of these research assistants. This is to ensure that the research instruments elicit desired information and that biases are avoided. There were also research assistants recruited and trained to assist in note taking and record of observation as it occurred in each ethnic group.

Focus group discussion (FGD)

The FGD guide was developed in line with the objective of this study. Each FGD comprises eight people who are homogeneous in characteristics. The semi-circular sitting arrangement was adopted to avoid high table effect. Discussion was used to bring out understanding and insights on ethnic groups that were not possible through the secondary data. The interactions among focus group discussants brought out different perspectives through the language used by the discussants. The discussions, facilitated by trained moderators, focused on household environment and child's health, perception of how traditional beliefs affect child survival, beliefs concerning children under-five years, cultural practices towards health care and nutrition (FGD guide in Appendix 2). Non-verbal communication and role played by each discussant were observed while tape recording the discussion. In order to control for the influence of the moderator in multiple FGDs, the same moderator was used for each ethnic group.

In-depth interview

In this study, disadvantage of FGD as a method of qualitative data collection was taken care of by the IDI. Draw back such as influence of discussion moderator and the difficulty of separating individual viewpoints from the collective group viewpoint were avoided in the IDI. The in-depth interview is semi-structured one to one discussion between interviewer and participant. Interview guide includes pertinent probing questions on household environmental health hazards and childhood mortality among Nigerian ethnic groups (IDI guide in Appendix 1). The guide was divided into various themes such as house setting and environment, general characteristics of the respondents, description of the household environment, household environment and child's health, perception of how traditional beliefs affect child survival, beliefs concerning children under-five years, cultural practices towards health care and nutrition. The interviews were conducted among the ethnic groups in a natural setting in order to avoid any form of bias. The research assistants for the IDI were the trained sociologists who conducted the FGD. The interviewer, who speaks the native language of the ethnic group, assured the participant of confidentiality of the information given which encouraged good rapport during the interview. The research assistants also

observed non-verbal communications and gestures while tape recording the interview.

3.7 Data Analysis Proceedures

In any study, the type of data collected during fieldwork will determine the type of analysis that will be carried out. The study utilised both quantitative and qualitative methods of data analysis as appropriate for each objective. The conceptual framework developed from the ecological system theory proposed by Bronfenbrenner as well as Mosley and Chen analytical framework guided the analysis of household environmental health hazards and childhood mortality among Nigerian ethnic groups.

3.7.1 Quantitative Data Analysis

The quantitative data were computer processed and analysed with Statistical Package for Social Science (SPSSv15). The type of scales of measurement and the questionnaire format (close and open ended questions) necessitates the statistical analysis at univariate, bivariate and multivariate levels. As stated earlier, household environmental factors include source of drinking water, time to water source, type of toilet facility, sharing of toilet facility, type of main flooring material of the household, type of cooking fuel and use of mosquito net for children under five years. The household environmental health hazards variable is categorised into two: potential health and non-potential health hazards. Demographic variables in this study are maternal age at birth, birth interval, sex of child, type of birth and birth order. The socio-economic factor is measured by maternal highest educational level, paternal highest educational level, residence, employment status of mothers and wealth index of the family.

Univariate Analysis

This level of analysis was used for objective one which is to examine the pattern of household environmental health hazards among Nigerian ethnic groups. It involves the use of descriptive statistics such as frequency distribution tables, percentage distribution and graphs. This level of analysis also provides a general overview of the background profile of ethnic groups such as demographic and socio-economic characteristics.

Bivariate Analysis- Kaplan Meier Analysis

In order to determine the risk of household environmental health hazards on childhood mortality, Kaplan-Meier analysis was used to estimate the differences among Nigerian ethnic groups. Kaplan Meier analysis is a descriptive procedure for examining the distribution of time to event variable; the distribution by levels of a factor variable or separate analysis by levels of a stratification variable compared. It is based on estimating conditional probabilities at each point when an event occurs and taking the product limit of those probabilities to estimate the survival rates at each point in time. This method estimates the survival function directly from the continuous survival or failure times. The non-parametric Kaplan-Meier (product limit) method is used to generate maximum likelihood estimates of S(t), the probability that death occurs at age greater than t where S(t) is:

$$S_i(t) = \prod_{j=1}^{t} [(n-j)/(n-j+1)]\ \delta(j)$$

Where: $S_i(t)$ is the probability that the ith case survives past time t; it is the estimated function.

N is the total number of cases

Π denotes the multiplication (geometric sum) across all cases less than or equal to t

δ(j) is a constant if the jth case is uncensored (complete) and 0 if it is censored.

By incorporating information on age at death, the distribution curve demonstrates the differential pace and level of mortality for infants and children. The NDHS 2003 data provide age at death in months for children, therefore a quantitative stratified survival curves at age 59 months highlight the cumulative impact of household environmental health hazards among the various ethnic groups.

Multivariate Analysis- Cox Regression Model

Cox regression model is survival regression analysis widely deployed in demographic studies of childhood mortality since they obviate the need to exclude recent births given censorship of experience by survey time (Siyan, 2000). Two specific objectives were addressed with this technique; differences in childhood

mortality among Nigerian ethnic groups and the mediating effects of demographic, socio-economic factors and household environment on childhood mortality among Nigerian ethnic groups.

This proportional hazard model assumes that the underlying hazard rate is a function of the independent variables (covariates). Although, no assumptions are made about the nature or shape of the hazard function, the model implies two assumptions. First, they specify a multiplicative relationship between the underlying hazard function and log linear function of the covariates. It is assumed that, given two observations with different values for the independent variables, the ratio of the hazard functions for those two observations does not depend on time. The second assumption is that there is a loglinear relationship between the independent variables and underlying hazard function. The equation is presented below:

$h\{(t),(z_1, z_2, z_3, \ldots. Z_n)\} = h_0(t)* \exp(b_1*z_1 + b_2*z_2 + \ldots + b_n*z_n)$

where: h(t, …) – Resultant hazard, given the values of the m covariates for the respective cases (z_1, z_2,…z_m) and the respective survival time (t). It is the product of the baseline hazard and covariate effect.

$H_0(t)$ is the baseline hazard; it is the hazard for the respective individual when all independent variable values are equal to zero. The ratio of the hazard is independent of time and indicative of relative risk of a given event. The relative risk shows the extent to which specific attributes predispose children to differential risk of death. A risk ratio significantly greater than one suggests that children with this attributes have a higher risk of death than the reference category while the relative risk ratio less than one implies that children with this attribute are expected to have lower risk of death than those in the reference category.

3.7.2 Qualitative Data Analysis

Qualitative data, consisting of words, were analysed systematically and logically to understand ethnic perception towards childhood morbidity and mortality in Nigeria. The FGDs and IDIs were analysed manually by adopting Hawe, Degeling and Hall (1990) four basic steps to analysing qualitative data. The first step was to organize the data by transcribing notes from tape recording of FGD and IDI; particular attention was paid to phrases with contextual or special connotations. It was thereafter reviewed by a competent third person to avoid alterations in context and

meaning. This gave an overall picture of the complete set of qualitative data. The second step was shaping the data information by assessing themes that emerges from the guides. This was done by sorting and noting the different categories of responses found under topic headings.

The third step entailed interpreting and summarising the information by looking at the range of views expressed on ethnic perception of childhood morbidity and mortality in Nigeria. The intra-ethnic perceptions, attitudes and behavioural practices towards child's health and survival for the eight FGDs and IDIs were compared and reported, especially behavioural practices among respondents within the particular ethnic group. Also there were inter-ethnic comparisons of findings for all the ethnic groups. This is to identify the differences and likeness in cultural beliefs, perception and behavioural practices among the various ethnic groups across the nation. The fourth step was explanation of findings from the qualitative data analysis; the different ethnic perceptions, attitudes and behavioural practices towards child's survival in their household environment was compared with the results from the quantitative analysis based on NDHS 2003.

3.8 Ethical Considerations

Ethics in research is about the responsibility to respect the right of others. The researcher sought and received the permission of ORC Macro Inc, USA before downloading the NDHS datasets. The permission process involved submission of abstract of the proposed study for review by ORC Macro Inc team of experts before given the permission to assess the datasets online. Further, letter of recommendation was obtained from the Department before the collection of qualitative data. In all the qualitative study locations, efforts were made to obtain permission and moral support from popular Community Leaders and Household Head. Verbal consent were also received from the study participants after issues such as participants consent and freedom to withdraw from this study at any time without fear were made clear to them. Confidentiality of the participants were emphasized and observed.

3.9 Limitations of the Study

The reliability of childhood mortality data in any survey is dependent upon the degree of reporting and recording of age at death. Displacement of dates at death affects infant and child mortality trends while misreporting of age at death distorts the age pattern of childhood mortality. As common to most survey on childhood mortality, the quantitative data for this study, from Nigeria Demographic and Health Survey 2003 reveals some evidence of omission or underreporting of deaths because information on dead children is difficult to obtain from mothers since they either forget or unwilling to talk about their dead children. However, despite evidence of heaping at age of death and incompleteness of information, it is observed that the age at death collected in the 2003 NDHS are far more superior to those collected in the 1990 and 1999 NDHS. Majority of deaths recorded at one year of age and the observed heaping occurred in the North East and North West, where lack of record keeping and uncertainty regarding dates of events make the data collection extremely difficult. Further, the excess deaths reported at 12 months have no effect on estimates of overall under-five mortality (NPC 2004). The grouping of Nigeria into five ethnic categories further shows some limitations in this study. It is assumed that the minorities ethnic group's linked by region have some similarities in culture and child care.

For the qualitative study, data were collected on ethnic perceptions of childhood morbidity and mortality among Nigerian ethnic groups from women as the principal respondents. The accessibility of these women was a major problem encountered in all the ethnic groups in the course of this study. The categorisation of these women into four – the educated, the uneducated, the rural and urban women – had a direct bearing on their occupation and consequently, accessibility. For those educated, majority of whom are civil servants and engaged in one business or another, it was difficult to access them. Those uneducated in the rural areas are either traders who sell in the weekly market system from villages to towns in the environment or farmers. The markets hold on different days in different villages and towns. Some of the respondents were unwilling to respond even after having consented to taking part in the research because of the culture that frown at counting of children and discussing of child's death. However, the principal researcher and the assistants were able to overcome the hurdles.

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1 Introduction

The results obtained from the analysis of secondary based on quantitative data from NDHS 2003 and qualitative fieldwork on household environmental health hazards and childhood mortality among Nigerian ethnic groups are presented in this chapter. It includes discussion on the background characteristics of the study sample, the pattern of household environmental health hazards, the differences in childhood mortality, the risk of household environmental health hazards on childhood mortality, different ethnic perceptions towards childhood morbidity and mortality; and the mediating effect of socio-economic, demographic factors and household environment on childhood mortality among Nigerian ethnic groups. Results, displayed through tables and graphs, provide easy comprehension and facilitate analytical discussion of the findings in this study. The findings from the focus group discussions (FGDs) and in-depth interview (IDIs) were constantly used to complement the quantitative result.

4.2 Background Characteristics of the Study Sample

4.2.1 Maternal socio-demographic characteristics

The socio-demographic characteristics of 3,688 mothers who gave births five years preceding the NDHS 2003 were examined in this study. Percentage distribution of maternal characteristics such as maternal age at birth, maternal highest educational level, partner's highest level of education, place of residence, employment status and wealth index were summarised in Table 4.1. There are disparities in the distributions among Nigerian ethnic groups. The ethnic groups in the northern part of the country have the highest proportion of young mothers while Yoruba and Igbo mothers are older. Forty-eight percent and 43% of Hausa-Fulani and NM children respectively were born when their mothers were less than 25years. Reluctance at educating the girl child in the northern part of the country might be contributory to early childbearing.

Table 4.1: Socio-demographic Profile of Mothers among Nigerian Ethnic Groups

Characteristics	Hausa-Fulani	Igbo	Yoruba	SM	NM
Maternal age at birth -15-19	21.0% *470*	5.9% *39*	6.0% *32*	11.7% *97*	16.1% *207*
20-24	27.1% *605*	21.7% *143*	23.4% *124*	25.8% *213*	27.1% *347*
25-29	22.6% *504*	32.0% *211*	30.4% *161*	26.9% *222*	26.1% *334*
30-34	16.0% *357*	20.2% *133*	19.6% *104*	16.8% *139*	14.7% *188*
35-39	9.4% *209*	13.6% *90*	13.8% *73*	12.3% *102*	11.1% *142*
40-44	3.3% *74*	5.6% *37*	5.7% *30*	5.6% *46*	4.1% *53*
45 and above	0.6% *14*	1.1% *7*	1.1% *6*	0.8% *7*	0.9% *11*
Maternal Highest education None	78.2% *1746*	17.0% *112*	15.1% *80*	26.3% *217*	49.7% *637*
Primary	12.7% *284*	34.8% *230*	30.0% *159*	33.4% *276*	30.4% *390*
Secondary	8.0% *179*	41.4% *273*	45.1% *239*	35.4% *292*	17.9% *229*
Higher	1.1% *24*	6.8% *45*	9.8% *52*	5.0% *41*	2.0% *26*
Paternal highest education None	63.2% *1395*	17.2% *109*	15.1% *77*	19.2% *146*	34.2% *424*
Primary	16.3% *359*	45.9% *290*	22.5% *115*	27.7% *211*	25.9% *322*
Secondary	12.7% *281*	28.8% *182*	45.6% *233*	38.0% *289*	25.3% *314*
Higher	7.8% *171*	8.1% *51*	16.8% *86*	15.1% *115*	14.6% *181*
Place of residence – Urban	29.3% *655*	50.0% *330*	66.2% *351*	29.3% *242*	27.1% *347*
Rural	70.7% *1578*	50.0% *330*	33.8% *179*	70.7% *584*	72.9% *935*
Employment status – Not working	47.8% *1068*	27.3% *180*	7.2% *38*	29.4% *243*	32.8% *421*
Working	52.2% *1165*	72.2% *480*	92.8% *492*	70.6% *583*	67.2 *861*
Wealth Index – Poor	53.2% *1188*	36.1% *238*	17.2% *91*	43.0% *355*	49.3% *632*
Middle	21.9% *490*	17.3% *114*	9.8% *52*	17.7% *146*	21.9% *281*
Rich	24.9% *555*	46.7% *308*	73.0% *387*	39.3 *325*	28.8% *369*

Source: Raw data from NDHS 2003

The percentage distribution of mother's highest level of education by ethnic membership in Nigeria was examined in this study. Nigeria has three tier system of formal education as at the time of this survey: primary, secondary and higher education. Primary education is for a minimum period of six years while the secondary education is for a minimum period of five or six years. An individual may then proceed to any tertiary institution by choice. The findings reveal that about one in every two Yoruba and Igbo mothers who gave birth within five years preceding the 2003 NDHS survey have at least secondary education; a formal education training of about 12 years. On the contrary, a substantial proportion of the Hausa-Fulani children and Northern minorities' (NMs) children belong to mothers with no formal education.

The pattern of maternal highest educational level among Nigerian ethnic groups is quite similar to paternal highest educational level. More than 60% of the Hausa-Fulani fathers have no education while in contrast more than 60% of Yoruba fathers have a minimum of secondary education. Majority of the fathers among the Igbo have primary education as the highest level of education attainment. There is clear difference in highest educational level of mothers and fathers between the ethnic groups in the northern region and those in the southern region of Nigeria. This is further reflected in the employment status of mothers. According to NDHS 2003, employed women are those who worked in formal or informal sector at any time during the 12 months preceding the survey. Above 70% of mothers from ethnic groups located in the southern region of Nigeria are working.

The residence of mothers is categorised into rural and urban. A large proportion of Hausa-Fulani, NMs and Southern minorities' (SM) ethnic groups mothers in this study live in rural areas. Conversely, 50% of Igbo and 66% of Yoruba mothers who gave birth five years preceding the survey live in urban area. Wealth index in demographic studies is used to evaluate the influence of social class on fertility behaviour and health of mother and child (NPC, 2004). Classification of mother's wealth index in NDHS 2003 was based on possession of some assets such as television, radio, bicycle and other consumable items. For the purpose of this study, wealth index is regrouped into poor, middle and rich. Based on this possession of asset, very few Yoruba and Igbo mothers are in the poor category. About four in every ten Hausa-Fulani, SM and NM mothers fall into poor group.

4.2.2 Children's Demographic Characteristics

The study analytical sample from NDHS 2003 was restricted to 5531 births that occurred between 1999 and 2003. Table 4.2 shows their demographic profile according to ethnic groupings. With the exception of the Hausa-Fulani, there are more male births between 1999 and 2003 than female (slightly above 50%) across the ethnic groups. The distribution of type of birth, a fertility behaviour which predisposes both mother and child to risk through premature births is examined in this study. There are more single births all over the country than multiple births. Yoruba mothers, however, have the highest proportion (4.9%) of multiple births.

The significance of birth interval to maternal and child health has been established in the literature (Gyimah and Fernando, 2002). Children born too close to a previous birth are at higher risk of death; especially if the preceding birth interval is less than 24 months. Also, deaths of a child can predispose mothers to low birth interval. About 20% of mothers who gave birth five years before the survey have a preceding birth interval below 24 months. The findings also reveal that birth intervals are relatively longer among the Yoruba when compared with other ethnic groups; about 53% of children were born 36 months after the preceding birth by Yoruba mothers.

The birth order of a child born five years preceding the NDHS 2003 as examined in this study reveals that about five in every ten children in Nigeria, irrespective of ethnic group, are third born and above. This perhaps explains the pronatalist feature of Nigerian mothers.

4.3 Patterns of Household Environmental Health Hazards among Nigerian Ethnic Groups

The patterns of household environmental health hazards among Nigerian ethnic groups were examined in this study. This was divided into three sections: description of household environment variables, perceived household environmental health hazards and pattern of household environmental hazards. Household environment variables include source of drinking water, types and use of toilet facilities, the flooring material of the household, type of cooking fuel, use of mosquito net for children under-five and presence of wash basin in the house.

