ANALYSIS OF INFANT AND CHILD MORTALITY TRENDS AND DIFFERENTIALS IN KADUNA STATE, NIGERIA

BY

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A THESIS SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, AHMADU BELLO UNIVERSITY, ZARIA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF A DEGREE OF DOCTOR OF PHILOSOPHY IN GEOGRAPHY

DEPARTMENT OF GEOGRAPHY
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ZARIA, NIGERIA

JANUARY, 2017

DECLARATION

I declare that this thesis entitled "**Analysis of Infant and Child Mortality Trends and Differentials in Kaduna State, Nigeria"** is carried out by me in the Department of Geography under the supervision of Prof. M. Mamma, Prof. J.G Laah and Dr. D.N Jeb**.** The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this thesis has been previously presented for another degree or diploma in this or any institutions.

Anslem Rimau Bako _____ _____

Signature Date

CERTIFICATION

This thesis entitled **"Analysis of Infant and Child Mortality Trends and Differentials in Kaduna State, Nigeria"** by Anslem Rimau BAKO meets the regulations governing the award of degree of Doctor of Philosophy (PhD) in Geography of the Ahmadu Bello University, and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This research is dedicated to the memory of my beloved father (Late) Mr. Lawrence Shehu Bako (Fuham)

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ABSTRACT

Despite modest improvements in child health outcomes during the 20th century, infant and child mortality rates remain unacceptably high in Nigeria. Infant and child mortality rate in Kaduna State is a major concern as the State recorded 88 deaths per 1,000 live births and 179 deaths per 1,000 live births in 2010. The aimed of this study is to analyze infant and child mortality trends and differentials in Kaduna State, Nigeria. The objectives were to determine the level and examine the trend of infant and child mortality rate from 2005-2014; examine the socio-economic and demographic differentials in infant and child mortality and the factors that determine infant and child mortality rate in the study area. Data from the hospitals in the Local Government Areas from 2005 to 2014 were analyzed to assess the trends of infant and child mortality. A total of four hundred (400) copies of semi structured questionnaire were administered using purposive sampling technique, of which 386 were found useful for analysis. The data were analyzed using descriptive statistics, ANOVA and regression analysis using SPSS 20.0 version. The descriptive statistics showed that 66.3% of the respondents are between the ages of 20 and 34 years, 36.8% are Hausa/Fulani, 28.8% have attended secondary school, and most of the respondents (21.8%) have monthly income between ₦30,001-₦40,000. Malaria is the major cause of under-five deaths with 30.1%. Experience of under-five (U5) mortality was found to differ by education, income, and occupation. The result also shows that under-five mortality is higher between women within 15-24 than 25-34 years. Women that got married early (15-24 years) experience more under-five mortality than the adult (25-34 years). Women with no formal education were found to experience more under-five mortality than those with formal education. The level of under-five mortality in Kaduna State has remained high since the past 10 years with an estimated under-five mortality rate of

163/1,000 live births. The trends in under-five mortality in Kaduna State since 2005 has been on the decrease, although the decrease is small over the years in which 2011, 2012, 2013 and 2014 witnessed steady decline or no change in the trends of infant and child mortality. Six factors were significantly associated with under-5 mortality, namely, distance to health facility, age at first marriage, age of mothers, current marital status, level of education, and length of breast feeding. Logistic regression revealed that distance from the health facility had the most significant correlation (0.379), followed by age at first marriage (0.138), age of mother (0.118), marital status (0.064), level of education (0.064) and length of breast feeding contribute (0.054). On the basis of the findings, the study recommends that programme interventions need to focus on mothers with low socioeconomic status. Also, the adolescent girls should be encouraged to go to school to acquire at least secondary education. This will increase age at first birth and reduce child death at first birth. Health services should be brought nearer to the communities so that mothers can have access to health facilities during pregnancy postpartum services to reduce infant and child mortality in the State.

TABLE OF CONTENTS

Title page - - - - - - - - - - i

Declaration - - - - - - - - - - - ii

Certification - - - - - - - - - - - iii

Dedication - - - - - - - - - - - v

Acknowledgements - - - - - - - - - - - v

Abstract - - - - - - - - - - - viii

Table of Contents - - - - - - - - - - x

List of Tables - - - - - - - - - xv

List of Figures - - - - - - - - - - xvii

CHAPTER ONE: BACKGROUND TO THE STUDY

1.1 Introduction - - - - - - - - - - 1

1.2 Statement of the Research Problem - - - - - - - - 5

1.3 Aim and Objectives of the Study - - - - - - - - 11

1.4 Research Hypothesis - - - - - - - - - 11

1.5 Scope of the Study- - - - - - - - - - 11

1.6 Justification of the Study - - - - - - - - - 11

CHAPTER TWO: CONCEPTUAL, THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1 Introduction- - - - - - - - - - - 13