Table 4.2: Demographic Profile of the Children among Nigerian Ethnic Groups

Characteristics	Hausa-Fulani	Igbo	Yoruba	SM	NM
Sex of child - Male	48.9% *1091*	52.9% *349*	51.5% *273*	50.6% *418*	52.3% *670*
Female	51.1% *1142*	47.1% *311*	48.5% *257*	49.4% *408*	47.7% *612*
Type of birth- Single birth	95.8% *2139*	96.7% *638*	95.1% *504*	96.1% *794*	95.6% *1226*
Multiple birth	4.2% *94*	3.3% *22*	4.9% *26*	3.9% *32*	4.4% *56*
Birth intervals- Below 24 mths	25.2% 457	24.9% 131	14.0% 55	20.4% 133	23.6% 246
24-35 months	40.2% 731	37.2% 196	32.4% 127	41.0% 267	37.6% 391
36 months and above	34.6% 629	38.0% 200	53.6% 210	38.6% 251	38.8% 404
Birth Order – First-born	18.6% *415*	20.0% *132*	25.8% *137*	21.2% *175*	18.7% *240*
Second-born	14.7% *329*	15.2% *100*	23.6% *125*	15.5% *128*	17.5% *224*
Third-born	13.5% *301*	14.8% *98*	17.7% *94*	14.8% *122*	15.2% *195*
Fourth-born and above	53.2% *1188*	50.0% *330*	32.8% *174*	48.5% *401*	48.6% *623*

Source: Raw data from NDHS 2003

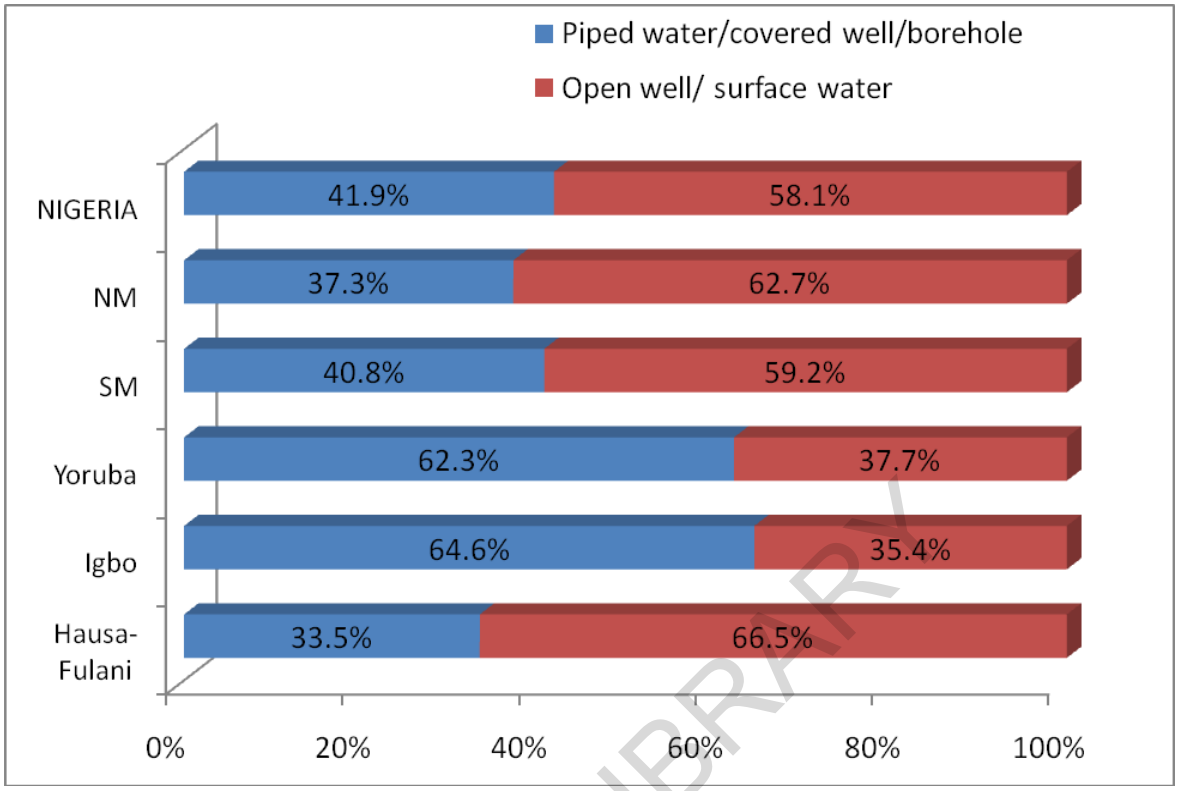
4.3.1: Pattern of household environment

The unique physiological characteristics of children place them at risk of death as a result of unhygienic household environment. Thus, various household variables were examined in this study among Nigerian ethnic groups. Figure 4.1 shows that there is difference in the source of drinking water among the ethnic groups. Overall, less than half of Nigerian mothers drink water from portable and improved source of drinking water (piped /covered well/borehole) while about six in every ten mothers have open well/surface water as their source of drinking water which could have adverse effects on both mother and child.

Sixty-two percent of Yoruba and 64% Igbo children live in household with improved source of drinking water such as piped water, covered well and borehole. This substantial proportion is more than the overall national figure of 41.9%. The source of drinking water among the Hausa-Fulani, SM and NMs reveal that 66.5%, 59.2% and 62.7% respectively have open well or surface water as source of drinking water. This group is at highest risk because surface water such as streams, lake or dams tends to be more contaminated due to variety of factors, including fetching and storage, which have adverse effects on child's health.

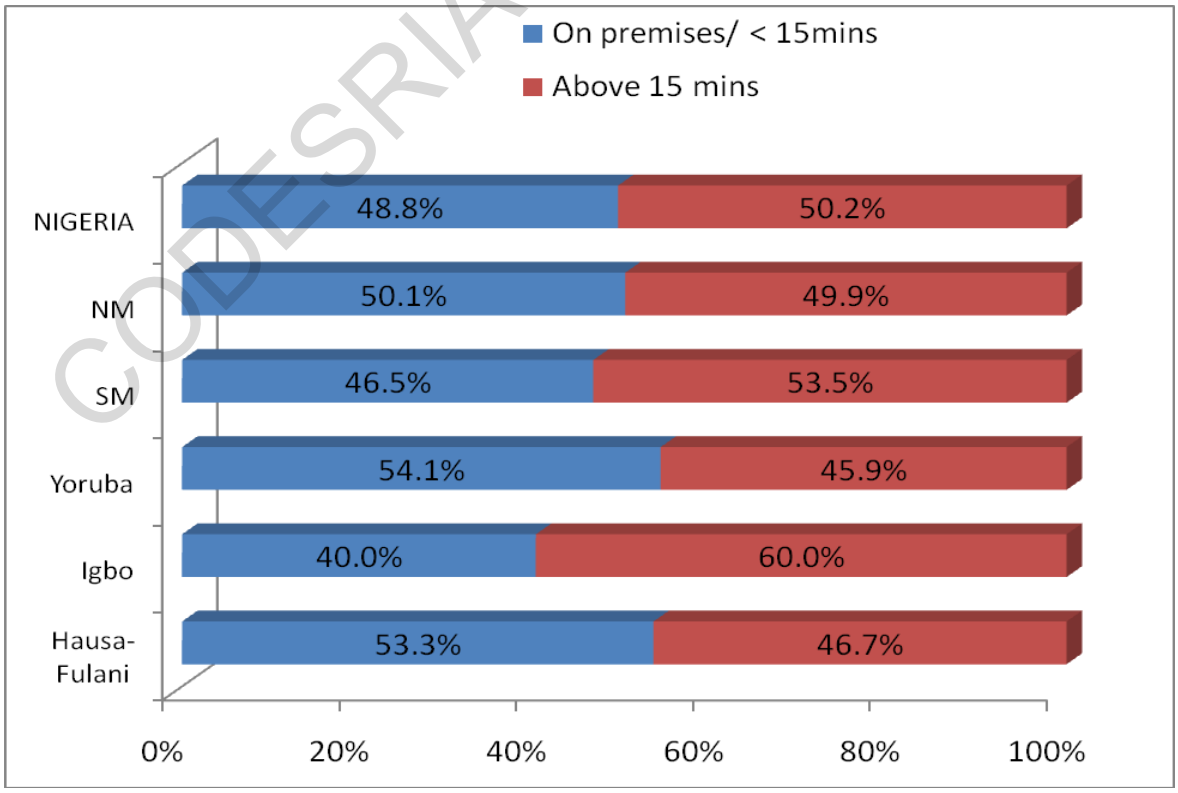
The time to get to source of drinking water was examined among Nigerian ethnic groups' mother who gave birth five years before the NDHS 2003 as shown in Figure 4.2. The findings reveal that in Nigeria, about half of the mothers surveyed have access to water on premise or within 15 minutes to the household.

Although the source of water may be improved and made hygienic, it could be difficult if it is not easily accessible. Mothers might find it burdensome to fetch water from places that are more than 15 minutes to the household. About half of the respondents in all the ethnic groups take about 15minutes or more to get to water source irrespective of the source of water. Although, about 64% of Igbo mothers have a better source of drinking water; just 40% of these mothers get their water on premises or less than 15 minutes.



Source: Raw data from NDHS 2003

Figure 4.1: Percentage distribution of sources of drinking water



Source: Raw data from NDHS 2003

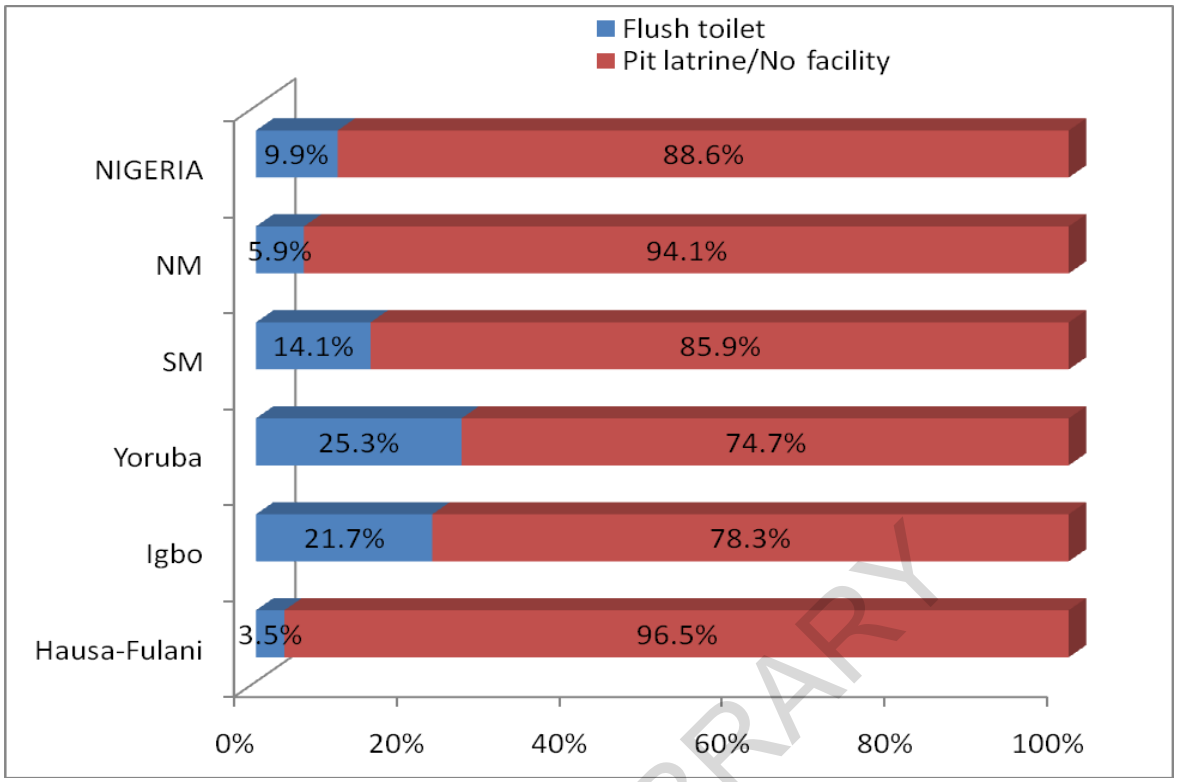
Figure 4.2: Percentage distribution of time to get to water source

This study further examined the availability of sanitary facilities within the household. The result in Figure 4.3 shows that nationwide, 88.6% use pit-latrine toilet or no facility among mothers who gave births five years preceding the NDHS 2003. The use of flush toilet is significantly low on the overall in Nigeria, with the Hausa-Fulani and NM group having less than 6% usage. Although, above 20% of Yoruba and Igbo mothers are using flush toilet, it is still relatively lower than expected when the highest educational level of mothers is considered.

As much as availability of sanitary facility can be a public health problem, the sharing of available toilet facility could also have several implications on the health of the children. The result as shown in Figure 4.4 reveals how toilet facility is shared on the average in Nigeria. About 58.8% of mothers in this analytical sample shared the toilet facility in Nigeria. The proportion of those who share toilet facility among Yoruba mothers is high when compared to other ethnic groups; above seventy percent of Yoruba mothers shared toilet facility with others.

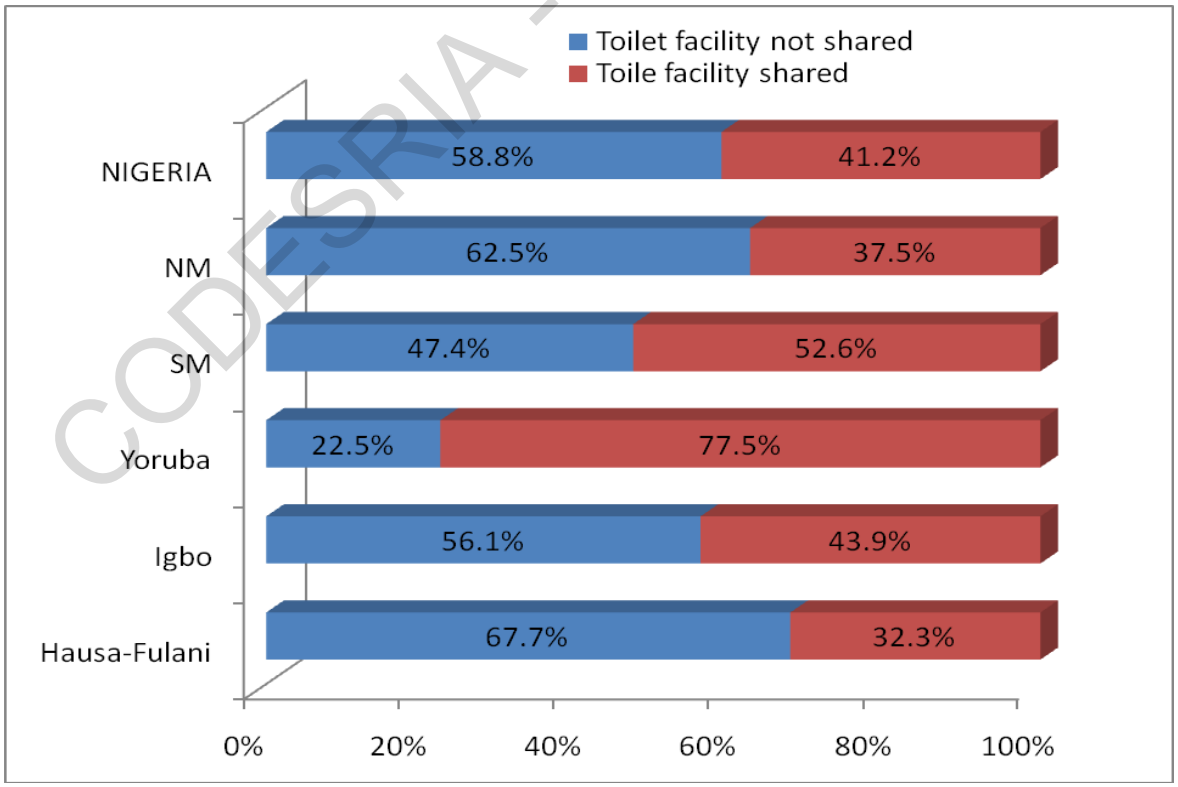
Questions were asked on the household main flooring materials in the NDHS 2003 questionnaire. NPC (2004) observed that the type of materials used for flooring is an indicator of the economic situation of households and therefore the potential exposure of every household member to disease-causing agents. In view of this, main flooring materials of household where mothers who gave births five years before the survey lives were examined in this study as in Figure 4.5.

The result shows that just about half of mothers live in household with finished flooring material such as cement, carpet or rug in Nigeria. While only about 15% and 28% of Yoruba and Igbo mothers respectively live in household with natural/rudimentary material, a substantial proportion of the Hausa-Fulani and NM ethnic group mothers use natural/rudimentary floors in their houses, peculiar to rural dwellers. This natural/rudimentary flooring material includes earth/sand or dung which could have adverse effect on the lives of children under-five, especially those who are still crawling. On the flooring materials, children born to mothers of southern Nigeria ethnic origin seem to have some advantage.



Source: Raw data from NDHS 2003

Figure 4.3: Percentage distribution of type of toilet facility in the household



Source: Raw data from NDHS 2003

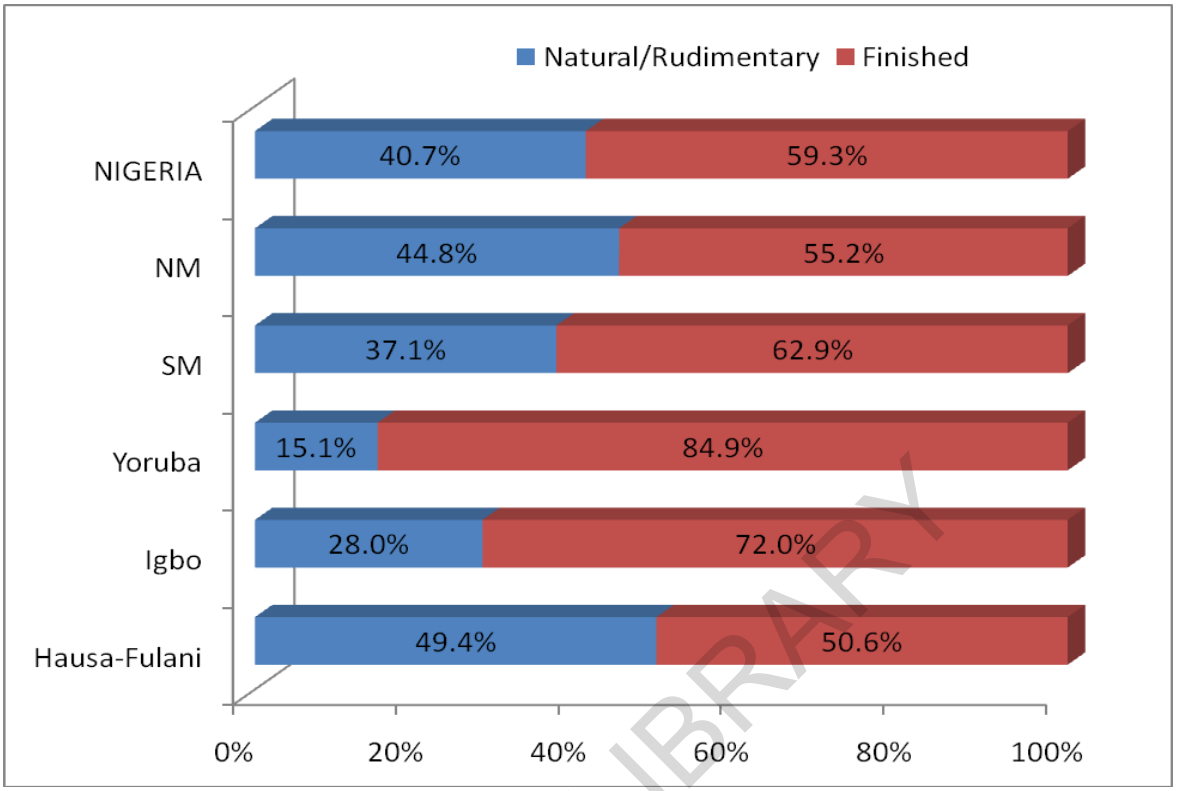
Figure 4.4: Percentage distribution of the toilet facility shared

The finding as shown in Figure 4.6 below reveals that overall, 81.7% of mothers use firewood, charcoal or straw which falls into the category of unprocessed biomass fuel. However, the type of cooking fuel used by Yoruba mothers is majorly electricity, LPG or kerosene. It is further observed that Yoruba, Igbo and SM have less than the national figure (81.7%) of mothers that use firewood, charcoal or straw. The other ethnic groups have a substantial proportion of mothers that use firewood, charcoal or straw. This raises a question on the type of indoor air pollution that children under-five are vulnerable to among Nigerian ethnic groups.

In the NDHS 2003, respondents were asked about the use of mosquito nets by household members in the previous night before the interview. This survey was carried out during the rainy season, a period of prevalence of malaria-carrying mosquitoes, when mosquito nets were most likely to be used. These malaria-carrying mosquitoes are responsible for the majority of malaria deaths in Nigeria, and the groups most vulnerable are children under five years of age and pregnant women (NPC, 2004). Figure 4.7 shows the ethnic differentials in the use of mosquito nets (treated and untreated) for children under-five years a night before the survey.

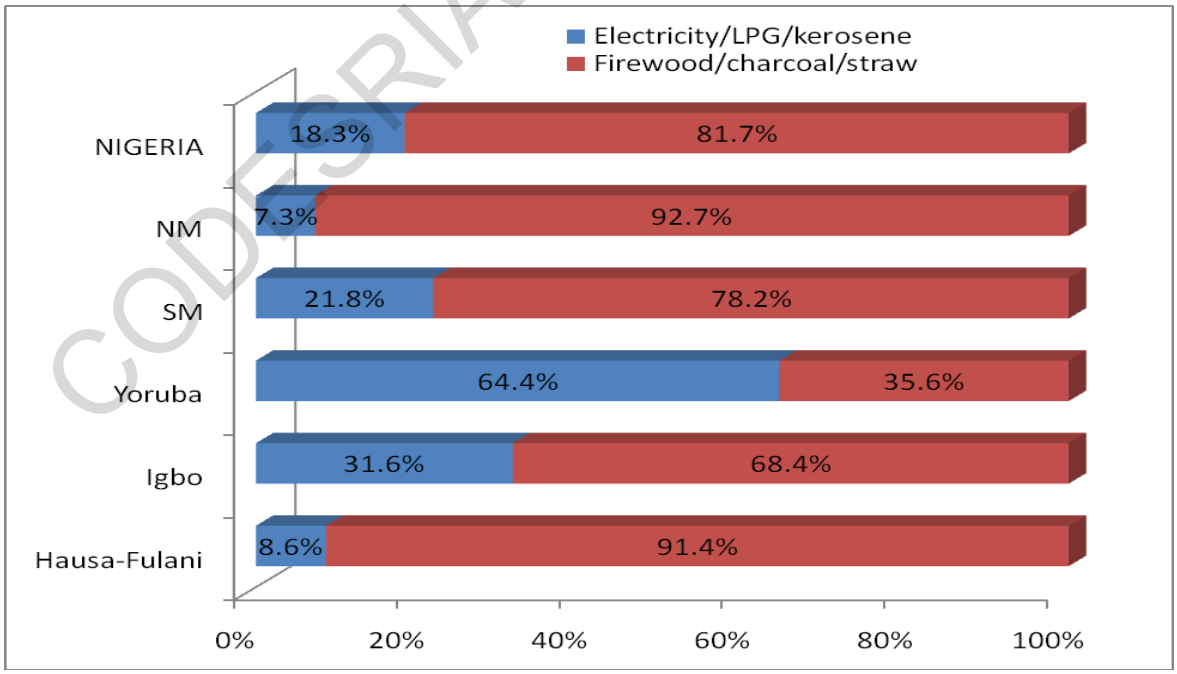
Despite the awareness on malaria prevention using mosquito net for children under-five, the findings show that usage was low among all the ethnic groups. Although there is overall low usage in the country, proportion of the SM and NMs ethnic groups' mothers using the mosquito nets for children is higher than other ethnic groups. The usage of mosquito for children under-five in the previous night before the survey is extremely low (0.4%) among the Yoruba mothers.

It is a common fact that having a place to wash hand is hygienic. It reduces contamination of food and drink; thus necessary for the health of everyone in the household. The proximity of the place for hand washing will encourage the practice. The result shown in Figure 4.8 reveals a similar pattern among all ethnic groups.



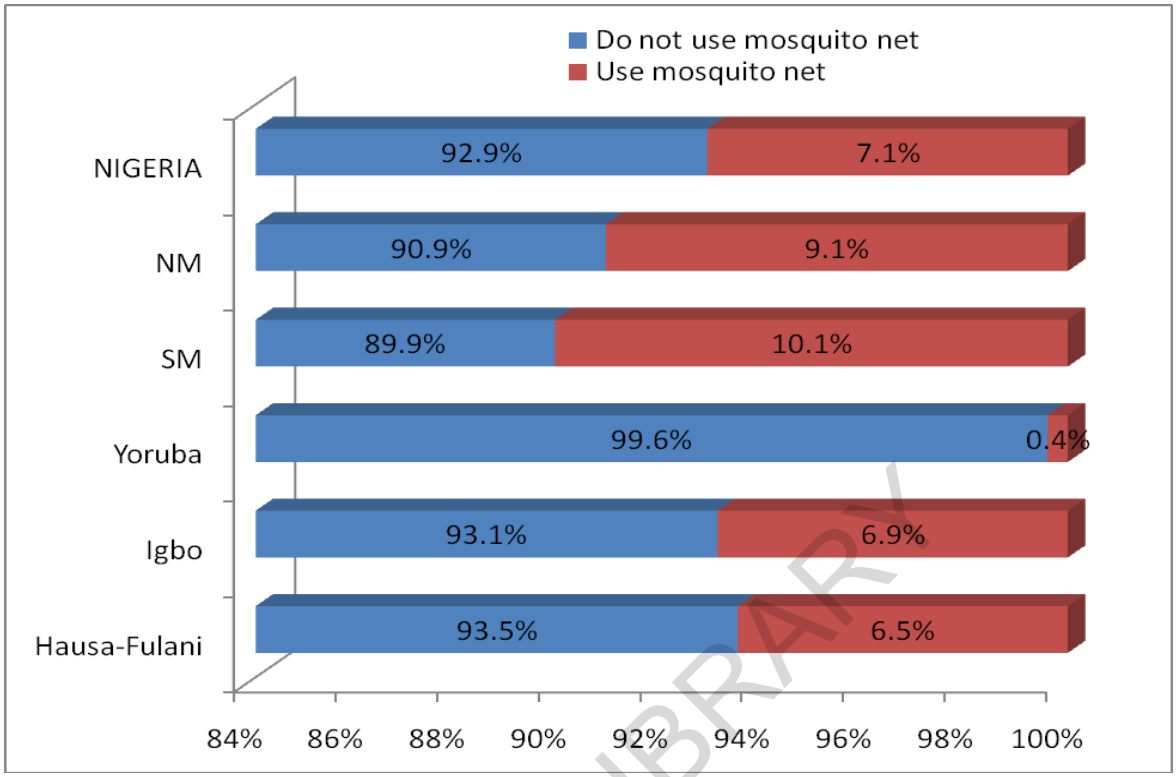
Source: Raw data from NDHS 2003

Figure 4.5: Percentage distribution of main flooring materials in the household



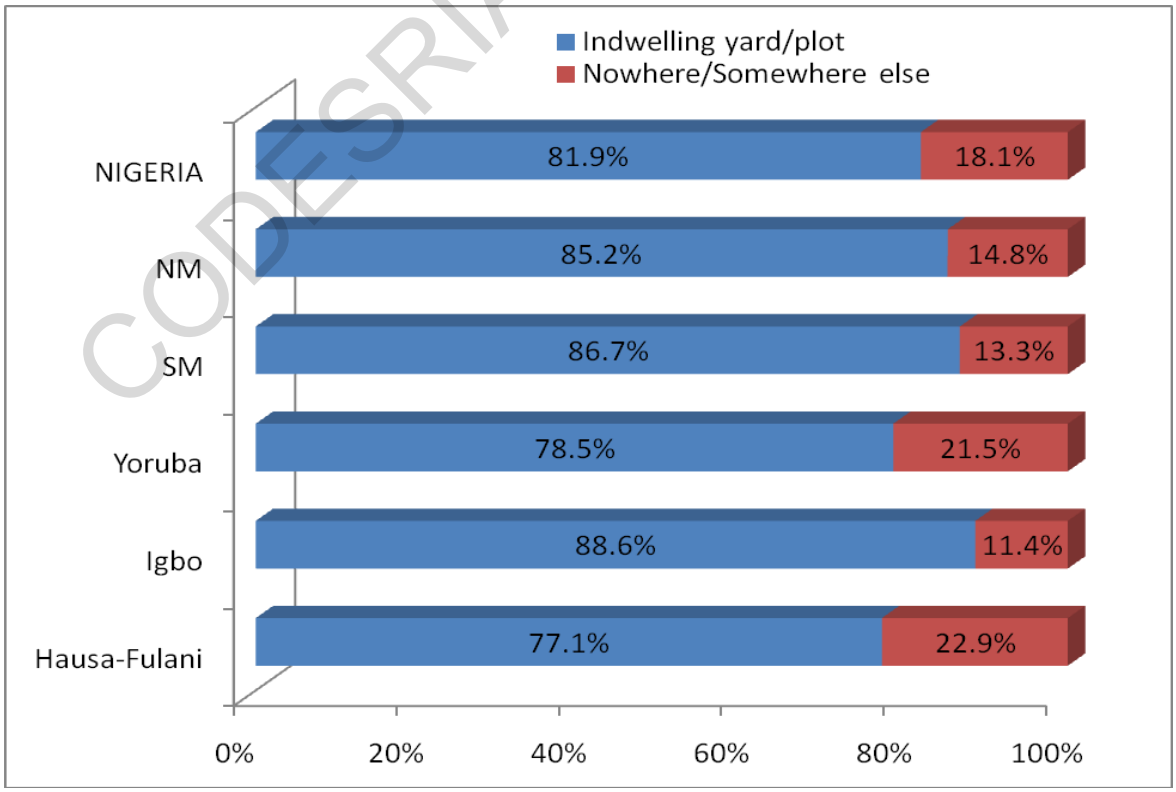
Source: Raw data from NDHS 2003

Figure 4.6: Percentage distribution of the type of cooking fuel used in the household



Source: Raw data from NDHS 2003

Figure 4.7: Percentage distribution of the use of mosquito net by children under-five



Source: Raw data from NDHS 2003

Figure 4.8: Percentage distribution of the place for washing hands

The finding from this analytical sample reveals that, majority of the mothers for all ethnic groups wash their hands before preparing meal within the dwelling yard/plot. Irrespective of the ethnic group, at least seven out of ten mothers among Nigerian ethnic groups have close proximity to the place for hand washing.

4.3.2: Perceived health hazards in the household

The perception of mothers among Nigerian ethnic groups on household environmental health hazards were examined through focus group discussion (FGDs) and in-depth interviews (IDIs). From the focus group discussion and in-depth interviews, mothers among different ethnic groups in Nigeria expressed their perception on various household environmental health hazards as shown in Table 4.3. The responses given by mothers in rural and urban areas reveal that most mothers among Nigerian ethnic groups have basic knowledge of the health hazards within the household. The health hazards within the household perceived by mothers vary from drinking contaminated water or kerosene, children defecating around the household with no one to clean them up to contaminating the water pots thereafter and eating without washing their hands. All the mothers/ caregivers interviewed further stated that sharp instrument, water related problems, unclean toilet facility and overcrowding are potential household health hazards. Other ethnic groups mentioned electric shock, poverty, drinking of harmful liquid, inhaling mosquito coil, accidents in the household, stagnant water in the drainage, insect bite from the floor, smoke from firewood and cold from floor as health hazards within the household. Majority of women in all the ethnic groups related household health hazards to mothers' carelessness; it was agreed that all the health hazards mentioned in Table 4.3 can affect childhood morbidity and mortality when parents/caregivers are not around to take good care of their children.

All the ethnic groups apart from Hausa-Fulani mentioned that children are likely to eat sand during play but the consensus among all the non-educated women for all ethnic groups is that as long as a child is breastfeeding, the breast milk will soften the sand/stone and a child will excrete it. However, majority of the educated women in FGDs and IDIs said that eating of sand by children is harmful to their health. This buttressed the fact that high level of maternal education is associated with better understanding and appreciation for hygiene and child's health related matters irrespective of cultural perception.

Table 4.3: Perceived Health Hazards in the Household among Nigerian ethnic groups

Perceived Health Hazards in the household	Hausa-Fulani	Igbo	Yoruba	Ijaws-SM	Tiv – NM
Sharp instruments such as broken bottles, razor, nails	M	M	M	M	M
Drugs, insecticides, chemicals, kerosene, petrol	M	M			
Overcrowding/too many people in the house	M	M	M	M	M
Inhaling mosquito coil/ insecticides		M		M	
Stagnant water in the drainage system		M		M	
Dirty and unclean toilet facilities, improper disposal of child faeces	M	M	M	M	M
Accidents in the household eg. Burns from frying oil/stove or hot water, fall from the stairs or tree or slippery bathroom, door bang on hand, drown in water bowl	M	M	M	M	M
Electric Shock		Mr			
Poverty		M			
Tendency to put sand in the mouth and		M	M	M	M
Not washing hand before eating		M	M	M	M
Drinking soap/detergents			M		
Smoke from Firewood			M	M	M
Insect bite on the floor;			M		M
Cold from the floor			M	M	M

Source: Fieldwork 2006 M- Mentioned, Mr- Mentioned in rural area only

Further classification of the mentioned perceived health hazards within the household as it relate to water, toilet facilities, flooring, cooking fuel, overcrowding, air pollution and accidents within the household among Nigerian ethnic groups is shown in Box 4.1 to 4.5. Irrespective of the residence of the respondents, majority of them identified one health hazard or the other as they relate to child's health.

The Hausa-Fulani mothers perceived that broken chair, hot pressing iron, knife carelessly placed among others can cause accidents for children under-five years in the household. Also, there was a consensus that children can have catarrh and cough by playing with water stored for household use. The qualitative findings among the Hausa-Fulani educated mothers reveal their perception on household room density; overcrowding is associated with spread of communicable disease such as measles and can adversely affect the survival of children under-five years. Improper disposal of child's faeces and improper care of sanitary facility were also mentioned as household health hazards that can lead to childhood morbidity or mortality by Hausa-Fulani educated mothers living in an urban area. The non-educated groups in rural area are also aware of some household health hazards as reflected in their responses, though not as clearly stated as in urban groups.

The result as shown in Box 4.2 on Igbo mothers' perception on household environmental health hazard that can predispose children under five to morbidity and mortality slightly differ from the Hausa-Fulani groups. Some well known household health hazards such as inhaling of mosquito coil that could affect children's health, stagnant water that can breed mosquitoes which causes malaria and accidents that made children to sustain injury were mentioned by Igbo mothers. Carelessness on the part of the mothers could also be inferred as a major concern among Igbo mothers from this qualitative analysis; placing sharp instruments, drugs, insecticides, kerosene or petrol carelessly in the household was recognized as potential household health hazards among Igbo mothers. An instance was cited when one of the discussant's daughters took eight different antibiotic meant for her father without the parents' knowledge.