2.2 Conceptual Framework- - - - - - - - - 13

2.2.1 Neonatal Mortality- - - - - - - - - - 13

2.2.2 Post-neonatal Mortality- - - - - - - - - 14

2.2.3 Infant and Child Mortality- - - - - - - - - 15

2.2.4 Under-five Mortality- - - - - - - - - 15

2.3 Theoretical Framework - - - - - - - 16

2.4 Literature Review- - - - - - - - - 19

2.4.1 Labour Market Status of the Mother - - - - - 19

2.4.2 Biological and Maternal Determinants of Child Survival - - - 19

2.4.3 Socioeconomic Determinants of Child Survival - - - - 19

2.4.4 Parent's Education - - - - - - - - 21

2.4.5 Place of Residence - - - - - - - - 23

2.4.6 Labour Market Status of the Mother- - - - - - 24

2.4.7 Demographic Differences and Infant and Child Mortality- - - - 25

2.4.8 Birth Order - - - - - - - - - 27

2.4.9 Birth Interval- - - - - - - - - 27

2.4.10 Age of the Mother- - - - - - - - - 29

2.4.11 Sex of the Child- - - - - - - - - 31

2.4.12 Environmental Health Determinants of Child Survival - - - - 33

2.4.13 Nutrient Deficiency as a Determinant of Child Survival - - - - 36

2.4.14 Healthy Seeking Behaviour as a Determinant of Child Survival - - - 37

2.4.15 Income - - - - - - - - - - 38

2.4.16 Breastfeeding and Immunization- - - - - - - 39

2.4.17 Mortality - - - - - - - - - - 40

2.4.18 Culture and Norms - - - - - - - - - 41

2.4.19 Overview of Malnutrition- - - - - - - - 41

2.4.20 Protein-Energy Malnutrition in Children Under Five Years- - - - 42

2.4.21 Marasmus and Kwashiorkor Among Children in the Urban Slums- - - 43

2.4.22 Hunger and Realities of Under Nourishment- - - - - 44

2.4.23 Anthropometric Indicators of Child Malnutrition- - - - - 45

2.5 Relevant to the Reviewed Materials to the Study- - - - - 46

CHAPTER THREE: THE STUDY AREA AND METHODOLOGY

3.1 THE STUDY AREA- - - - - - - - - 47

3.1.1 Location and Size - - - - - - - - - 47

3.1.2 Physical Setting- - - - - - - - - - 47

3.1.3 Climate - - - - - - - - - - 48

3.1.4 Geology and Relief- - - - - - - - - 50

3.1.5 Soil and Vegetation- - - - - - - - - 51

3.1.6 Historical Development - - - - - - - - 52

3.1.7 Population and Growth Distribution- - - - - - - 53

3.1.8 The Economic Activities- - - - - - - - 53

3.1.9 Basic Infrastructure and facilities- - - - - - - 56

3.2 METHODOLOGY - - - - - - - - 58

3.2.1 Reconnaissance Survey- - - - - - - - 58

3.2.2 Types of Data-- - - - - - - - - 58

3.2.3 Sources of Data- - - - - - - - - 58

3.2.4 Sample Frame- - - - - - - - - 60

3.2.5 Sampling Size and Sampling Technique - - - - - 60

3.2.6 Data Analysis-- - - - - - - - - 63

CHAPTER FOUR: RESULTS AND DISCURSSION

4.1 Introduction- - - - - - - - - - 64

4.2 Demographic and Socio-economic Characteristics of the Respondents- - 64

4.2.1 Age and Ethnicity- - - - - - - - 64

4 .2.2 Religion of the Respondents- - - - - - - - 65

4.2.3 Education, Occupation and Income of the respondents- - - - 66

4.2.4 Marital Status of the Respondents- - - - - - - 69

4.2.5 Age at Marriage- - - - - - - - - 74

4.2.6 Age at First Birth- - - - - - - - - 71

4.2.7 Type of Marital Union-- - - - - - - - 72

4.2.8 Household Size of the Respondents - - - - - - 72

4.2.9 Number of Children in the Household - - - - - 74

4.2.10 Number of Surviving Children- - - - - - - 75

4.2.11 Sex Preference- - - - - - - - - 75

4.2.12 Type and Ownership of Accommodation- - - - - - 76

4.3 Health Facility- - - - - - - - - 78

4.3.1 ANC Visitation and Health Care Centre Patronage - - - - 78

4.3.2 Postnatal Care Visitation and Reason for Health Care Centers Patronage- - 80

4.3.3 Distance to and Means of Mobility to Health care Facilities - - - 82

4.4 Water Supply and Type of Toilet Facilities- - - - - - 84

4.5 Nutrition- - - - - - - - - 85

4.5.1 Breast Feeding Practices - - - - - - - - 85

4.5.2 Introduction of Solid Food - - - - - - - - 87

4.5.3 Supplementary Feeding- - - - - - - - 88

4.5.4 Under-five Feeding Food- - - - - - - - 89

CHAPTER FIVE: INFANT, CHILD MORBIDITY AND MORTALITY

5.1 Introduction- - - - - - - - - 91

5.2 Type of Morbidity- - - - - - - - 91

5.3 Immunization-- - - - - - - - 95

5.4 Use of Mosquitoes Nets- - - - - - - 93

5.5 Causes of Infant and Child Mortality - - - - - - 93

5.6 Levels Trends and Differentials in Infant and Child Mortality- - - 96

5.6.1 Introduction- - - - - - - - - 96

5.6.2 Levels of Infant and Child Mortality - - - - - - 96

5.6.3 Under Five Mortality-- - - - - - - 99

5.6.4 Trends of Infant and Child Mortality- - - - - - 101

5.6.5 Trend of under-five Mortality- - - - - - 103

5.6.6 Spatial Trends of Infant and Child Mortality - - - - - 106

5.6.7 Socio-Economic Differentials of Infant and Child Mortality- - - 109

5.6.8 Selected Demographic Analysis of Infant and Child Mortality Differentials - 114

5.6.9 Factors of Infant and Child Mortality- - - - - - 118

5.6.10 Test of Hypothesis - - - - - - - - 127

CHAPTER SIX: SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Summary of the Findings- - - - - - - - 129