Box 4.1: Perceived Health Hazards in the household among the Hausa-Fulani

Sharp instruments such as broken bottles, razor, nails	*"And even knife and other sharp instrument can be harmful if carelessly placed on the floor" (FGD rural non-educated)*
	"Like broken chair, hot pressing iron, keeping medicine within children's reach, washing soap and even our drainages which attract a lot of mosquitoes that in-turn harm children and adult (FGD urban educated)"
Drugs, insecticides, chemicals, kerosene, petrol	*"Yes, if the child is at crawling age, he may eat or touch something that can harm him/her or sometimes a child can drink medicine when it is placed within his/her reach or may even drink kerosene if kept carelessly or mistakenly" (FGD rural uneducated)*
Water related hazards	*"I fell down due to slippery of the tiles with 9 months pregnancy and which almost damage the child. I almost lost my life and that of the baby."* (*FGD urban educated)*
	"Through playing with water, they may have fever, catarrh, cough etc "(IDI rural uneducated)
Overcrowding	*"Like when one of the children is suffering from one communicable disease like measles, it can be transferred to other children. Another communicable disease common to children they said is cough and to some extent diarrhea" (FGD urban educated)*
Dirty and unclean toilet facilities, improper disposal of child faeces	*"The toilet and kitchen should be kept closed after use. Other dangerous things should also be removed out of the children's reach."(FGD urban educated)*
	Yes, it affects their children, for example after child finishes toileting, if the mother leaves the waste, and the child may eat (FGD urban educated)

Source: Fieldwork 2006

Box 4.2: Perceived Health Hazards in the Household among the Igbo

Sharp instruments such as broken bottles, razor, nails	*"In the household, some children sustain injury from broken bottles, knives, and the sticks they use in playing". (Igbo 1DI non-educated rural)*
	"Household health hazards include broken bottles, nails, razor blades and kitchen knives that are not well kept and at children's reach." (Igbo Urban educated FGD)
Drugs, insecticides, chemicals, kerosene, petrol	*"An example has to do with my little daughter who took 8 different anti-biotic. She picked drugs that were given for her father in the hospital and drank them without our knowledge. What saved her was that the drugs were adulterated type; they were not as powerful as expected." (Urban educated FGD)*
Accidents in the household eg. Burns from frying oil/stove or hot water, fall from the stairs or tree or slippery bathroom, door bang on hand, drown in water bowl	*"I have seen a situation where a child got drawn in water kept in a big basin. Only God knows what she wanted to see or pick from the water. These things constitute health hazards in household." (Igbo Urban FGD non-educated)*
	"I have seen where the mother of a child was around, the child climbed up and falls from two-story building broke legs and hands. So it is God that can really save and protect our children." (Igbo FGD urban educated)
Overcrowding/too many people in the house	*"Another form of health hazard is a densely populated house either as a result of too many people or furniture, which leads to poor ventilation. This can cause convulsion for children and contagious diseases can easily spread. Under-five children stand high risk of being infected in such households." (Igbo Urban FGD educated)*
Inhaling mosquito coil/ insecticides	*"Most parents use mosquito coils, and insecticides to avoid mosquito bite. This for under five children, I think is very bad. Children inhale this chemicals and it leads to health problems, which only doctors can explain their effect on children's health." (Igbo Urban FGD educated)*
Stagnant water in the drainage system	*"Pouring dirty water and waste very close to the house and leaving refuse for so long before disposing are examples of health hazards. For instance broken bottles, nails, stagnant water in drainage system can be regarded as health hazards."(Igbo FGD rural non-educated)*
Dirty and unclean toilet facilities, improper disposal of child faeces	*"Toilet facilities in most houses are flush system. The problem with it is when there is insufficient water, some adults can mess the toilets, which may serve as source of infection for the entire household" (Igbo Urban educated FGD)*
Electric shock	*"Yes, even electricity at home constitute health hazard. You know electricity is just less than a year in this village and careless mothers and fathers can expose their children to such hazards and its deadly effects. One woman lost a six years child less than two months now as a result of electric shock." (Igbo FGD rural non-educated)*

Source: Fieldwork 2006

Poverty and electric shock are additional factors mentioned by Igbo mothers on household environmental health hazards Some of the Igbo mothers in the FGD stated that poverty is a reflection of socio-economic status as in the words of one FGD discussant:

> *"The main thing that causes health hazard in household environment is poverty. To a large extent, poverty makes you to live in dirty environment, share toilets with twenty to twenty five people, be more than 8 in two rooms or sleep without mosquito net or use insecticides. The issues of cooking fuel, water, and toilet facility are a function of money. If you are poor, you cannot afford to live in a flat. So you have to share bathroom, toilet and kitchen. In such situation the cleanness of the environment depend on the kind of people you live with. You can take charge of your environment. Imagine where people will go to toilet without flushing it because they failed to fetch water. The whole compound, including your room will be polluted because of the foul odour from the toilet. This can affect people's health especially that of children" (FGD urban educated)*

Although some mothers agreed with this assertion, others were of the opinion that poverty does not necessarily encourage uncleanness, stating that poverty should not be the excuse for an unhygienic environment. Electric shock as a potential household health hazard was only mentioned in a rural area where rural electrification was newly installed.

Yoruba mothers' perceptions on household health hazards did not significantly deviate from the Igbo as shown in Box 4.3. Accidents in the household, burns from hot water, overcrowding, improper disposal of child's faeces, smoke from firewood, drinking dangerous liquid were likewise mentioned as in Igbo's perception**.** Health hazards from flooring materials were mentioned. It was perceived that there could be insect bite from the floor and a child could have cold or catarrh from cemented flooring while lying on the bare floor. Carelessness or negligence on the part of mothers in handling and exposing children to health hazards in the household were also emphasized in the FGDs and IDIs conducted among the Yoruba mothers as in other groups. There was a consensus in the responses in both rural and urban areas that children, especially under-five, are assumed to be ignorant of dangers in the household.

From the findings among the Ijaw group, mothers' responses show that children are vulnerable to health hazards in the household as shown in Box 4.4. Health hazards mentioned include injury from sharp objects, falling down from slippery carpet, overcrowding and inhaling smoke from mosquito coils or firewood dirty environment, and improper disposal of child's faeces were also mentioned

Box 4.3: Perceived Health Hazards in the Household among the Yoruba

Sharp instruments such as broken bottles, razor, nails	*"Children can sustain injury from the house environment if sharp instruments are carelessly placed on the floor."(IDI Urban educated)*
Accidents in the household eg. Burns from frying oil/stove or hot water, fall from the stairs or tree or slippery bathroom, door bang on hand, drown in water bowl	*"Like when one puts water down the child draws it, or at times, you can fetch water in a big bowl to use for washing, your children don't know anything they can enter it at times, if you don't get there in time." (IDI Urban not educated)*
	"One should not be careless with the child, maybe I am cooking and a visitor comes in, I carry my child along and attend to the visitor. So I cannot be careless to the extent that my child will pour hot things on his/her body." (FGD rural not educated)
Overcrowding / too many people in the house	*"At 6months old, a child is not to sleep in a crowded room, this could cause health problem for the child."(IDI Urban educated)*
Dirty and unclean toilet facilities, improper disposal of child faeces	*"If the house is not clean and one is taking care of a child, the child can be stooling"(FGD Urban educated)*
	"I feel it is just negligence that can cause a child to eat feaces. A child that you cannot leave for five minutes; when the child defecates before it gets to the level of the child eating his/her feaces, if you are fond of the child, you will come to his/her rescue."(IDI Urban noneducated)
Smoke from Firewood	*"It can cause catarrh for a child, and the smoke can also affect the eyes of the child, like if one is using firewood and you have the child strapped to the mother's back, the smoke can make the child have catarrh and also the child's eyes will turn red and brings out water"(FGD rural not educated)*
Insect bite from the floor;	*"Yes, insect bite is one example of health hazards associated with flooring material" (FGD Urban educated)*
Cold from the floor	*"You know normally cemented floors are cold and from there cold might enter into child that lies on the cemented floor."(IDI Urban educated)*

Source: Fieldwork 2006

Box 4.4: Perceived Health Hazards in the Household among the Ijaws

Sharp instruments such as broken bottles, razor, nails	*"As usual now, we educate them. Don't play with sharp objects, don't play with fire, fire do burn and don't go near smoke and you sweep the dirty things around especially because of the creeping ones. Your eyes should always be on the child, always on the child. You cannot go and mind your neighbors' environment but you have to keep yours clean" (IDI urban educated)*
Accidents in the household eg., fall from the stairs or tree or slippery bathroom, door bang on hand,	*"It can affect the child, for the carpet it is slippery and children like running and might fall down. But the rug is better, it prevents cold but the carpet can be very cold" (IDI Urban educated)*
Overcrowding/too many people in the house	*"Children when they are small, and they sleep in a house where the people are many, they fall sick. You have to pray to God that he should protect them and prevent them from falling ill." (IDI rural not educated)*
Inhaling mosquito coil/ insecticides	*"Mosquito coils causes catarrh for children" (IDI rural educated)*
Dirty environment and stagnant water in the drainage system	*"Dirty environment, untidiness. Maybe they litter the place with dirt, stagnant water that toddlers might crawl into. Some expose their food and give it to their children, this causes dysentery and diarrhea."(FGD urban non-educated)*
Dirty and unclean toilet facilities, improper disposal of child faeces	*"The flies perch on the waste bin and heaps and then later perch on open or exposed food. This causes sickness for the child. Sometimes, when children defecate, their excreta is not removed on time and flies would perch on it and in turn perch on their food."(FGD rural not educated)*
Not washing hand before eating	*"Hazards like sicknesses now, as they tamper with dirt it causes sickness. Sometimes they do get affected and it causes cough, they will not wash their hands and as they rush home, they will like to touch one or two things. Maybe as children they will contact cough, even malaria." (IDI urban educated)*
Smoke from firewood	*"I cook outside and the smoke goes up but I still don't allow my children especially when they were young to come near the cooking fire when cooking. Because when they do, they cough." (FGD rural not educated)*
Infections from the floor	*"If the floor is broken, it can cause leg infection, rashes and heat. When children sleep on cold floor, it can cause pneumonia, which the children will not know. If there is no proper care, they will die." (FGD urban educated)*

Source: Fieldwork 2006

Box 4.5: Perceived Health Hazards in the Household among the Tiv

Sharp instruments such as broken bottles, razor, nails	*"The farm around and the other bush harbors snakes and broken bottles, also sticks which could cause health problem for the children" (IDI rural educated)*
Overcrowding/too many people in the house	*"The number of children sleeping in a room could cause ventilation problem and further cause an outbreak of a disease. Mother must be very vigilant. A child especially a sick child should never be allowed to sleep in an overcrowded room."(FGD urban educated)*
Dirty and unclean toilet facilities, improper disposal of child faeces	*"The toilet door is to be kept shut, and toilet properly kept so that flies don't visit the toilet and seat on the food served to children. This situation could cause diarrhea hence should be avoided."(IDI rural educated)*
Accidents in the household eg. Fall from the stairs or tree or slippery bathroom, door bang on hand, drown in water bowl or well	*"Mothers must be very careful since children could be very fast, also help them realize that some things like fire and wells could be dangerous, so that with time they too avoid such things or are careful when dealing with them." (IDI Urban educated)* *"If they are allowed into the farm especially during very hot afternoons, they are at risks of snake bites, if the well is not covered, children could fall into it."(IDI Urban not educated)*
Smoke and burns from firewood	*"Though we cook with firewood, we don't allow children to play near fire, they could get burned."(FGD rural educated)*
Insect bites on the floor;	*"If they are allowed into the farm especially during very hot afternoons, they are at risks of snake bites" (FGD urban educated)* *"If they wander into the bushes they could get injured or bitten by snake or other insects"(FGD rural not educated)*

Source: Fieldwork 2006

A slight deviation from other ethnic groups was the flooring material related health hazards mentioned in urban FGDs. The discussant perceived that if the floor is broken, it can cause leg infection, rashes and heat. These findings reveal that Tiv mothers either in rural or urban area perceived some household health hazards similar to other ethnic groups in this study. The Tiv mothers believed that broken bottle in/around the house can cause injury for children especially those crawling and snake bite in the farm, there could also be disease outbreak due to overcrowding and accidents can occur to children under five in the household if the mother should be careless with open well or fire used for cooking. The problem of unclean sanitary facility, as observed in other ethnic groups, was also mentioned as potential risk to children under age five in the household environment.

4.3.3: Pattern of Household Environment Health Hazard among Nigerian Ethnic Groups

Classification and pattern of household environment into potential health hazards and non-potential health hazards derived from the responses on household environmental variables is shown in Table 4.4 and Figure 4.9.

The household environmental health hazards variable was scored as defined below:

(i) Source of drinking water:
Piped water and covered well/borehole (scored 1)
Open well water and surface water (scored 0)

(ii) Time to get to water source
On premise and less than 15 minutes (scored 1)
More than 15 minutes (scored 0)

(iii) Type of toilet facility
Flush toilet; Not shared toilet facility (scored 1)
Pit toilet latrine or no facility; Shared toilet facility (scored 0)

(iv) *Main flooring material*
Finished flooring (scored 1)
Natural and rudimentary flooring (scored 0)

(v) Type of cooking fuel
Electricity, gas or kerosene (scored 1)
Firewood, charcoal or straw (scored 0)

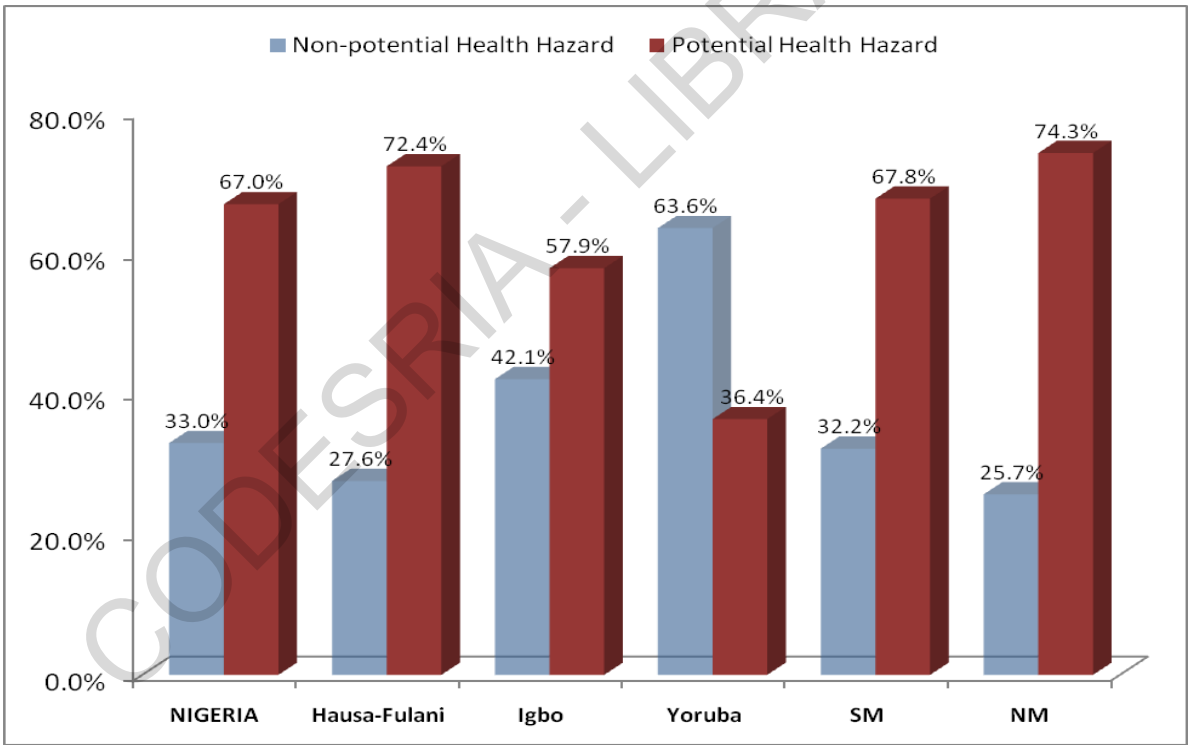
(vi) Use of mosquito net by children under five
Yes (scored 1)
No (scored 0)

(vii) Place for hand washing in the household:
Yes (scored 1)
No (scored 0)

The sum of the scores was further categorised into: non-potential health hazard (scored= 7) and Potential health hazard (scored = 0-6).

Table 4.4: Classification of Health Hazards within the Household

POTENTIAL HEALTH HAZARDS	NON-POTENTIAL HEALTH HAZARDS
Sources of drinking water: Open well water and surface water	***Sources of drinking water:*** Piped water and covered well/borehole
Time to get to water source: Above 15 minutes	***Time to get to water source:*** On premise and below 15 minutes
Type of toilet facility: Pit toilet latrine or no facility; Shared toilet facility	***Type of toilet facility:*** Flush toilet; Not shared toilet facility
Main flooring material: Natural or rudimentary flooring	***Main flooring material:*** Finished flooring
Type of cooking fuel: Firewood, charcoal or straw	***Type of cooking fuel:*** Electricity, gas or kerosene
Use of mosquito net by children under five: No	***Use of mosquito net by children under five:*** Yes
Place for hand washing in the household: No	***Place for hand washing in the household:*** Yes



Source: Raw data from NDHS 2003

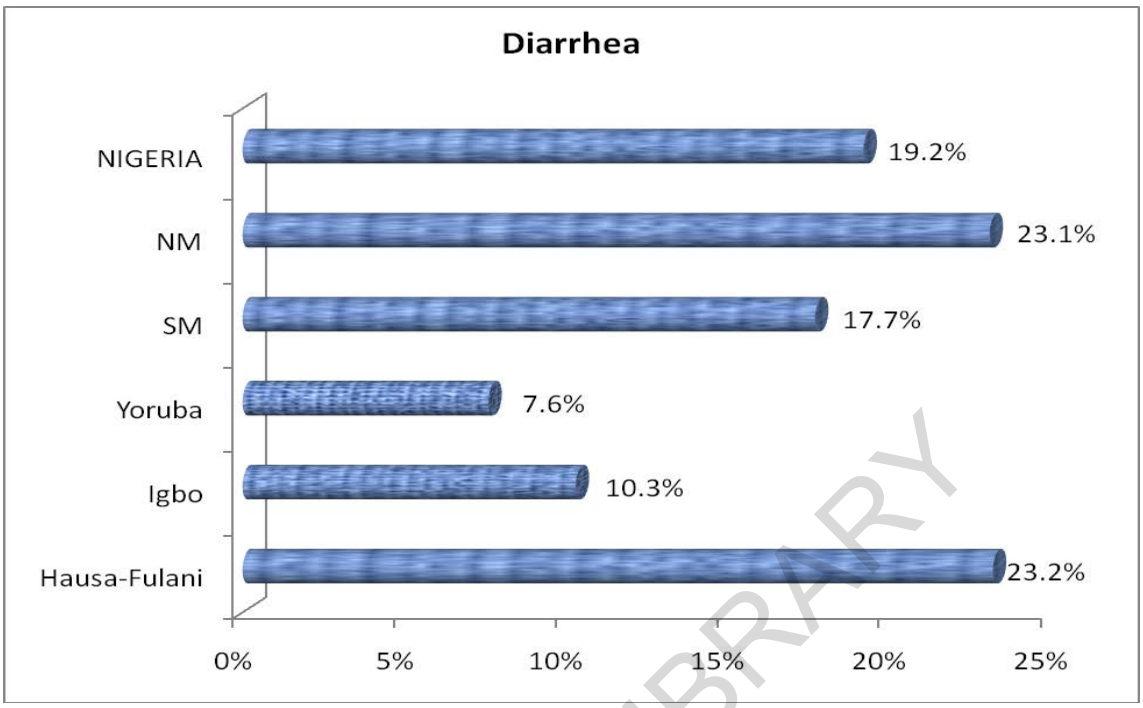
Figure 4.9: Percentage distribution of pattern of household environmental health hazards

Overall, the result from the study of mothers and children who gave birth five years preceding the survey shows that about 30 out of 100 children live in a household environment classified as non-potential health hazard. It is noteworthy that the proportion of children under-five nationally that live in an environment classified as potential health hazards is alarming (67%) and raises a serious concern to public health in Nigeria. There is however ethnic differentials of household environmental health hazards in Nigeria, especially the north-south regional dichotomy. About 64% and 42% Yoruba and Igbo children respectively live in a secure environment classified as non-potential health hazards environment.

Ethnic groups in the northern part of Nigeria have the largest proportion of mothers who drink open well/surface water and use pit latrine toilet/no facility. These mothers also have natural/rudimentary flooring, use firewood/charcoal for cooking, have nowhere to wash their hands and do not wash hands before preparing meals when compared to other ethnic groups. Although, other ethnic groups live in potential health hazard environments, the Hausa-Fulani and NM seem to be most disadvantaged in this regard.

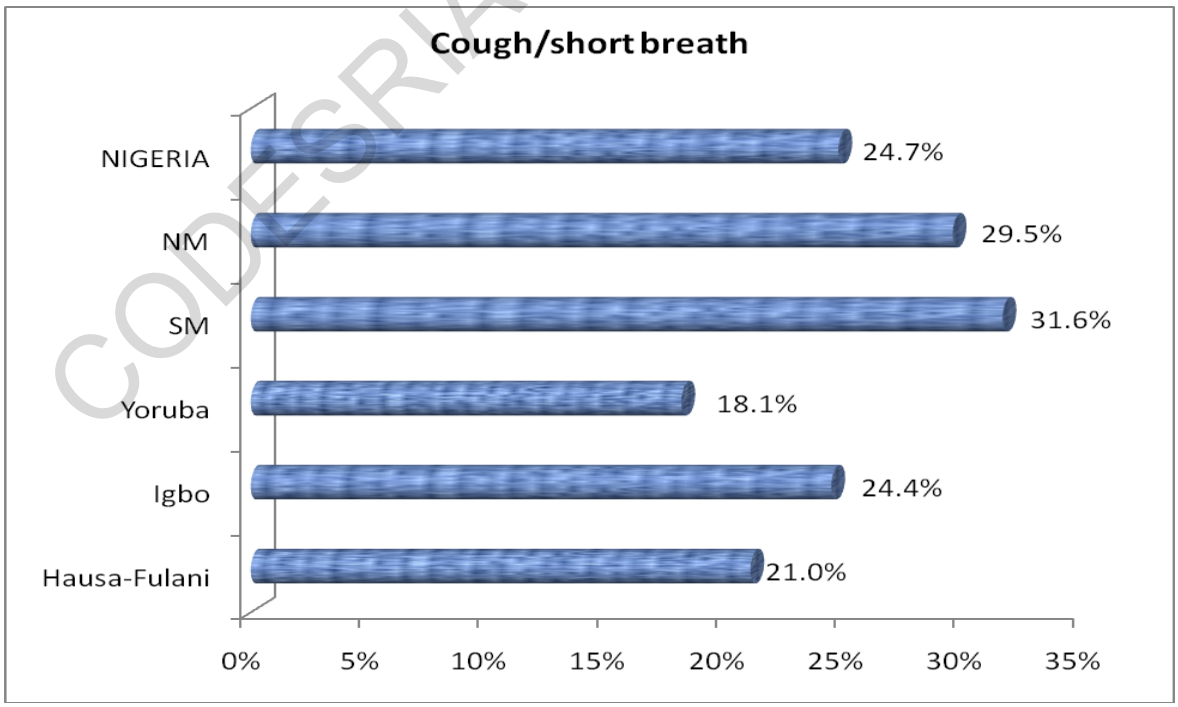
4.4 Childhood morbidity among Nigerian Ethnic Groups

The pattern of childhood morbidity which could lead to childhood mortality was examined among the ethnic groups. Three major childhood morbidity that were experienced in the two weeks preceding the survey were examined: diarrhea, fever and cough/short breathe. Dehydration from diarrhea has been identified as major cause of death among young children in Nigeria. Responses as shown in Figure 4.10 on diarrhea incidence in the last two weeks preceding the survey revealed that children born to Yoruba women have the least episode of diarrhea. The incidence is higher among the Hausa-Fulani, Northern and Southern minorities' ethnic group. Contributing to this incidence is the source of drinking water for these two ethnic groups as literature has shown that the type of drinking water is a major determinant to diarrhea. This study shows that the ethnic groups with best source of drinking water have the least incidence of childhood diarrhea. Acute respiratory infection characterised by coughing or short rapid breath has been found to be one of the major causes of childhood mortality in developing countries. Figure 4.11 shows the incidence of cough or short rapid breathe among children under-five among Nigerian ethnic groups.



Source: Raw data from NDHS 2003

Figure4.10: Incidence of childhood diarrhea in the two weeks preceding survey



Source: Raw data from NDHS 2003

Figure 4.11: Incidence of ARI among under-five year children two weeks preceding the survey

Incidence of cough or short rapid breathes within two weeks preceding the survey is highest among SM group and lowest among the Yoruba. Although, acute respiratory infection is expected to be significant among the ethnic groups where biomass fuel (firewood, charcoal, straw) is used for cooking, it is surprising that the incidence is high among all ethnic groups irrespective of their type of cooking fuel.

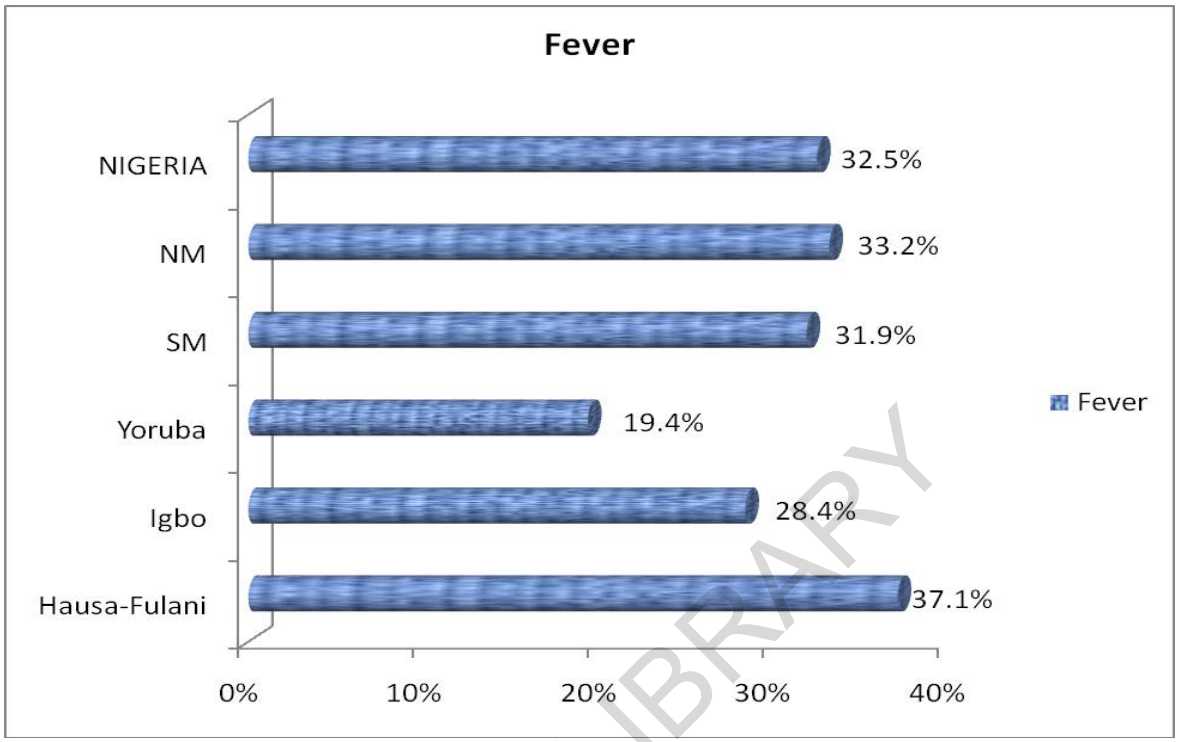
Fever is assumed to be common childhood morbidity in developing countries, especially Sub-Saharan Africa (SSA); the findings as shown in Figure 4.12 did not deviate from this assumption. It is quite alarming that within two weeks preceding the survey, about 37 out of 100 children under-five among Hausa-Fulani, about 33 out of 100 among the Northern minorities, 32 out of 100 among the Southern minorities children under-five reported incidence of fever.

4.5 Ethnic Groups Perception of Childhood Morbidity and Mortality in Nigeria

The value placed on child is a cultural phenomenon which varies from one society to another, that is, from one ethnic group to another. The findings from the qualitative study show that all the mothers linked childhood morbidity to mortality. It is generally believed that with the exception of some children, the general cause of death is from illness.

Although, tradition demands that both mother and child should be catered for during pre-natal and post-natal period, it is believed that illness is inevitable among children, especially those less than five years of age. Table 4.5 is a summary of findings in the FGDs and IDIs among the selected ethnic groups on some childhood morbidity. Further, breakdown of perceived causes of childhood morbidity and mortality according to ethnic membership of mothers are shown in Boxes 4.6 to 4.10.

There are different perceptions on causes of childhood morbidity among Nigerian ethnic groups. Contaminated/dirty water and teething are generally perceived in all the ethnic groups as causes of diarrhea for children under-five.



Source: Raw data from NDHS 2003

Figure 4.12: Incidence of fever among under-five two weeks preceding the survey

Table 4.5: Perceived causes of childhood morbidity among Nigerian ethnic groups

Childhood morbidity	Hausa-Fulani	Igbo	Yoruba	Ijaw- SM	Tiv – NM
Diarrhea	Teething, untreated water, unripe fruit or change of water. Yam moi-moi, okro soup, keeping sponge near well	Improper care of the feeding bottle, open food, not washing hands before eating, picking dirty things on the floor	Untreated/contaminated water, junk, sugary food, improper care of the feeding bottle, eating of contaminated food	Contaminated water; contaminated food	untreated water or uncooked food; teething; Mango; Untidy toilet facility
Measles	Hot season, from God, evil jinns (spirit), overcrowding	Heat	Too much heat, dry season	Viral infection, Overcrowding, heat	Measles is seen as normal
Cough /catarrh/ ARI	Exposure to cold, playing with water	Exposure to smoke from firewood or lemon grass. Taboo on wearing cloth during "Ozu" festival can expose children to cold	Smoke from firewood, exposure to bare floor, improper care during rainy season	Exposure to cold; sleeping on bare floor; smoke from firewood	Exposure to cold
Fever	Mosquito especially during rainy season	Convulsion resulting from malaria is seen as attack from evil spirit	Mosquito bite, improper care of feeding bottle	Dirty water; mosquito bite, child playing in the sun	Contaminated water, mosquito bite

Source: Fieldwork 2006

It was only the Igbo and Yoruba mothers that mentioned improper care of the feeding bottle as cause of childhood diarrhea. Measles is seen as normal for Tiv children, therefore no precise cause was mentioned while the remaining ethnic group attributed incidence of measles to heat. Exposure to cold, smoke from firewood and bare floor were mentioned as causes of cough and catarrh among the children under-five in Nigeria. Even though the pattern of perceived causes of childhood morbidity varied slightly, a higher proportion of mothers, irrespective of residence, mentioned modern treatment/curative measures in all the ethnic groups for this study. For instance, majority of the respondents in all the ethnic groups mentioned the use of oral rehydration therapy for home treatment of diarrhea (though called different names). The Igbo mother further mentioned Saint leaf/ *Ugulu* as a cure for diarrhea. However, diarrhea will not to be taken to hospital except in extreme cases of dehydration among the mothers in rural area. While there were no specified treatment mentioned for measles apart from traditional healer, health centres or hospitals for Hausa-Fulani, Tiv, Igbo and Yoruba, Ijaw mothers apply onions, cold water and squeezed sugar water. The Ijaw mothers also used long black bitter spice as cure for cold and catarrh which they claimed is effective.

In all the ethnic groups studied on childhood morbidity and mortality, some children are believed, will die irrespective of treatment given when they are sick. This happens if the parents' refuse to acknowledge a particular taboo or beliefs that the community value and adhere to concerning children. Among the Hausa-Fulani, common causes of childhood mortality reported or experienced include jaundice, vomiting, abdominal discomfort and diarrhea. This implies that mortality usually stems from congenital and hygiene factors.

One of the discussants experienced childhood mortality as a result of pneumonia among the Igbo. Childhood mortality was also attributed to *Ogbanje* a spirit believed to cause serious morbidity condition such as convulsion that leads to childhood mortality. The Yoruba like the Igbo believe that some children are possessed by *Abiku*, an evil spirit believed to be causing recurring deaths of a particular child. The breaking of a taboo by bringing a plantain bunch to the town from the farm is also perceived to cause childhood mortality among the Yoruba.

Box 4.6: Hausa's Mother's Perception on Childhood Morbidity and Mortality

Diarrhea	*"A child must not also be given pottage (of any kind either that of yam, beans, etc), to prevent him from diarrhea and there is also a belief that keeping birthing sponge near well causes diarrhea" (FGD urban uneducated)*
	"Once a child is on breast milk, he is free from all kinds of diseases. And when he is sick (diarrhea) between 0 – 6 months, it is always associated with teething which is considered normal and should not be taken to the hospital, as it is believed that even the hospital cannot cure it" (FGD rural educated)
	"I lost my one year old child because of diarrhea that is caused by teething and drinking tap water(IDI Urban uneducated)
	"Okro soup should not be given to children and the breast-feeding mother, as they are believed to be causing diarrhea"(FDG Urban educated)
Measles	*"Hot season and with no electricity, it is during this season that measles disturb children. (IDI urban educated)*
	"Is caused traditionally by evil Jinns and this is the most dangerous disease in Hausa land" (IDI urban educated)
	"Measles is caused by God"(IDI rural educated)
Cough/Catarrh	*"When a child is exposed to cold, either early morning cold or water" (IDI urban educated)*
	"When children play with water, it can cause cold and catarrh" (IDI rural educated)
Fever	*"Children suffer different kind of diseases during rainy seasons, especially fever that is caused by mosquitoes"(IDI urban uneducated)*
Childhood mortality	*Children Ever Born-7, Alive-3, Dead -4 (IDI rural educated)* *"All of them suffered from jaundice – 3 male, 1 female. The 1st & 3rd suffered for 2 days but were not taken to hospital, 2nd for 3 days and on reaching the hospital, and the 4th suffered for 25 days".*
	Children Ever Born-10, Alive-8, Dead -2 (IDI rural uneducated) *"1st was a female, 1 year and died as a result of cough. 2nd was male, 7 years – Stomachache". (IDI rural non-educated)*
	Children Ever Born-8, Alive-8, Dead -4 (IDI urban uneducated) *"1st died at about 2yrs – vomited from morning and died in the evening (male). 2nd died at 1yr because of teething and drinking tap water.*
	Children Ever Born – 8, Alive-5, Dead-3 (IDI urban educated) *1st died Premature (male), 2nd died of Jaundice – that was right from birth – 11 days old (male); 3rd died of Measles at the age of 2 years (male)*