6.2 Conclusion- - - - - - - - - 132

6.3 Recommendations- - - - - - - - 133

6.3.1 Recommendation(s) for Further Research- - - - - - 136

REFERENCES- - - - - - - - - 140

APPENDIX I: Questionnaire- - - - - - - 154

APPENDIX II: Focus Group Discussion- - - - - - 169

APPENDIX III**:** Co-efficient of under-five mortality- - - - - 170

APPENDIX IV: ANOVA of Under-Five Mortality- - - - - - 177

LIST OF TABLES

Tables	Description	Page
3.1	Sample Size by Local Government Areas - - - - -	60
4.1	Age and Ethnicity of the Respondents- - - - - -	65
4.2	Distribution of Respondents According to Education, Occupation and Income -	67
4.3	Marital Status, Age at first Marriage and Age at first Birth - - -	70
4.4	Household Size of the Respondents- - - - - - -	73
4.5	Distribution of Respondents by Number of Surviving Children- - -	75
4.6	Respondents by Reasons for Sex preference - - - - -	76
4.7	Type and Ownership of Accommodation- - - - - -	77
4.8	Ante-natal Clinic Visitation and health Care Centre Patronized -	78
4.9	Postnatal Care Visitation and Reasons for Patronizing Health Care Centers- -	81
4.10	Distance and Means of Mobility to Health Centre - - - -	82
4.11	Sources of Water Supply and Type of Toilet Facilities - - - -	84
4.12	Breast feeding Practices by the respondents - - - - -	86
4.13	Introduction of Solid Food - - - - - - - -	87
4.14	Frequency of Eating Balance Diet - - - - - - -	90
5.1	Type of Children Morbidity- - - - - - - -	91
5.2	The use of Treated Mosquitoes Nets by the Respondents- - - -	93
5.3	Causes of Infant and Child Mortality- - - - - -	94
5.6	Socioeconomic Differentials of Under-five Mortality- - - -	110
5.7	Demographic Analysis of Infant and Child Mortality Differentials- - -	116
5.8	Regression Analysis of Under-Five Mortality- - - - -	120
5.9	ANOVA of Under-five Mortality- - - - - - -	122

LIST OF FIGURES

Figures	Description	Page
2.2	Conceptual and Theoretical Framework for Infant and Child Mortality- -	17
3.1	Map of Kaduna State Showing the Study Area- - - - -	48
4.1	Distribution of Respondents by Religion- - - - - -	66
4.2	Distribution of Respondents by Type of Marital Union - - -	72
4.3	Percentage Distribution of Respondents by Number of children - - -	74
4.4	Percentage Distribution of respondents by Type of Supplementary Food to U5-	88
5.1	Percentage Distribution of Respondents by Immunization Coverage- -	92
5.2	Levels of Infant and Child Mortality Per Year - - - - -	98
5.3	Levels of Under–Five Mortality Per Year - - - - - -	100
5.4	Trends in infant and child Mortality Rates, 2005-2014- - - -	102
5.5	Trends of Under-five Mortality from 2005-2014- - - - -	103
5.6	Spatial Trends of Under-Five Mortality from 2005-2014 - - -	107
5.7	Spatial Location of Under-five Mortality- - - - - -	108

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Health is a state of human well being which in 1948, the United Nations (UN) declared as a right (United Nations, 2008). Thus, striving for improvement in health is a moral obligation for policy-makers at all levels of governance (National and International). In addition to being a goal, scholars have posited the significance of health to human development. This represents a shift in development strategy; earlier, health has been viewed as an end of development, but now the general tenet is that improvement of health standards is a means to achieve other aspects of development (Mamman, 1992; Kumar and File, 2010; World Health Organization (WHO), 2013; Bello and Joseph, 2014). Death of children under five is a factor that defines the well-being of a population and it is usually taken as one of the development indicators of health and socioeconomic status which indicate the quality of life of a given population, as measured by life expectancy (Buwembo, 2010).

Infant mortality is defined as the death of a live born child between the day of birth and span of 12 months United Nation International Children Fund (UNICEF), 2008). The mortality rate among infants is the measure of probability of children dying before reaching the age of one year. Child mortality includes deaths that occur at ages 1 to 5 years. The reduction of infant and child mortality is a worldwide target and one of the most important key indices among Sustainable Development Goals (SDGs) of reducing infant and under-five child mortality rates by two-thirds from the 1990 levels by 2015 (Desta, 2011). As a result of this, in October 2008, the Nigerian government‘s National Health Insurance Scheme (NHIS) launched a pilot health project, titled the NHIS/SDG Maternal and Child Health Project (Bello and Joseph, 2014). The Project

focuses on reducing maternal and child mortality and is assisted by the World Bank's Heavily Indebted Poor Countries Initiative funds (HIPC).

Cases of infant and child mortality are largely under-reported and seldom documented in developing countries (Nigeria inclusive). Survival efforts can be effective only if they are based on accurate information of the cause of morbidity (Abhulimhen and Iyoha, 2012). The environment where the child is born and raised is increasingly becoming so unhealthy so that the life of the child is continually threatened by diseases (Chaudhari, Srirastava, Maitra and Desai, 2009). Another factor that is affecting the survival of infants and children has been identified to be the increasing devastating effect of Human Immunodeficiency Virus / Acquire Immune deficiency Syndrome (HIV/AIDS). This threat has become a major concern affecting the lives of families and thereby reducing the survival chances of the child (Baingana and Bos, 2009).

Many countries have shown considerable progress in tackling child mortality rate and it has been more than halved in Northern Africa, Eastern Asia, Western Asia, Latin America the Caribbean and Europe. It has placed them on track to achieving the (SDG) in contrast to many countries with unacceptably high rates of child mortality. Sub-Saharan Africa which accounts for $1/5^{th}$ of the population of children under 5years, also accounts for half (8.8 million) of deaths in 2008 indicating insufficient progress to meet the SDG 2020 target world health organization (WHO, 2014).

Smith (2010), posited that infant and child mortality rate is high in Sub-Saharan Africa. Despite the region having only one fifth of the world's infants population, it habours half of childhood deaths globally. Worldwide, mortality in children younger than 5 years has dropped from 11.9 million deaths in 1990 to 7.7 million in 2010. About 33.0 percent of deaths of children younger than 5 years occur in South Asia and 49.6%

occur in Sub-Sahara Africa with less than one (1) percent of deaths occurring in high income countries (Rajaratnam, Tran, Lopez, and Murray, 2010).

In Nigeria, an examination of mortality levels across three successive five-year periods show that under-five mortality decreased from 199 deaths per 1,000 births during the middle to late 1990s (1993-1998) to 157 deaths per 1,000 births in the middle part of this decade (2003-2008) and 128 deaths per 1, 000 births in 2013 (NPC and ICF Macro, 2013). Infant mortality rates have remained steady at 75 deaths per 1,000 births for 1999 and 2008 while under-five mortality rates show increase between 1999 and 2008. Under-five mortality rates increased from 140 deaths per 1,000 live births in 1999 to 157 deaths in 2008 (Buwembo, 2010).

Socio-demographic and economic factors play important roles in determining child survival all over the world (Shawky and Milaat, 2011). For instance mothers' education has an implicit effect on the health of children (Abuqamar, Coomans and Louckx, 2011). Early marriage has also been identified in several studies to have affected both the socioeconomic condition and infant mortality (Othman and Saadat, 2009). A study conducted by Raj, Saggurti, Micheal, Alan, Michele, Decker, Balaiah and Jay (2010) in India showed that children born to mothers who were married before attaining the age of 18 were at a higher risk of stunting and underweight compared to children of women who had married at age 18 or older.

According to National Population Commission (NPC) and ICF Macro (2009), at the geopolitical level, the northwest zone has very high prevalence rate of 91 and 139 deaths per 1000 live birth for infant and child mortality respectively. Similarly, Bello and Joseph (2011) reported that the zone has mortality rate of 188 per 1000 for age 0-5 followed by the north east with 175.2 death while the lowest rate was recorded in the central region of Nigeria.

The above portends the complex scenario experienced from each of the components of Nigerian State; the proportion coming from each component cannot be assumed as equal, since the differences in child mortality across states and regions are overwhelmingly explained by economic and social factors therein given the different approaches employed by various governments. This present situation notwithstanding, may not mean that there was no improvement in the child mortality situation as a result of different public and donor interventions, but, the pace still remains too slow to achieving the Millennium Development Goals of reducing child mortality by a third by 2020 in Kaduna State.

In Kaduna state, both infant and child mortality have been unstably declining at gradual rates over the years at a high prevalence rate of 115 deaths per 1,000 live births and 205 deaths per 1000 live births for infant and child mortality respectively in 2003, 91 deaths per 1,000 live births and 189 deaths per 1,000 live births for infant and child mortality respectively in 2007, and 88 deaths per 1,000 live births and 179 deaths per 1,000 live births for infant and child mortality respectively in 2010 (NPC and ICF Macro, 2009; Partnership for Transformation of Health System (PATHS), 2010; PATHS, 2010). This slope sluggishly and still a far cry from Sustainable Development Goal (SDGs) of a reduction in infant and child mortality rate by about two third within 1990 to 2020.

The increase in mortality rates in Kaduna State seem to be firmly established and this would appear as the most striking demographic phenomenon of the last seven years. While, the pattern of mortality increase in Kaduna State bears similarities to the observed pattern in the early stage of the demographic transition, it is occurring now under quite different social, economic, and medical conditions. Child mortality rates are

rapidly increasing as more infants are born with HIV and antropogenic factors such as internal crises, malnutrition and climate change (KMOH, 2014).

1.2 STATEMENT OF THE RESEARCH PROBLEM

The impact of different health conditions vary by age and sex as a result of both biological and behavioural factors that determine susceptibility to certain illnesses or injuries. Also, the relative weight of different age groups in the population interacts with the age-specific risks of death from various causes to determine the percentage distribution of deaths by cause over the course of the demographic and epidemiologic transitions. Therefore, examining causes of mortality by age and sex is critically important for understanding the transition processes.

Sufficient details are lacking in understanding the levels and determinants of infant and child mortality at the local government level, given the peculiarities of each local government area in Nigeria. Kaduna State has unacceptably high mortality rate and disease burden profile. In 2008, the infant mortality rate (IMR) was 115 per 1,000 live births; under-five mortality rate (U5MR) was 205 per 1,000 live births and Maternal Mortality Ratio (MMR) was 980 maternal 800/100,000 live births (about 1 death for every 12 pregnant women) (PATHS, 2010). An alarming fact was that these figures represented a worsening trend over the previous five years. Corresponding figures for 2007 were 91, 191 and 950 respectively (NPC and ICF Macro, 2009). These figures represent a worsening trend. Leading causes of morbidity and mortality are communicable disease, malaria, diarrhea diseases, respiratory tract infection and vaccine-preventable diseases (VPD).

Most studies have approached infant and child mortality based on trend analysis. For instance, (Wilopo, 2009; Hong, Ayad, Rutstein and Ren, 2009; Bongaarts, 2014) showed that there is a declined in infant and child mortality. However these studies did

not focused on differentials. Infant and child mortality differentials help to explain the particular group or areas to tackle so as to reduce the mortality rate.

Wong, Tam, Yu, and Wong (2002) investigated the association between air pollution and mortality in Hong Kong. A Poisson regression was performed to examine the relationship between concentration of daily air pollutants and daily mortality from respiratory and cardiovascular diseases during 1995 -1998 using an Air Pollution Health (APHEA) approach. They found significant associations between the concentration of all pollutants and mortalities from all respiratory diseases and Ischaemic Heart Diseases (IHD). Similar findings were reported in a study by Kumar and Gemechis (2010) using data from the 2005 Ethiopian Demographic and Health Survey. The study reported that birth interval, mother's literacy, household wealth, mother's age at birth, mother's exposure to mass media, sex of the child, religion, family size, birth order and residence were important predictors of infant and child mortality. These studies did not focused on infant and child mortality and the use of primary data.

In another study, Pandey (1998) examined infant and child mortality in India. The research revealed that sex of the child, mother's residence, mother's exposure to mass media, use of clean cooking fuel, mother's literacy status, access to a toilet facility, mother's religion and ethnicity, income of the household, birth order, mother's age at birth and mother's health care were important determinants of infant and child mortality. Rasheed (2008), examined the trend and pattern of under-five death in Lagos state, Nigeria was able to examine closely the trend in under-Five mortality rate in the country and his work showed that the projection of 55 per 1000 for 2015 may be unattainable because of the unabating increase recorded in the past five years. This study using secondary data shows that 73.8% of the children die before their first birthday while 37% die before the end of their first month. The most common killers of

the under five children are found to be Bronco Pneumonia, Sepsis, Anemia and Malaria. He further highlighted the role of Traditional beliefs in treatment of under-5 illnesses. These studies only used secondary data without the use of primary data and the studies did not look at the mortality differentials.