Source: Fieldwork 2006

Box 4.7: Igbo Mother's Perception on Childhood Morbidity and Mortality

Diarrhea	*"But I think how parents preserve water can make it unhealthy and cause diarrhea and other infections" (FGD Urban educated)*
	"For instance, mothers of under five can create health hazard through the manner they feed their children e.g. feeding items that are dirty can cause diarrhea, which may expose the child to morbidity." (FGD urban educated)
	"Mothers absence from home as you see in most homes lead to … frequent diarrhea because of dirty hands and what they pick up and eat …" (IDI rural uneducated)
Cough/Catarrh	*"We use lemon grass and mosquito coil to prevent malaria. Though like Nwaka said this can cause cough and catarrh for children as well as smoke from from fuel wood. But we use it and my children are not sick." (FGD rural educated)*
	Traditionally or even now, during the Ozu festival everybody (adults and children including infants) are not allowed to put on clothes. This traditional belief is still strong in our community and it can cause cold and sometimes malaria for under five children. (FGD rural educated)
Fever	*"Another traditional practice, which I think affect child survival is the way convulsion is treated in some Igbo societies. Generally convulsion is perceived as an attack by evil spirits in traditional Igbo society. The common treatment is to use pepper and cane to wipe the spirits out. Instead of allowing the child to receive better treatment knowing that convulsion is caused by heat and malaria, they strictly follow the traditional way by using fire and apply pepper in the child's eyes. This sometimes results in death." (FGD Urban educated)*
	"Again some people still belief in reincarnation such that when their child is sick, instead of treating the child or take him/her to a better hospital, some parents believe that he/she wants them to know who reincarnated and acknowledge the person's wishes while alive. Such cultural practices are inimical to children's health and survival because adhering to such beliefs delays the right treatment such that slight fever may turn to serious ailment as a result of delays while trying to follow the traditional procedures." (FGD Urban educated)
Childhood mortality	*"I have experienced under-five child mortality as a result of pneumonia. I took the baby to hospital and they gave him injection that later formed abscess and eventually killed my baby. Part of the reason was my inexperience in handling babies. Young mothers should be taught how to cover their children and to check them at interval and ensure they are well covered at night. Ignorance of cold can kill one's baby". (FGD urban educated)*
	"The child of my neighbor died from suffocation. The clothes on the bed covered the child while the mother was cooking. By the time she finished the child had died from suffocation. This is example of how house environment even on the bed can result in mortality due to mother's carelessness" (Urban FGD educated)
	"Those that believe in "dada" or Ogbanje do sacrifices and ritual in junction roads. The positive beliefs of taking good care of children still exist. For instance convulsion is perceived to be caused by evil spirit and it is treated using traditional medicine. I used traditional method to treat my child aged three and half years when he had convulsion last year. They used blades and local pomade to cure the illness"(IDI rural uneducated)

Source: Fieldwork 2006

Box 4.8: Yoruba Mother's Perception on Childhood Morbidity and Mortality

Diarrhea	*"OK, now if a small child who has not eaten and given a coca-cola, once the child puts the bottle in the mouth the child does not take away the mouth till the child finishes the coke and if it continues to develop in the child it can cause dysentery or diarrhea"(IDI urban uneducated)*
	"When the child is growing especially when they want to teeth they do stool, or vomit and then nurses let us know that it is not teeth but we believe it is the teeth because when they are teething they will cough, stool and vomit." (FGD rural not educated)
Cough/Catarrh/cold	*"Cold floor can make a child sick like in the rainy season the weather is cold and can cause "giri" for the child. Cough can also worry the child, yes." (FGD urban educated)*
	"The smoke can cause catarrh in children and cough, it's firewood o, not stove o." (FGD rural not educated)
Measles	*"Measles is common during dry season when the heat is too much"(FGD urban educated)*
Fever	*"But in some other people their children have malaria through the type of food they give to their children. If the food is not properly taken care of" (FGD rural not educated)*
	"if mosquito bites a child it also causes malaria fever so that is why we made mosquito nets at the door also"(IDI urban educated)
Childhood mortality	*"Some children are called 'abiku' (meaning when they are given birth to they die and it occurs over again) so belief of people is that the best bet is to give such children mark; there is a lady I know sometimes ago, she had been given birth to like five times and she has been dying, on the sixth time they cut her five fingers when she was already dead, they placed her hand on a tree and they cut off her five fingers, when she was given birth to again she had only one finger and she lives" (IDI rural educated)*
	"It is abomination to bring plantain bunch into the village and now a lot of people do it now and they discovered that many children are dying now that, that maybe the cause of the death of the children in this village" (IDI rural not educated)

Source: Fieldwork 2006

Box 4.9: Ijaw Mother's Perception on Childhood Morbidity and Mortality

Diarrhea	*"The river water causes diarrhea and other sickness for our children because it is in the same water that we dispose our excreta, bath in and also drink from (FGD rural uneducated)*
	Diarrhea is caused by bad water and stomach upset and we have some nature herbs, which we give to the child to try to control the stooling (IDI rural educated)
Cough/Catarrh/cold	*"My children sleep on a mat on the floor, and they suffer from cold and cough especially during the raining season. As for smoke everybody knows it causes cough for children; even adults." (FGD rural uneducated)*
	Breathing in of dust and smoke which pollutes the air can cause cough. (FGD urban educated)
Measles	*"We know that measles is a viral infection, it transfers from one person to another. It is a disease caused by viral infection when somebody is sick from measles; you make sure you give the person enough rest and good treatment. You also make sure there is enough ventilation". (FGD urban educated)*
	"When there are so many people in the room, children can contact measles" (IDI urban educated)
	"What I understand about measles is that when your child's temperature is unnecessarily increasing and you don't take care of the child, measles may result and before you know it, it is all over the child's body. When you notice that your child's temperature is high, you should quickly give treatment (FGD rural uneducated)
Fever	*"When we touch the child's stomach in the case of measles it will seem there is krawkraw (spots). For malaria, there is a vein we touch that makes the child cough, some of the children will have catarrh. We tell the parents to carry them (children) to the hospital." (IDI rural uneducated)*
	"For malaria now, we prevent children from poing into the dirty water" (FGD urban educated)
	"We use mosquito nets to prevent children from contacting malaria" (IDI urban uneducated)
Childhood mortality	*Children Ever Born -9, Alive 7 Dead-2 (IDI rural uneducated)*
	"The1st died at age four because of convulsion, the second one at age five because of convulsion also"
	"In Ijaw there is a particular name given to children to reduce or stop sickness among children or perhaps frequent death Those who experience that like a child whose mother believe in the reincarnation of that child will call them Ebefua "you won't die again", Timipade "Don't go back" (IDI urban educated)

Source: Fieldwork 2006

Box 4.10: Tiv Mother's Perception on Childhood Morbidity and Mortality

Diarrhea	*"Some children stool after eating mango and finally die. Unkept toilet facility could cause diarhoea. Water must be boiled and filtered for children below a year before drinking, because little ones can contact disease from water, which may lead to death."(FGD urban educated)* *"Diarrhea is not just dirtiness, sometimes it is as a result of spell. And when a child is teething, such experiences diarrhea, but such diarrhea is considered good and not a thing for panicking. (FGD rural educated)* *"Diarrhea" is of two types. Type 1 is good, while type 2 is bad. The good one is when a child is growing teeth, but the bad one is when for "no" just reason the child is stooling, very weak and inactive. The toilet door is to be kept shut, and toilet properly kept so that flies don't visit the toilet and seat on the food served to children. The type 2 diarrhea could lead to death." (IDI rural educated)*
Cough/Catarrh/cold	*"My child just recovered from a serious cold, which is as a result of change in weather" (IDI rural uneducated)*
Measles	*"Measles is seen as a common disease for children, so when a child does not have measles, the parents will be worried." (FGD urban educated)*
Fever	*"Since this place has a nearby farm, insecticide is used twice a week in the huts to keep them free of mosquitoes which can cause malaria". (IDI rural educated)* *"The stream by these houses cause mosquito to persist through out of the year, hence, any form of carelessness could lead to fever." (IDI rural uneducated)*
Childhood mortality	*"Some children are identified as good or bad by native doctors and so if it is bad child, such is thrown away after rites have been performed. Of recent, there was a case of a woman who was said to give birth to a "bad or evil" child and this child who was the last born he was responsible for the death of the woman's children, although that evil child was thrown away, the mother also died, this death was attributed to the evil child." (IDI urban educated)* *"Most common one is that a pregnant women must not walk alone once it is evening and that she must not behold a dead dog, a taboo called "Swende". These are meant to protect the unborn child from death." (IDI urban uneducated)* *"Swende" is the most dangerous, my sister was affected by this taboo and has had 7 children who have all died (FGD urban educated)*

Source: Fieldwork 2006

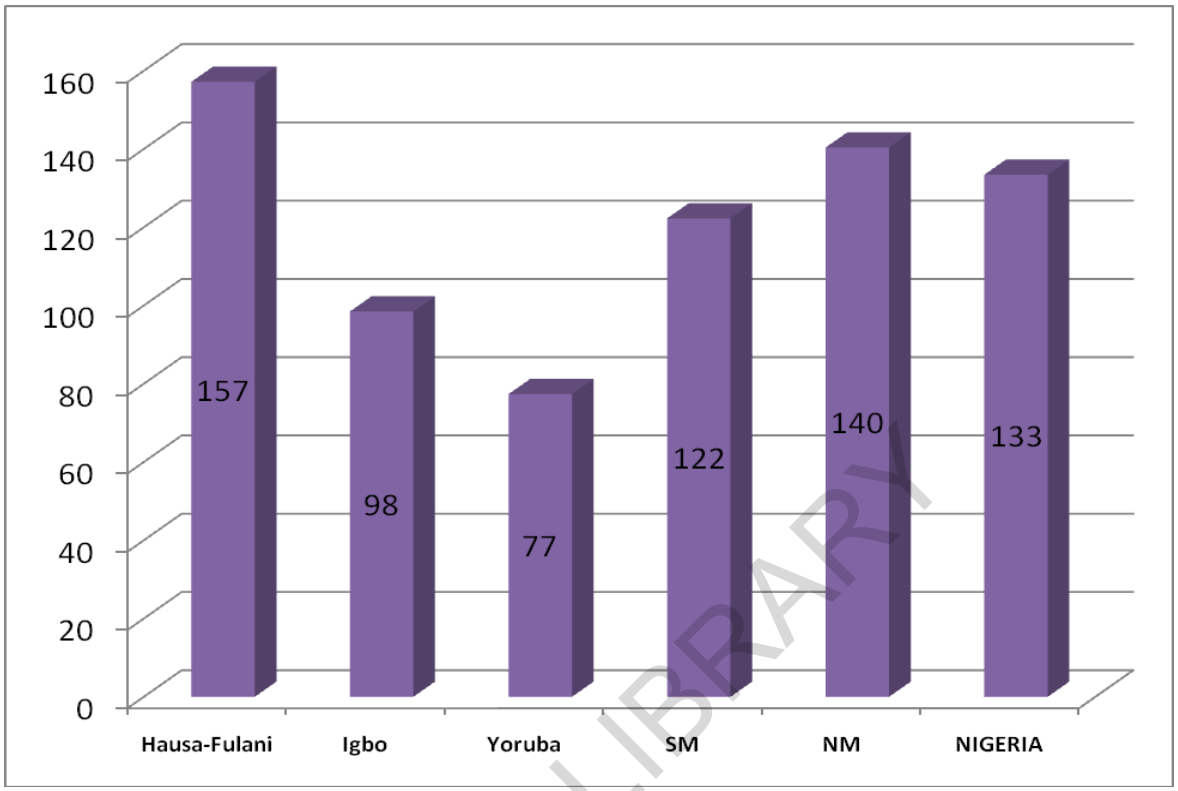
The common cause of childhood mortality experienced and mentioned by the Ijaw mothers is convulsion. Also there is a belief in the spirit that affects re-incarnation which made mothers to call such children names like "*Timipade*" meaning "don't go back" or "*Ebafua*" which means "You won't die again". This is to forestall reoccurrence of the child's death. The killing of children identified as "bad or evil" by native doctors is a socio-cultural factor that affects childhood mortality among the Tiv. ther belief is "Swende"- death that arises when a pregnant woman beholds or touches a dead dog.

An examination of the perceived causes of mortality among these different ethnic groups shows that their belief systems affect their perception on childhood mortality. A common theme is the belief that evil spirit induces childhood mortality irrespective of ethnic groups.

4.6 Childhood mortality among Nigerian ethnic groups

An examination of the direct estimates for under-five mortality for all ethnic groups in the study indicates significant difference as shown in Figure 4.13. The theoretical assumption that the modernising effect of formal education among some ethnic groups can affect the risk to childhood mortality is supported in this study. Hausa-Fulani group has the highest number of deaths of children under-five among the ethnic groups in the country. From the direct estimates of under-five mortality for five years preceding the survey, there are about 157 and 140 deaths per 1000 live births among the Hausa-Fulani and Northern minorities respectively. Conversely, 77.4 and 98.5 deaths were observed out of 1000 live births among the Yoruba and Igbo respectively.

Further analysis with Cox regression reveals disparities in childhood mortality among Nigerian ethnic groups. The dependent variable is the event of death of a child. For this study, it is hypothesized that there is significant effect of mother's ethnic membership on childhood mortality in Nigeria. For interpretation of Cox regression result, a risk ratio significantly greater than one indicated that children with this attributes have a higher chance of death than the reference category while the relative risk ratio less than one indicated that children with this attribute are expected to have lower risk of death than those in the reference category. The result is shown in Table 4.6.



Source: Raw data from NDHS 2003

Figure 4.13: Direct Estimate of under-five mortality among Nigerian ethnic groups

Table 4.6: Cox Regression Analysis on Childhood Mortality and Mothers' Ethnic Group Membership

Variables	**Childhood mortality**	***Infant mortality (0-12mths)***	***Child mortality (13-59mths)***
Ethnic groups			
Hausa-Fulani (ref.)	1.000	1.000	1.000
Igbo	0.630*	0.848	0.171*
Yoruba	0.527*	0.529*	0.387*
Southern-minorities	0.597*	0.789	0.584*
Northern-minorities	0.867	0.954	0.606*

Source: Raw data from NDHS 2003 **- p<0.05*

The Hausa-Fulani ethnic group is the reference category because it is the ethnic group with the highest incidence of childhood morbidity earlier examined. The result shows that the ethnicity variable on childhood mortality is significant ($p<0.05$) particularly among the Yoruba, Igbo and Southern minorities ethnic groups with reference to Hausa-Fulani. The relative hazard of death is significantly lower among children born to Yoruba mothers (0.567), Southern minorities (0.597) and Igbo (0.630) for under-five mortality. The observed wide disparity between the Yoruba, Igbo, SM ethnic groups and the reference category (Hausa-Fulani) confirms NDHS 2003 findings on regional differences between mothers in the southern part and those in the northern part of the country. The NDHS report was based on region, whereas the present study is based on actual ethnic group membership in the region.

As expected, the NM group did not show any significant difference from the reference category; the relative hazard for the Northern minorities ethnic group is closer to the reference category than other ethnic groups. This may be attributable to geographic location and cultural similarity with the reference category. Cox regression analysis of infant and child mortality shows differences among Nigerian ethnic groups. Infants generally have lower chances of survival than children above one year; once a child survives the first 12 months, the likelihood of living up to 59th month increases. This is because of children's critical physiological developmental stage before age 12 months. Children born to mothers in the Hausa-Fulani have relative high hazards to infant mortality compared to other ethnic groups. However, there is a wide margin when all other ethnic groups are compared with the Yoruba on infant mortality. The findings further show that ethnic differential is significant for children aged 13 to 59 months. Those children within the age 13 to59months in the ethnic groups in the Southern part of Nigeria can, on the average, survive child mortality than those in the Northern part.

Overall, deaths among Yoruba children are lower than all other ethnic groups surveyed in Nigeria, both infant mortality and under-five mortality. Although, Yoruba, Igbo and SM are from the southern part of Nigeria, presumably an enlightened part because of early impact of western civilisation, more Yoruba infants survive infancy than Igbo and SM ethnic groups. Also, ethnic groups in the Northern region have less access to the artifacts of modernity than those in the

Southern region. Less modernised groups tend to have lower chances of child survival that is a higher risk of childhood mortality as observed in this study.

4.7 Risks to Childhood Mortality based on Household Environment among Nigerian Ethnic Groups

Kaplan-Meier survival analysis was used to estimate the differences in risks to childhood mortality based on household environment among ethnic groups in Nigeria. It also gives log-rank (Mantel-Cox) test of equality of survival for the different level of household environmental variables. Table 4.7 shows the risks according to household variables classified into potential health hazards and non potential health hazards. The finding reveals that source of drinking water is significant to childhood mortality risk among Hausa-Fulani and NM. Under-five children in household with open well/surface water have higher risks to death than those with piped water/ borehole or covered well. In the southern part of the country, children who live in households with open well and surface water as source of drinking water also have greater risk to childhood mortality even though it is not significant. Time to get to water source is not significant to the risk of childhood mortality for all ethnic groups.

Type of toilet facility in this study is found to be statistically significant to under-five mortality among the Igbo, SM and Hausa-Fulani. There are about 96%, 92%, and 92% chances of surviving under-five deaths respectively for Igbo, SM and Hausa-Fulani if they live in household with flush toilet. As expected, children living in household with pit toilet latrine or no facility have higher risk of death. The sharing of the toilet facility is only significant to risk of under-five mortality among the ethnic groups in the northern Nigeria.

Table 4.7: Kaplan-Meier estimates of differences in risks to Childhood mortality based on household environment among ethnic groups in Nigeria

Household Characteristics	Hausa-Fulani	Igbo	Yoruba	Southern Minorities	Northern Minorities
Source of drinking water					
NPH- Piped water/covered well/borehole	84.5 *	90.6	91.7	83.79	87.5 *
PH- Open well/ surface water	77.6	85.7	86.9	84.93	79.8
Time to water source					
NPH- On premises/ < 15mins	78.7	85.9	91.0	86.3	80.6
PH- Above 15 mins	76.4	91.8	84.4	85.3	82.6
Type of toilet facility					
NPH- Flush toilet	92.1 *	96.4 *	95.0	92.1*	88.6
PH- Pit latrine/No facility	78.2	68.1	87.7	83.1	82.3
Toilet facilities shared					
NPH- No	78.5*	91.9	93.5	84.2	81.1*
PH – Yes	83.3	90.3	91.2	86.4	89.2
Main flooring material					
NPH- Finished	82.8*	90.5*	91.4	84.2	85.0*
PH – Natural/Rudimentary	74.5	85.6	82.7	82.8	79.8
Type of cooking fuel					
NPH – Electricity/LPG/kerosene	87.9*	93.8*	92.5	84.2	92.1
PH- Firewood/charcoal/straw	77.8	86.7	85.3	84.6	81.9
Use of mosquito nets by children under-five					
NPH-Yes	86.7	85.9*	100.0	90.8	81.1*
PH – No	82.1	91.0	92.1	87.3	86.6
Place for hand washing					
NPH- Indwelling yard/plot	78.0	88.6	88.8	83.6	83.6*
PH- Nowhere/Somewhere else	80.9	91.2	92.8	90.0	77.2
Wash hand before preparing last meals					
NPH- Yes	78.9	87.5	88.9	84.5	82.9
PH- No	80.4	90.0	92.7	90.0	80.4

** - p < 0.05 PH- potential health hazards NPH – non-potential health hazards*

While there is no significant difference on the main flooring materials of the household and risks to childhood among SM andYoruba, Igbo, NM and Hausa children in finished flooring house have significant lower risks to death; 91%, 85% and 83% chances of survival respectively. The type of cooking fuel has been found to be correlates of childhood morbidity in various studies in developing countries. For this study, it is only significant among the Hausa-Fulani and Igbo. Survival rates are 93% and 88% respectively for Hausa-Fulani and Igbo in household where electricity, gas or kerosene is used as fuel for cooking.