Mahy (2003) worked on Childhood Mortality in the developing world and reviewed evidence from the demographic and health surveys from 56 developing countries using the bio-demographic and socio-economic variables. The results of this study showed that in sub-sahara Africa (SSA), large number of children die between age one and four, the age range with potentially the most preventable childhood deaths. Furthermore, the results showed that under five mortality ranges from 25 deaths per 1,000 live births in Turkey to 274 per 1,000 in Niger Republic. Only three of the 29 countries (Namibia and Gabon) surveyed in SSA have under-five mortality rates below 100 per 1,000. This study focused on childhood mortality with no specific reference to either infant or mortality differentials and only makes use of secondary data from Demographic and Health survey.

Fayehun and Obafemi (2006) investigated ethnic differentials in childhood mortality in Nigeria using the Nigerian Demographic and Health Survey data of 2003. The researchers organized 40 Focused Group Discussions (FGDs) and 40 In-depth Interviews (IDI) to complement their finding on the NDHS. Employing the direct estimates and Cox regression on childhood mortality, found significant difference in U5MR with ethnic groups and particularly observed that the northern parts of Nigeria have the highest risks. Significant effects of demographic and socio-economic variables on childhood mortality were also affirmed. However, the study only focused on investigated ethnic differentials in childhood using secondary data without looking at the trend of infant and child mortality using primary source.

In the same light Smith, (2009) studied the relationship between maternal schooling and child mortality in Nigeria, using data from NPC and ICF Macro, (2009) and observed that maternal schooling still independently decreases odds of U5MR. A Population-based study of effect of multiple births on infant mortality in Nigeria by Uthman (2010) examined the relationship between multiple births and infant mortality using invariable and multivariable survival regression procedure with Weibull hazard function, controlling for child's sex, birth order, prenatal care, delivery assistance, mother's age at child birth, nutritional status, educational level, household living conditions and several other risk factors. The results showed that children born multiple births were more than twice as likely to die during infancy as infants born singleton holding other factors constant. Maternal education and household index were associated with lower risk of infant mortality. None of these studies have analyzed the trends and differentials of infant and child mortality using both primary and secondary data. This study observed differentials, but on regional scale studies of infant and child mortality differentials are rarely approached from local scales especially LGA which are the fundamental units for health care infrastructural planning and records.

Oladapo, Lamina and Fakoya (2006) investigated maternal deaths in Olabisi Onabanjo University Teaching Hospital, Sagamu, Nigeria, in 2005 using registers labour, delivery records and retrieved case files. The study revealed that major causes of deaths were hypertensive disorders in pregnancy, haemorrhage and sepsis. Mojekwu (2012) examined the environmental determinants of child mortality using principal component analysis as a data reduction technique with varimax rotation to access the underlying structure for sixty-five measured variables explaining the covariance relationships amongst the large correlated variables in a more parsimonious and simultaneous multiple regression for child mortality modeling in Nigeria. The result

from the stepwise regression model shows that household environmental characteristics do have significant impact on mortality. These studies only use secondary data as the only source of their information on infant and child mortality.

Researches on sickness and healthcare delivery system (FMoH, 2011; Bako, Mamman and Laah, 2014; Fagbamigbe and Olalere, 2014) in Kaduna State have remained heavily biased towards the analysis of the use of health facilities, the impact and effects of the disease, the survival strategies of those living with the disease and the occurrence of diseases and not the trend of infant and mortality differentials. For mortality, however, the practicability of survey data is more limited since direct analysis of mortality requires longitudinal data as well as long observation times and large sample sizes in order to provide a sufficient number of deaths (Fantahu, 2008).

Iwalaiye (2009) assessed maternal mortality (MM) levels and differentials in Kaduna State using structured questionnaire and found that married women had the highest maternal deaths cases. In most developing countries including Nigeria, the traditional sources of Maternal Mortality (MM) statistics (vital registration system and sample surveys) in which the estimate of Maternal Mortality Rate (MMR) is based are unreliable and completely imperfect consequently the estimate obtained directly from such sources are often flawed and misleading. Iwalaiye (2009) research was on maternal mortality and not on infant and child mortality.

Kyei (2011) investigated the socio-economic factors with respect to the disparities in place of residence and how it affects under-5 mortality in South Africa using data from Demographic Health Survey. His study showed that parent place of residence, mothers education, occupation, marital status, duration of breast feeding as well as loss of older children previously are factors affecting under-5 mortality in South Africa. Olufunke and Obafemi (2006) examined the direct estimates and Cox regression

on ethnic differentials in childhood mortality in Nigeria using secondary data from Nigeria Demographic and Health Survey of NPC and ICF Macro, (2003) complemented with 40 focus Group Discussions (FGDs) and 40 in depth interviews (IDI) among selected ethnic groups in Nigeria. The study indicated significant difference with ethnic groups in Northern Part of Nigeria having the highest risk.

Several health agencies both at the international and national levels, including non governmental agencies across the globe have striven towards combating the menace of under-five mortality. However, to the best of the knowledge of the researcher no study has been carried out on the trends and levels of mortality among under-five children in Kaduna state. Even where research exists on other parts of the country, very few of such works have placed emphasis on the socioeconomic differentials. Studies in these areas have not clearly indicated the pattern or trends of infant and child mortality as to whether the trend is increasing or decreasing in Kaduna State. The study was therefore carried out to find out the levels of infant and child mortality rate, trends and to find out whether the socio-economic condition of the parents affect under-five mortality in Kaduna State.

This research therefore aims at addressing the following research questions:

1. What is the level of infant and child mortality in the study area?
2. What is the trend of infant and child mortality rate in the study area?
3. What are the factors that determine infant and child mortality rates in the study area?
4. What are the differentials in infant and child mortality rates between socio-economic and demographic characteristics in the study area?