The use of mosquito nets as predictor of risk to childhood mortality, though not significant, gives 100% survival chance to Yoruba children, 90.8% to SM children and 86.7% to Hausa-Fulani. The risk to childhood mortality among Igbo and NM children under-five based on the use of mosquito nets is statistically significant. It is surprising that children that do not use the mosquito net have better chances of survival than those who use mosquito nets among the Igbo and NM. Improper handling of the mosquito nets might be responsible for this deviation. Place for hand washing is slightly significant among the NM while washing of hands by mothers is not significant as factors that can affect childhood mortality among Nigerian ethnic groups.

Hausa-children under-five who live in households with pipe water/covered well/borehole, flush toilet facility, finished flooring and electricity/ kerosene cooking fuel among others will have lower risks to childhood mortality. Similarly, source of drinking water, sharing of toilet facility, flooring materials, use of mosquito nets and place for hands washing are household environmental variables that are significant to risks of childhood mortality among the NM ethnic group. Among the ethnic groups in the southern part of Nigeria, it is only among the Igbo that some household environment variables are significant predictors of risks to under-five death. However, the chances of survival for children from southern part of the country, presumably an enlightened part because of early impact of civilization, are generally higher than other ethnic groups irrespective of the significance of household environment variable examined in this study.

4.8 THE MEDIATING EFFECTS OF SOCIO-ECONOMIC AND DEMOGRAPHIC AND HOUSEHOLD ENVIRONMENTAL HEALTH HAZARDS AND CHILDHOOD MORTALITY AMONG NIGERIAN ETHNIC GROUPS

The Cox Hazard regression model technique is used to test the effect of household environmental health hazards on childhood mortality among ethnic groups in Nigeria. The dependent variable is the event of death of a child. For this study, it is hypothesized that there is mediating effects of socio-economic and demographic factors on household environment and childhood mortality among Nigerian ethnic groups. Thus, various models are included in the analysis. As earlier mentioned, a risk ratio significantly greater than one indicated that children with this attributes have a higher risk of death than the reference category while the relative risk ratio less than one indicated that children with this attribute are expected to have lower risk of death than those in the reference category. The result is shown in Table 4.8.

The first model examines the ethnic groups and childhood mortality. This is the baseline model, referred to as control variable. The result is as observed earlier in the previous section. The relative hazard of death is significantly lower among children born to Yoruba mothers (0.567), SM (0.597) and Igbo (0.630). The NMs group did not show any significant difference from the reference category.

The second model includes the first model and household environmental variables. This is aimed, in line with the objective of this study, at explaining the pattern and variation of childhood mortality among Nigerian ethnic groups in the presence of household environmental variables. The findings reveal no significant difference in childhood mortality among the ethnic groups when household environmental variable was introduced into the model. This result is significant for this study as it implied that the disparities in childhood mortality among Nigerian ethnic could be controlled if the household environment is hygienic and improved.

Table 4.8: Relative hazards of childhood mortality among Nigerian ethnic groups

Variables	Model 1	Model 2	Model 3	Model 4
Ethnic groups				
Hausa-fulani (ref.)	1.000	1.000	1.000	1.000
Igbo	0.630*	0.755	0.896	0.909
Yoruba	0.527*	0.801	0.840	0.762
Southern-minority	0.597*	0.664	0.639*	0.662
Northern-minority	0.867	0.936	0.959	0.979
Source of drinking water				
Piped water		0.815	0.865	0.989
Open well		0.651*	0.681*	0.694*
Covered well/borehole		0.675*	0.708	0.805
Surface water (ref.)		1.000	1.000	1.000
Time to get to water source				
On premises		0.507	0.441*	0.431*
Less than 15 mins		0.868	0.930	0.909
Above 15mins (ref.)		1.000	1.000	1.000
Type of toilet facility				
Flush toilet		0.384*	0.333*	0.354*
Pit latrine/No facility (ref.)		1.000	1.000	1.000
Toilet facilities shared				
No		1.393*	1.402*	1.369*
Yes (ref.)		1.000	1.000	1.000
Type of flooring material				
Natural/rudimentary		1.000	1.000	1.000
Finished (ref.)		0.619*	0.649*	0.806
Type of cooking				
Electricity/gas/kerosene		1.414	1.605	1.973*
Firewood/charcoal (ref.)		1.000	1.000	1.000
Place for Hand washing				
Indwelling yard		1.114	0.984	0.986
Nowhere/somewhere else (ref.)		1.000	1.000	1.000
Wash hand before preparing last meal				
No		0.729	0.649	0.671
Yes (ref.)		1.000	1.000	1.000
Sex of child				
Male			1.255	1.286
Female (ref.)			1.000	1.000
Type of birth				
Single			0.247*	0.243*
Multiple (ref.)			1.000	1.000
Birth order				
Second-born (ref.)			1.000	1.000
Third-born			0.842	0.809
Fourth-born and above			1.095	0.988
Age of mother at birth				
15-19 (ref.)			1.000	1.000
20-24			0.390*	0.393*
25-29			0.430*	0.448*
30-34			0.592	0.606
35-39			0.681	0.682
40 and above			1.039	1.046
Birth interval				
Below 24 months (ref.)			1.000	1.000
24-35 months			0.739*	0.749
36 months and above			0.402*	0.400*
Maternal educational level				
No education (ref.)				1.000
Primary				1.100
Secondary				0.575*
Higher				0.831
Type of Residence				
Urban				1.036
Rural (ref.)				1.000
Work status				
Not working (ref.)				1.000
Working				1.139
Wealth Index				
Poor (ref.)				1.000
Middle				0.665
Rich				0.688

Source: Raw data from NDHS 2003 ** - p<0.05*

However, among the household environmental variables considered for this study, children who live in houses with covered well/borehole, use flush toilet and have finished flooring have lower hazard to mortality than others. Although the risk of death of those households who drink piped water is not statistically significant, it is still lower than surface water.

In model 3, where demographic variables are controlled for, the disparities in the risk to childhood mortality among the Yoruba, Igbo and NM ethnic group when compared to the reference category are not statistically significant though there are decreases in the differences. For the SM ethnic group, there is significant difference in risk to childhood mortality when compared to reference category with the addition of demographic variables. Children born five years preceding the 2003 NDHS to SM ethnic group mothers have significant lower risk to death than those born to Hausa-Fulani mothers.

The household environmental variables on child's death also gave slightly different patterns when demographic variables are controlled for. Children who live in household with open well water, getting water on premises, used flush toilet and finished flooring have lower risk to childhood mortality than others. The findings in this study also reveal a highly significant difference on childhood mortality because of the type of birth; the risk to childhood mortality is significantly lower (0.247) among births that are single when compared to multiple births.

Mother's age has been found in various studies to be important determinants of child's health. Children born five years preceding the survey to mothers age 20-29 have significantly lower risk than those of age 15-19. Adolescent motherhood is reflected in women aged 15- 19 while those of 20-29 years are in their early and mid reproductive years. Although, these two age groups grew up in a period of higher enrolment in formal education, higher participation in labour force and more campaign on maternal and child's health, the risk to under-five death is significantly higher among these age groups. As expected in fertility behaviour, the risk to childhood mortality among births to mothers age 30 and above increases when compared to the reference category. Also, children whose preceding birth interval is two years and above have lower chance of death than those below two years.

The inclusion of socio-economic variables in model 4 shows that there is no significant difference in ethnic group membership and childhood mortality in Nigeria. This is very pertinent as this model includes all other variables. This implies that the disparities in childhood mortality observed among the ethnic groups in this study could be controlled if the household environment, demographic variables and socio-economic variables are relatively similar. The pattern of household environment and demographic variables on childhood mortality in Model 2 and 3 did not change after the inclusion of socio-economic variables in Model 4. However, this result reveals that while residence, wealth index and mothers' job status have no significant effects on childhood mortality, maternal education is significant. As expected, mothers with secondary education have lower chances of experiencing under-five death than those in the reference category (No education). High levels of maternal education have been associated with better understanding and appreciation for hygiene and child's health.

Overall, the household environmental variables affect the relative hazard of deaths among Nigerian ethnic groups in this study and there are significant mediating effects of demographic and socio-economic variables. All these variables tend to lower the disparities noticed in under-five deaths among Nigerian ethnic groups.

4.9 Discussion of the findings

The findings of this study are discussed in line with the study objectives. On the overall, the distributions of children according to maternal and socio-demographic characteristics that can predispose them to childhood mortality vary among Nigerian ethnic groups. From the background profile of mother and child, the ethnic groups in the northern part of the country have the highest proportion of young mothers while Yoruba and Igbo mothers are older. With the exception of the Hausa-Fulani in this study, there are more male than female births across all ethnic groups in Nigeria, which is quite significant for a patriarchy society like Nigeria**.** Maternal education, a strong correlate of fertility and maternal and child health, is high among the ethnic groups in the southern part of the country while most of the Hausa-Fulani children and NM children have mothers with no formal education.

4.9.1 Ethnic differentials in Childhood Morbidity and Mortality in Nigeria

The pattern of childhood morbidity and mortality was examined among Nigerian ethnic groups. Theoretical supposition is that least modernized groups are more likely to indulge in socio-cultural practices detrimental to under-five survival (Gyimah, 2002b). The findings in this study on childhood morbidity and mortality did not deviate from this supposition.

Responses on incidence of diarrhea in the last two weeks preceding the survey show that children born to Yoruba women have the least episode. The high incidence of childhood diarrhea among the Hausa-Fulani, northern minorities and southern minorities' ethnic groups is alarming as dehydration from diarrhea has been identified as one of the causes of death among young children in Nigeria. The fact that the source of drinking water is a correlate of childhood diarrhea as reported in literatures is buttressed in this study (Jinadu *et* al 1991; Kwasi and Markku, 2005). The major source of drinking water for these two ethnic groups has shown that drinking water is a major determinant to incidence of childhood diarrhea; ethnic groups with improved source of drinking water have the least incidence of childhood diarrhea.

Incidence of cough or short rapid breath within two weeks preceding the survey is highest among SM group and lowest among the Yoruba. Although, acute respiratory infection is expected to be significant among the ethnic groups where biomass fuel (firewood, charcoal, straw) is used for cooking, the incidence is surprisingly similar among all ethnic groups irrespective of the type of cooking fuel. This can be attributed to other factors found in other studies such as environmental pollution from emission of carbons in the more industrialised southern area of Nigeria (Mishra and Retherford, 2007). World Health Statistics 2009 estimate that fever is common childhood morbidity in developing countries, especially Sub-Saharan Africa where about 15 in 1000 live-birth die from malaria before the age of five. The finding in this study is consistent with the report. It is quite alarming that within two weeks preceding the survey, about one third of the analytical sampled children under-five reported incidence of fever among the Hausa-Fulani, Northern and Southern minorities' ethnic groups. One the factors responsible for this high incidence is overall low usage of mosquito net despite awareness on prevention of malaria through the use of mosquito nets. These

malaria-carrying mosquitoes are responsible for the majority of malaria deaths in Nigeria, and the groups most vulnerable are children under five years of age and pregnant women. Although the 2003 NDHS survey was carried out during the rainy season, a period of prevalence of malaria-carrying mosquitoes when mosquito nets were most likely to be used, the usage is low and the incidence of fever is high (NPC, 2004)

As found in the literature, survival chances of infants are generally lower than children above one year old (Zenger, 1992; WHO, 2009). Deaths of infant especially during neonatal period are higher than after one year. The findings reveal that among all the ethnic groups, infants generally have lower chances of survival than children above one year old with children born to Hausa-Fulani mothers having relative high risk to infant mortality. There is a wide margin when all other ethnic groups are compared with the Yoruba on infant mortality. Furthermore, children within the age 13-59months in the ethnic groups in the southern part of Nigeria can, on the average, survive child mortality than those in the Northern part. This study supports the theoretical assumption that the modernizing effect of formal education among some ethnic groups can affect the risk to childhood mortality. Hausa-Fulani group, the least educated group, has the highest number of deaths of children under-five among the ethnic groups in the country. The geographic location and cultural similarity of Northern minorities and Hausa-Fulani are evident in the high incidence of childhood mortality for the two ethnic groups. However, the relative hazard of death is significantly lower among children born to Yoruba mothers, Southern minorities and Igbo for under-five mortality. This is consistent with findings in Cameroon where high under-five mortality among the Fulbe-Fulani group is explained by lack of formal education (Kuarte Defo, 1996).

The findings from qualitative data as also observed in other studies show that it is generally believed that with the exception of some cases, the general cause of death is illness which is inevitable among children, especially those under five years of age (Ogunjuyigbe, 2004; Onyeabochukwu, 2007). There are some differences in the perceived causes of childhood morbidity among the Nigerian ethnic groups. Contaminated/dirty water and teething are generally perceived in all the ethnic groups as causes of diarrhea among under-five children. The Igbo and Yoruba mothers mentioned improper care of the feeding bottle as an additional

cause of childhood diarrhea. Measles is seen as normal for Tiv children while the remaining ethnic group attributed incidence of measles to heat. Exposure to cold, smoke from firewood and bare floor are mentioned as causes of cough and catarrh among the children under-five in Nigeria. Though the pattern of perceived causes of childhood morbidity varies slightly, a higher proportion of mothers, irrespective of residence, mentioned modern treatment/curative measures in all the ethnic groups for this study. However, some children are believed will still die irrespective of treatment given when they are sick because of their parents' refusal to acknowledge a particular taboo or beliefs that the community adheres to.

4.9.2 Household environmental health hazards and childhood mortality among Nigerian ethnic groups

Source of drinking water has great implication on the health outcome of both mother and child. Improved source of drinking water expected to be free of disease are piped, covered well or borehole. Others such as surface water and open well are more likely to carry disease causing agents (NPC, 2004). The differences in risk to childhood mortality based on household environment with Kaplan-Meier survival analysis show that source of drinking water is significant to childhood mortality in Nigeria. This is similar to studies in developing countries on source of drinking water in the household and childhood mortality; under-five children in household with open well/surface water have higher risks of death than those with piped water/ borehole or covered well (Rutstein, 2000; Policy Project/Nigeria 2002). The risk of death from unimproved source of drinking water is particularly higher among Hausa-Fulani and NM; a large proportion of mothers from these ethnic groups drink from surface water such as streams, lake or dams which tend to be more contaminated due to a variety of factors. Although, the ethnic groups in the southern part of Nigeria are presumably exposed to early impact of modernization and the chances of survival based on source of drinking water are generally higher than others, children who live in households with open well and surface water as source of drinking water also have greater risk to childhood mortality among these ethnic groups.

Several studies in Nigeria and other Sub-Saharan Africa countries on childhood mortality have found that improper excreta disposal of both children and adults were significantly related to high incidence of childhood morbidity; there is

increased prevalence of diarrhea and cholera in such household (Ayeni and Oduntan, 1980; Tankins, 1981; Trussell and Hammerslough, 1983; Jinadu *et al* 1991, Rustein, 2000). The findings in this study are also consistent with Obungu, Kizito and Bicego (1984) that flush toilet is associated with lower mortality. The risk of under-five deaths is significantly higher among the Hausa-Fulani, Igbo and SM that live in household with unhygienic toilet facility such as pit latrine and no facility.

Another finding is risk of deaths of children under-five who live in household where unprocessed biomass fuel that has high level of toxic indoor air pollutant is used cooking fuel among some ethnic groups in Nigeria. The type of cooking fuel used in the household is an important variable that could enhance exposure of children to unprocessed biomass fuel from wood, charcoal, straw and dung. Exposure to unprocessed biomass fuel has high level of toxic indoor air pollutants and has been linked to reduced birth weight, acute respiratory infection, childhood mortality and nutrition deficiency (Mishra and Retherford, 2007). Studies have shown that mothers and their young children are at high risk of exposure to the smoke emitted from burning of coals, firewood and other source of fuel because of their traditional role in the preparation of food and carrying of young children while cooking (Rutstein, 2000). This study clearly demonstrates that exposure to biomass fuel significantly increase the risk of deaths among children under-five irrespective of the ethnic groups. Apart from children of Ijaw mothers, those living in household where the cooking fuel is firewood, charcoal or straw are vulnerable to the adverse effects of the smoke from such cooking fuel which significantly reduces their survival chances.

Further classification of household environment into potential and non-potential health hazards shows that ethnic groups in the northern part of Nigeria have the largest proportion of mothers and children that are exposed to potential health hazards when compared to other ethnic groups. Although other ethnic groups live in potential health hazard environments, the Hausa-Fulani and NM seem to be most disadvantaged in this study. From the qualitative findings, high level of maternal education is associated with better understanding and appreciation for hygiene and child's health related matters irrespective of cultural perception as found in the literature (Caldwell, 1979; Mosley and Chen, 1984 Boerma and Bicego, 1992; Sharkhatreh, *et al*, 1996; Gyimah, 2003) Mothers of children under-

five perceived many health hazards in the household, varying from drinking contaminated water, children defecating around the household with no one to clean them up, contaminating the water pots thereafter and eating without washing their hands. All the mothers/ caregivers interviewed mentioned sharp instrument, water related problems and unclean toilet facility and overcrowding as potential household health hazards. Only the Igbo mothers mentioned poverty as a reflection of socio-economic status which makes an individual to live in dirty environment, share toilets with many people and sleep in overcrowded rooms without mosquito nets or insecticides. There seems to be little or no difference in the response given by mothers in the rural and urban areas on perception of health hazards in the household among all the ethnic groups.