1.3 AIM AND OBJECTIVES

The aim of this study is to analyze infant and child mortality trends and differentials in Kaduna State. However, the specific objectives are to:

i determine the level of infant and child mortality in Kaduna State.

ii examine the trend of infant and child mortality rate from 2005-2014.

iii identify factors responsible for infant and child mortality rate in the study area

iv examine the socioeconomic and demographic differentials of infant and child mortality in Kaduna State

1.4 RESEARCH HYPOTHESIS

There is no significant difference between infant and child mortality rates across socio-demographic characteristics in the study area.

1.5 SCOPE OF THE STUDY

The study is concerned with the analysis of infant and child mortality trends and differentials. It covers three (3) out of the twenty three (23) Local Government Areas (LGAs) of Kaduna State. This study focuses on residential and socioeconomic factors influencing infant and child mortality in the study area among parents who have ever had/ still have children and whose children are not above the age of five. Information covers the demographic and socioeconomic characteristics of respondents, infant and child mortality information, availability and accessibility of health care services, type, availability and accessibility of other basic amenities and information received from the proposed focus group discussions. The data for the research were collected for the span of ten years (2005 - 2014).

1.6 JUSTIFICATION OF THE STUDY

The study is expected to elicit the influence of socio-cultural dimension issues influencing under-five mortality. This study expected to elicit information that can greatly enhance a better understanding of some of the factors associated with under-five

years of age mortality rate in Kaduna State. The data can also be employed in explaining trends and differences in overall mortality rate among under-five years of age and be used in indicating priorities for health programmes and the allocation of resources. It can also be used for assessment and monitoring of public health problems and programmes among children under five years of age and to assist health educators to create community-based awareness for the people. The information can be used to stimulate discussions and action, prioritize the health delivery at the national level and to mobilize local, national and international resources for reducing mortality.

The findings of the study will provide information about the wide spread of child mortality rate to stakeholders like the department of probation and child protection, Ministry of Labour and Social Development, Ministry of Health, National council for children, UNICEF, WHO and other NGO's whose beneficiaries are children so as to improve the quality of child care and their health.

CHAPTER TWO

CONCEPTUAL, THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1 INTRODUCTION

The purpose of this chapter is to present the conceptual, theoretical framework including literature review to explain demographic, socio-economic, anthropogenic factors, environmental and health determinants of infant and child mortality. This framework will form the basis for the analysis in this study.

2.2 CONCEPTUAL FRAMEWORK

In this section, there are some technical concepts relevant to the study and demand for clarification in the way and manner being used in this study. The concepts include neonatal, post-neonatal, infant, child, and under-five mortality.

2.2.1 Neonatal Mortality

The first 28 days of life the neonatal period represent the most vulnerable time for a child's survival. Neonatal mortality includes deaths that occur during the first 28 days of life (Ouma; Bashar and Tuno, 2014). The neonatal period begins with birth and ends 28 complete days after birth. Neonatal deaths may be subdivided into early neonatal deaths, occurring during the first seven days of life (0-6 days) and late neonatal deaths, occurring after the seventh day but before the 28th day of life. The WHO (2006) shows that, neonatal deaths in developed countries are declining and this is as a result of changing patterns in reproductive health, socioeconomic progress and improved quality of obstetric and neonatal facilities. On the other hand no good historical data on neonatal mortality are available for developing countries.

Causes and determinants of neonatal deaths differ from those causing and contributing to post neonatal and child deaths. Furthermore, WHO (2006)

suggests that neonatal deaths and stillbirths stem from poor maternal health, inadequate care during pregnancy, inappropriate management of complications during pregnancy and delivery, poor hygiene during delivery and the first critical hours after birth, and lack of newborn care. The report further points out that some babies die after birth because they are severely malformed, are born very prematurely, suffer from obstetric complications before or during birth, have difficulty adapting to extra uterine life, or because of harmful practices after birth that lead to infections.

2.2.2 Post-neonatal Mortality

Post-neonatal mortality includes death that occurs at ages 1 to 11 months (Ouma; Bashar and Tuno, 2014). Post-neonatal mortality is most often caused by infectious diseases, such as pneumonia, tetanus, and malaria. An important factor in reducing post-neonatal mortality is adequate nutrition, particularly breast milk, which provides babies with both the nourishment and the antibodies to fight 7 infectious diseases. Breast milk can be supplemented or substituted by mixing formula; however, it is important that clean water is used.

The issue of HIV-infected mothers' breast-milk has become controversial. A number of countries have instituted policies that recommend that mothers with HIV (human immunodeficiency virus) should not breast-feed, based on some evidence of mother-to-child transmission of HIV through breast-feeding. In contrast there are policies that promote breast-feeding in areas with high HIV prevalence. Because breast-feeding protects against the infectious diseases that take the lives of millions of infants every year, there is a policy debate about the best course of action to take. Researchers do not know if the protection against infectious diseases afforded by breast-feeding outweighs the risks of HIV transmission to children, so it is not possible to make a definitive conclusion about the risks and benefits of breast-feeding by mothers with

HIV. However, Maquins, Joacim, John, Mary, Amek, Frank, and Kayla, (2015) suggest that the breast-fed babies of mothers with HIV had six times the protection against diarrheal deaths in the first few months of life than babies who were not breast-fed. In the second half-year of life, protection against both diarrheal and acute respiratory infections was about double that for non-breast-fed babies.

2.2.3 Infant and Child Mortality

Infant mortality is defined as the death of a live born infant between birth and exact age one (1) (UNICEF, *et al*. 2007). Infant mortality rate is the probability of a child born in a specific year or period dying before reaching the age of one, if subjected to current age specific mortality rates of that period.

Infant mortality is a potentially important indicator. This is because mortality tends to decline more slowly among infants than among children aged 1 to 5. Child mortality includes deaths that occur at ages 1 to 5 years.

2.2.4 Under-five mortality

Under-5 mortality includes deaths that occur between birth and exact age 5 (Ouma; Bashar and Tuno, 2014)). Generally all deaths in childhood occur before age 5, thus the probability of dying by age 5 can be regarded as a good index of overall level of child mortality.

2.3 THEORETICAL FRAMEWORK

The theoretical framework for this research is based on the Mosely-Chen model that motivated the idea that countries with the same income per capita will have differing mortality rate since the relationship is mediated in several ways. For example analysis of household data will show a very strong relationship between mortality and both preceding and succeeding birth interval (Bello and Joseph, 2014). Hence, higher fertility, in turn is associated with income, but imperfectly so as both cultural factors and livelihood strategies (crucially the availability of alternative safety nets) play a role. So, policy to reduce fertility, either through promotion of productive health or through the provision of reliable safety nets, will bring down mortality. Mosley and Chen (1984) set the framework of child survival based on the assumption of all socioeconomic factors of child mortality necessarily operate through a common set of intermediate factors, they identify clearly the proximate and socioeconomic determinants of infant and child mortality and they categorized fourteen proximate determinants of infant and child mortality into five general groups based on some reasons (see Fig. 2.1) in an optimal setting, over 97% of children born can be expected to survive until the fifth birthday, proximate determinants through the socioeconomic factors operate to influence the infant and child mortality and socioeconomic, biological and environmental factors are the driving forces behind the reduction of infant and child mortality.

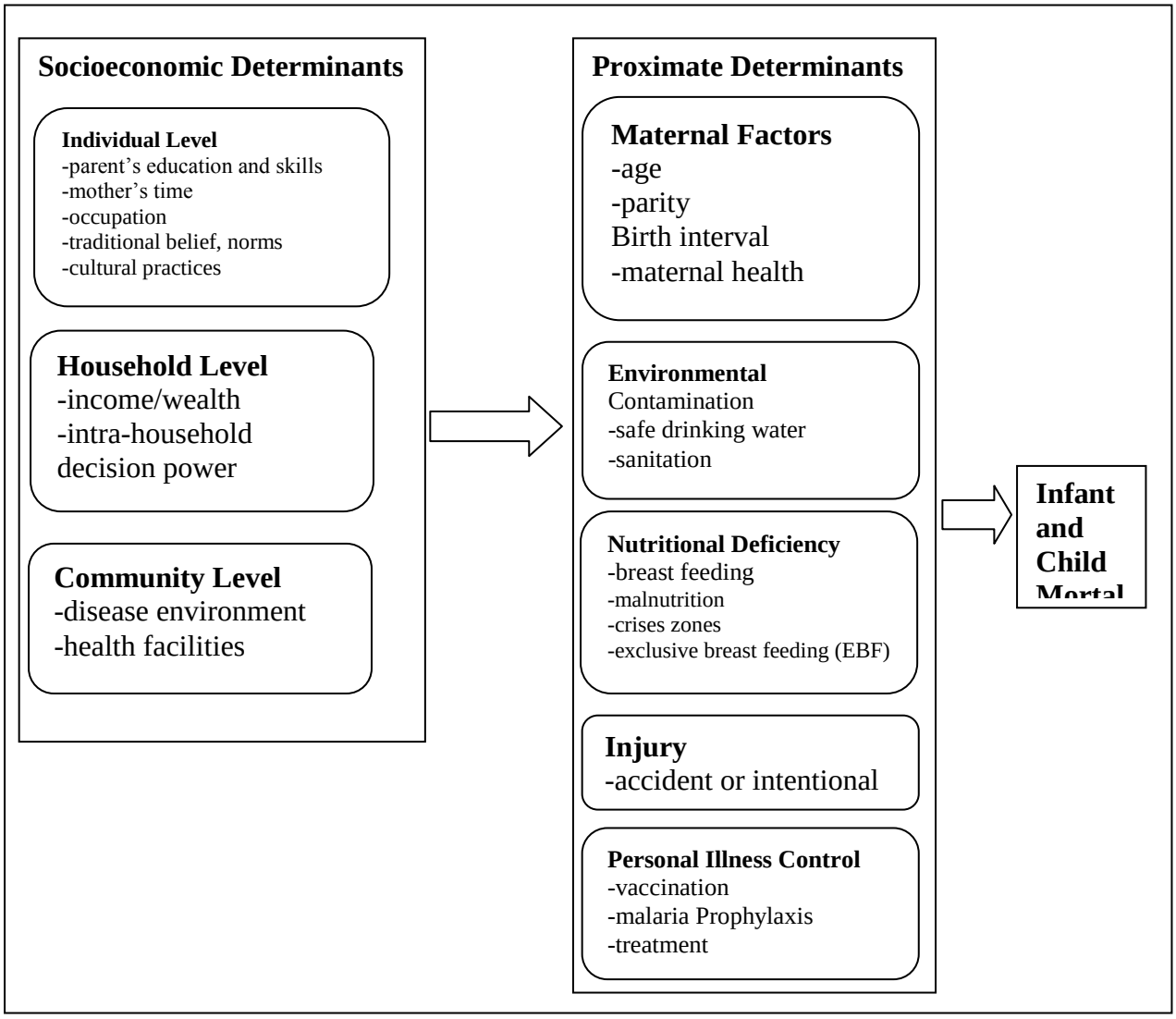


Fig 2.1: Theoretical Framework for Infant and Child Mortality
Source: Adopted and Modified from Mosely, Chen (1984) and Desta (2011)

Based on the model by Bryman and Cramer (1990) on quantitative data analysis for social scientists and Casterline, Cooksey and Ismail (1989), which build on the Mosley and Chen (1984) conceptual framework, our conceptual model shown in Figure 2.2 assumes that death is the final biological expression of a process that is determined basically by the economic and social structure of a country or region. These conditions influence the occurrence of the disease and its development, one of the possible outcomes of which is death. Structural determinants are mediated at the family level, since the child's growth and development are heavily dependent on the living

environment of his /her family. These conditions generate the biological risk factors that act directly on the child's health.