Apart from the effect of household environmental health hazards on childhood mortality among Nigerian ethnic groups, this study hypothesized that there are mediating effects of socio-economic and demographic factors on household environment and childhood mortality among Nigerian ethnic groups. As observed by Rutstein (2000), there is need to analyse all factors simultaneously using multivariate analysis to determine each factor unique effect on childhood mortality. This study therefore used Cox Hazard regression model technique to examine multifactorial causality of childhood mortality in Nigeria (Mosley and Chen, 1984). The significant relationship that exists between ethnicity and childhood mortality reduces when household environmental variables was introduced into the model. This result is significant for this study as it implied that the disparities in childhood mortality among Nigerian ethnic groups could be controlled if the household environment is hygienic and improved. This is consistent with the findings in urban Eritrea by Macassa et al (2004). Further, there is a decrease in disparities in childhood mortality among Nigerian ethnic groups when demographic and socio-economic factors are introduced into the model. Thus, there may be no significant disparities in childhood mortality among the ethnic groups if there is relative similarity in household environment, demographic variables and socio-economic variables. Although, the result shows that while residence, wealth index and mothers' job status have no significant effects on childhood mortality in this study, maternal education is significant. The household environmental variables affect the relative hazard of deaths among Nigerian ethnic groups in this study but there is a significant mediating effect of demographic and

socio-economic variables. The inclusion of socio-economic variables tends to lower the disparities observed on under-five deaths among Nigerian ethnic groups.

4.10 Theory and Conceptual Issues

The findings from this study generally support previous conclusions in literature on the usefulness of the Mosley and Chen analytical framework for the study of child survival in less developed countries as well as the Ecological system theory on child's survival within the context of the system of relationships that form his or her environment.

4.10.1 Findings and Ecological System Theory

It was observed in this study that changes in any layer will indeed, ripple throughout other layers. This study corroborates the observation by Berk (2000) that microsystem layer, closest to the child, reflects the outcome (survival or mortality) of the relationship and interaction a child has with his or her immediate surroundings. The findings of this study show that the household environment which is at the mesosystem level influences child mortality or survival through potential health hazards from source of drinking water, basic household sanitation and use of mosquito nets. Although the child is not directly involved in the larger social system defined as exosystem layer in the EST theory, the multivariate analysis in this study shows that this layer of environment has the most significant influence on child health outcomes through interaction with other environment. The assumption that the macrosystem which is considered as the outermost layer in child's environment has a cascading influence throughout the interaction of other layers is buttressed in this study. The influence of this outermost environment is only significant by its interaction with the exosystem and mesosystem levels.

4.10.2 Findings and Mosley and Chen Framework

The Mosley and Chen analytical model is used in this study because of its comprehensive nature in capturing multifactorial causality of childhood mortality in developing countries. The basic framework of Mosley and Chen's model is based on the idea that the factors that affect childhood mortality work through a set of "proximate determinants." Some of the proximate determinants, as defined by Mosley and Chen are maternal and demographic factors, environmental health

factors, nutrient deficiency, injury and personal illness control, are examined. The findings corroborate Mosley and Chen model that childhood mortality can be explained by many factors in Nigeria. It further reveals that the selected proximate determinants significantly work through socioeconomic variables to affect child mortality or survival in Nigeria.

CHAPTER FIVE
SUMMARY AND CONCLUSION

5.1 Summary

The unique physical and biological characteristics of children under-five years make them vulnerable to health hazards, present in environmental settings where people live. Most under-five deaths in Nigeria and in other less developed countries have been linked to childhood morbidity induced from the household environment. In addition, childcare practices of mothers which could be traced to their ethnic membership can affect the way in which children, especially under age five, are exposed to the contaminants in the household environment. This study therefore, examined patterns of household environmental health hazards, differences in childhood morbidity and mortality, risks of household environmental health hazards on childhood mortality, perception towards childhood morbidity and mortality and the mediating effects of socio-economic and demographic factors on household environment as they affect childhood mortality among Nigerian ethnic groups. The household environmental health hazards were derived from the responses on household environmental factors and categorised into two: potential health hazards and non-potential health hazards.

To address the general objective of the study which is to determine the effect of household environmental health hazards on childhood mortality among Nigerian ethnic groups; existing literature were reviewed on childhood mortality in Nigeria, factors affecting mortality, environmental health hazards and child's health, as well as ethnicity and childhood mortality. The conceptual framework for this study was derived from the Mosley and Chen analytical framework for the study of child survival in developing countries and Ecological System theory(EST) proposed by Bronfenbrenner. The Mosley and Chen analytical model seeks to create multivariate model for studying childhood mortality; mortality can be examined from multifactorial causality. The EST focuses on the quality and context of child's environment. It defines complex layers of environment, each having an effect on a child's survival cum development. Terms such as microsystem, mesosystem, exosystem and macrosystem were used to define the various layers surrounding a child. The Mosley and Chen analytical framework identified factors that affect childhood mortality while the Ecological System theory categorised the

factors into appropriate level as it affects child's health. The ethnic origin and beliefs of parents fall into what Bronfenbrenner categorised as macrosystem level which has a cascading influence through the interaction of other levels on child's development, survival and health outcome. The next layer, the exosystem is on the basis that a child cannot function directly on the factors at this level but the impact of such factors affects the child positively or negatively. These are the socio-economic, maternal and demographic factors as defined in Mosley and Chen's framework. The subsequent layers are mesosystem and microsystem. Thus, four major hypotheses were derived from the conceptual framework of this study and the pertinent variables were appropriately measured.

The study utilised quantitative and qualitative methods of data collection. Focus group discussion (FGD) and in-depth interview (IDI) methods complemented the survey based secondary data from Nigeria Demographic Health Survey 2003. For this study, child record constitutes the basic analytical sample; a retrospective child file consisting of all children born to sampled women was generated from the NDHS 2003 data. Although there were 23,038 births from 7,620 women recorded in the survey, the analysis was restricted to births within five years of the survey, which gave 5,531 births from 3,688 women. This was to ensure that maternal and household characteristics relate to current situations. Ethnic membership was broadly categorised into Hausa-Fulani, Igbo, Yoruba, Southern minorities (SM) and Northern minorities (NM). Qualitative data were collected among these ethnic groups, with the Ijaw and Tiv representing SM and NM respectively. Focus group discussions and IDIs were conducted to understand the beliefs, perceptions and attitudes towards childcare and survival among various ethnic groups in the country; to ascertain whether there are socio-cultural practices that enhanced exposure to environmental health hazards that could lead to childhood mortality. The quantitative data were analysed using descriptive statistics and multivariate regression while the FGDs and IDIs were analysed by content after transcribing and reviewing by a competent third person.

There were disparities in the household environment of children among Nigerian ethnic groups; ethnic groups in the northern part were at relative disadvantage on basic household environmental variables that affect hygiene. Yoruba children were least exposed. An examination of childhood mortality and household environment indicate significant difference with ethnic groups in the northern part of Nigeria having

the highest risk to childhood mortality. There are also significant mediating effects of demographic and socio-economic variables on household environmental health hazards and under-five mortality in Nigeria. The values placed on children among all ethnic groups were reflected in different socio-cultural beliefs and practices with significant influence of urban residence and education of mothers.

5.2 Recommendations

In line with the findings of this study, the following recommendations are proposed in order to significantly reduce childhood mortality in Nigeria and meet the Millennium Development Goals number four which is to reduce under-five mortality by two-third between 1990 and 2015.

1. There should be multi-sector approach towards provision of water and basic facilities in the household. Government, non-governmental Organisations (NGOs), private sectors among others should seek to invest in programmes that will promote better hygienic household environment, increase access to clean water and good sanitation as part of community development effort.

2. Government should also seek the support of individuals in the rural areas by funding community level initiatives around the household environment. Local government authorities should be involved in managing basic facilities within the community such as portable water.

3. Prompt attention should be given to various factors affecting equal distribution of resources and facilities to rural and urban areas in both the northern and southern parts of Nigeria. The disadvantaged ethnic groups in this study are mostly based in the northern part of Nigeria; therefore, greater attention should be devoted towards provision of facilities that can guarantee improvement in child survival in the northern part of Nigeria.

4. There should be improvement on information flow and education on best childcare practices to mothers. From the qualitative findings, it is evident that most mothers correctly perceived health hazards in the household but alternatives available to them in terms of water provision and basic sanitary expose children under age five to risk of morbidity and mortality.

Enlightenment in the local dialect on the need for proper handling of drinking water, good personal and household hygiene and use of mosquito net can reduce the occurrence of childhood morbidity and mortality.

5. Awareness on good personal and household hygiene practices can significantly reduce the incidence of childhood diarrhea as noted by Bateman and McGahey 2001 in the Environmental Health project. The Environmental Health project advocates an integrated approach call Hygiene Improvement Framework, which is based on the recognition that behaviours especially drinking safe water, sanitary disposal of faeces and washing hands at appropriate times are the key determinants of risk to diarrhea. Thus, hygiene improvement must be supported with material and promotion of good hygiene behaviour and enabling institutional and policy environment.

6. Nigeria as a country need to actively participates in the programmes of Organisations such as the International Research and Information Network on Children's Health, Children's Environmental Health Network and Environment, and Safety (INCHES), which have been created to protect children from environmental hazards and promote a healthy environment.

7. There should also be re-introduction of sanitary health inspection programme in Nigeria. It is noteworthy that none of the ethnic groups' member mentioned the role of sanitary inspector in their community despite the compulsory environmental sanitation day in most states of Nigeria. Regular sanitary inspection of household environment by government certified agents with appropriate and lawful sanction for erring household would help ensure safe environment for children under-five years.

8. At the policy level, there is need for redirection of programmes and policies on household hygiene and sanitation. Current programmes have been targeting women while male's involvements are not emphasized. Although, Nigeria is a patriarchal society, enlightenments directed towards household hygiene should be for both men and women and not women only. Male

enlightenment on dangers in household and ways to assist their family should be emphasized.

9. Intervention on increasing access to education can be further achieved by encouraging research and establishing research centres where there would multidisciplinary studies on environmental hazards. Efforts should be intensified to incorporate household environmental health and people's belief and practices into the teaching manual for health care providers.

10. Finally, it is necessary that cultural belief should be taken into cognizance when developing policy on maternal and child health. More preventive measures should be put in place on threats from industrialization and urbanization in Nigeria.

5.3 Conclusion

This study provides detailed empirical results on ethnic differential on childhood mortality in Nigeria. It further shows the disparities in household environments and health hazards among Nigerian ethnic groups. Children of mothers whose ethnic membership are from the northern region of the country are most exposed to health hazards within the household while Yoruba children are least exposed. The ethnic disparities in childhood morbidity and mortality are also clearly demonstrated in this study. The chance of survival for children born to mothers whose ethnic groups from the southern part of Nigerian is higher than the northern part. Likewise, there are disparities in the risk of childhood mortality based on the type of health hazards the child is exposed to within the household environment. This study also observes that children are highly valued among all ethnic groups and traditional methods of childcare have been gradually modified through the incorporation of safe method of childcare.

The findings on household environments, socio-economic and demographic factors on childhood mortality are consistent with Mosley and Chen framework on childhood mortality in the developing countries. Following from the Ecological System Theory, this study observes that childhood mortality is a reflection of the outcome of interaction of systems of relationship within the child's environment. This study empirically throws more light on household environmental health

hazards and ethnicity for the understanding of childhood mortality. Although, household environment and specific socio-cultural practices are salient to the exposure of under-five children to health hazards within the household, mothers' educational level significantly affects the differences observed in this study. Therefore, women should have more access to education and information on best childcare practices in the household environment and people's belief should be taken into cognizance when developing policy on child health. Intervention on water accessibility and basic sanitation should be jointly provided by different sectors in Nigeria. This empirical information on under-five mortality would also serve the needs of health ministries to identify segment of the population that are at high risk.

Future research can separate the ethnic groups in the southern and northern parts of Nigeria termed in this study as "Southern minorities" and "Northern minorities' to examine individual ethnic groups' perceptions on child care and survival. Another research endeavour can document fathers' perceptions, attitudes and behaviour on health hazards within the household and under-five mortality.

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APPENDIX I

In-depth Interview Guide

Part A

House setting and environment

Give general description of the following:

(i) Venue

(ii) Housing structure

(iii) House environment

(iv) Flooring material of the house

(v) Number of people in the house

(vi) Other useful information

(2) General Characteristic of the respondent

(i) Sex

(ii) Age

(iii) Educational level

(iv) Ethnic group

(v) Occupation

(vi) Total children ever born

(3) Description of the household environment

(i) What is the main source of drinking water in the household?

(ii) How long does it take to get there?

(iii) What do you use mainly for cooking?

(iv) What kind of toilet facilities does your household have?

(v) Do you share these toilet facilities with other household?

(vi) How many rooms are used for sleeping in your household?

(vii) How many people sleep in a room in this household?

(viii) Do you use mosquito net in this house? If yes, is it for everybody? (Probe further if children under-five years are given preference)

Part B

3- **Household environment and Child's health**

(i) Where do you normally put your child?

(ii) Where do your children play?

(iii) Do you think they face any health hazards in the house environment?

(iv) If yes, state how they could be harmed?

(v) Can you relate these hazards to the health and survival of a child? (particular attention to be directed towards source of water, toilet facility used, flooring material, cooking fuel, household room density and use of treated mosquito net)

(vi) Give personal examples to the question above.

3- How could children be protected from these likely hazards?

3- How do you protect them? Relate personal examples

(2) Perception of how traditional beliefs affect child survival: beliefs concerning children under-five years; cultural practices towards health care, public health centre and nutrition.

(i) How do you perceive children in your culture?

(ii) What do you personally think about these cultural perceptions?

(iii) By traditional beliefs, how should they be catered? In terms of health care, nutrition etc.

(iv) Can you give specific beliefs (in forms of proverbs, idioms and songs)

(v) Are there cultural practices directed towards child's survival (such as food restriction, taboos, rituals, sacrifices, incisions, giving specific names etc)

(vi) Do these beliefs still hold concerning children in this community? State how effective it is.

(vii) Have you ever applied these beliefs before toward your child? If yes, state them.

APPENDIX II

Focus Group Discussion Guide

Part A

3- **Household environment and Child's health**

(i) What do you know about health hazards?

(ii) Can you site some examples?

(iii) Are there any health hazards in the house environment? Give examples

(iv) Can you relate these hazards to the health and survival of a child? (particular attention to be directed towards source of water, toilet facility used, flooring material, cooking fuel, household room density and use of treated mosquito net). Give examples.

3- How could children be protected from these likely hazards?

(2) Perception of how traditional beliefs affect child survival: beliefs concerning children under-five years; cultural practices towards health care, public health centre and nutrition.

(i) What is the cultural perception of children in this community?

(ii) What do you personally think about these cultural perceptions?

(iii) By traditional beliefs, how should they be catered? In terms of health care, nutrition etc.

(iv) Can you give specific beliefs (in forms of proverbs, idioms and songs)

(v) Are there cultural practices directed towards child's survival (such as food restriction, taboos, rituals, sacrifices, incisions, giving specific names etc)

(vi) Do these beliefs still hold concerning children in this community? State how effective it is.

(vii) Have you ever applied these beliefs before toward your child? If yes, state them.

APPENDIX III

The retrospective child file generated from NDHS 2003

Step 1
Obtained permission from Orc Macro Inc. USA to download and use NDHS women data file

Step 2
The data set downloaded in SPSS format was transformed using the restructure data wizard in SPSSv15. The child birth record variables were rearranged into groups of related cases. This created new data sets of 23,038 cases of births from 7,620 women in the NDHS 2003 sample surveyed.

Step 3
Live births that occurred between 1999 and 2003 were selected to ensure that maternal characteristics relates to current situation especially in household environments.

Step 4
The key variables were re-categorised to for the purpose of this study as follows.

Variables	New variable values
Ethnicity	1- Hausa-Fulani 2- Igbo 3- Yoruba 4- Southern minorities 5- Northern minorities
Source of drinking water	1-Piped water 2- Open well water 3- Covered well/borehole 4- Surface water (streams, rivers)
Time to water source	1- On premises 2- less than 15 minutes 3- Above 15 minutes
Toilet facility	1- Flush toilet 2- Pit toilet 3- No facility
Toilet facility shared	0- No 1- Yes
Type of flooring material	1- Finished 2- Natural/Rudimentary
Use of mosquito net for children under-five	0- No 1- Yes
Place for hand washing	1- Nowhere 2- Indwelling yard/plot 3- Somewhere else
Wash hands before preparing last meal	0- No 1- Yes
Maternal age at birth	1- 15-19 2- 20-24 3- 25-29

	4- 30-34 5- 35-39 6- 40-44 7- 45-49
Sex of child	1- Male 2- Female
Type of birth	1- Single birth 2- Multiple births
Birth interval	1- Below 24 months 2- 24-36mths 3- Above 36 months
Birth order	1- First born 2- Second born 3- Third born 4- Fourth born and above
Maternal highest educational levels	1- None 2- Primary 3- Secondary 4- Higher
Paternal highest educational levels	1- None 2- Primary 3- Secondary 4- Higher
Residence	1- Urban 2- Rural
Mother's employment status	0- Not working 1- Working
Wealth index	1- Poor 2- Middle 3- Rich

APPENDIX IV

Nigeria Demographic and Health Survey 2003
Household and Individual Woman's Questionnaire