These determinants of mortality are grouped into four categories, namely; i) The socio economic characteristics such as mother's education, occupation, residence, resources of the household, income of the mother and medical care, ii) The intervening/housing conditions/ environmental variables such as source of water, toilet facilities and distance from home to the nearest health facility. iii) The demographic variables such as age of mother at child birth, Birth order, previous birth interval, breastfeeding and sex of the child. iv) Concept of access in terms of accessibility to geographical location, affordability in terms of financial capability, adequacy in term of quality services, acceptability in terms of cultural practices and availability in terms of facilities provision. From the theoretical framework shown in Figure 2.1, it is clear that socio-economic characteristics of mother play a key role in determining child mortality. They both directly and indirectly influence childhood mortality. Indirectly, they operate through demographic/housing conditions/environmental factors to influence infant and child mortality.

2.4 LITERATURE REVIEW

2.4.1 Labour Market Status of the Parent

Labour market or work status of the mother is likely to affect child survival in both directions. The need to work, especially outside the home, may affect survival chances directly, simply by preventing the mother from caring for the infant. This may have substantial effects through lack of proper feeding and particularly breastfeeding early in life (Hobcraft, McDonald, and Rutstein, 1984). However, a working mother can also be associated with high family income which can increase a child's survival.

Short, Chen, Entwisle and Fengying (2002) identified that both work compatibility and work intensity reduce women's involvement in child care in China. However, they also pointed out that, if women with intensive work demands provide less child care, this does not necessarily hinder children's physical and psychological development. This is because in China, relatives or other members of the household assist in child care. Child care is not exclusively left to the mother.

2.4.2 Biological and Maternal Determinants of Child Survival

Mosley and Chen (1984) identified birth order, birth interval and age of the mother as factors which influence child survival. Studies conducted by Hobcraft, McDonald and Rustein (1985), Rutstein (2000) and Davanzo, Razzaque, Rahman, Hale, Ahmed, Ali, Mustapha and Gausia (2004) show the association of these factors to child survival.

2.4.3 Socioeconomic Determinants of Child Survival

The predominant causes of child deaths worldwide are diarrhoea, pneumonia and malaria. Cause of death is defined as "disease or injury which initiated the train of morbid events leading directly to death" (International Classification of Diseases, 2000). According to this definition, statistics on causes of children under-five deaths do

not take into account factors that have indirect impacts on child health, and that constitute the underlying causes of death. Examples of such factors are living environment and demographic characteristics of the household. In understanding, addressing and ultimately mitigating the problem of excess child mortality, it is important to investigate the impact and causeway of these non-medical factors. This has lately been recognized by both medical and social scientists and large international Child health organizations such as the World Health Organization, The World Bank, International Monetary Fund and UNICEF.

The renewed focus on underlying causes of death has lead to the emergence of the buzz-phrase social determinants of health. Social determinants of health are the conditions in which people live, and that affect their opportunities to lead healthy lives (Labonté and Schrecker, 2007). Examples of social determinants of health are cultural, tradition, and religious practices (World Health Organization, 2011). The point of introducing social determinants of health is therefore not to exclude factors traditionally focused upon in health research, but rather to include the root causes of health outcomes.

The relationship between socioeconomic factors and childhood mortality has been well established by several studies, namely: Hobcraft, McDonald, and Rutstein, (1984): Cleland (1990): Hobcraft (1993): Machado and Hill (2005). The framework adopted from Mosley and Chen (1984) in this study uses mother's education, type/place of residence, and labour market status of the mother as socioeconomic factors which might influence child survival.

2.4.4 Parent's Education

Parent's educational level can affect child survival by influencing her choices and increasing/limiting her skills in health care practices related to contraception, nutrition, hygiene, preventative care and disease treatment. In many cases correlation between the health effect and the educational level of the father or other non-childbearing, economically productive adult members in a household largely occur because of operations on the proximate determinants through the income effect (Mosley and Chen 1984).

The relationship between parent's education and child survival has received a lot of attention and a number of studies have been conducted on this relationship. In Hobcraft, McDonald and Rustein (1984) the association of mother's education and child survival usually survived controls of other socioeconomic variables. The research further suggested that there was no threshold level of maternal education that needed to be reached before advantages in child survival began to accrue. However, some studies have shown that the associations between mother's education and child survival were weaker in Sub-Sahara Africa than in Asia or particularly Latin America, where socioeconomic differentials were generally higher. The reason for this kind of association is unknown; however Hobcraft (1993) has tried to explain this association. He suggests that perhaps health infrastructures are weaker in sub-Sahara Africa, thereby inhibiting the ability of more educated mothers to take advantage of their human capital in the health environment. Different researchers suggest pathways whereby mother's education might enhance child survival. Cleland (1990) concluded that education may have a modest effect on health knowledge and beliefs.

Madise, Matthew and Margretts, (1999) in their study of several African countries found higher levels of education i.e. secondary schooling and beyond to be important for child health. However, Magadi (1997) suggests that father's not mother's

education is significantly associated with child health in Kenyan communities where the status of women is low. Mosley and Chen (1984) also indicated that parent's education may influence attitudes and thus preference in choice of consumption goods. They pointed out that this effect is likely to be most significant for child survival when a more educated father is married to a less educated parent. Parent's education can also be linked to other factors that shape and modify the economic choices and health-related practices of individuals according to cultural traditions and norms of society.

Education, and parent's education in particular, is one of the most frequently described social determinants of child mortality in developing countries, and empirical evidence strongly suggests that educated women have fewer and more healthy children than the less educated (Kiros and Hogan, 2001; Houweling and Kunst, 2010). Studying the relationship between maternal education and child mortality in 17 developing countries, Bicego and Boerma (1993) found a significantly higher mortality rate for children aged 0-23 months that had mothers with low levels of education. They also found neonatal mortality to be significantly less sensitive to maternal education than mortality among children aged 1-23 months. This is consistent with Hobcraft, McDonald, and Rutstein, (1984) who found an increasing impact of mother's (and father's) education on child mortality as children grow older. While some of the effects of education on child mortality found in the literature are likely to be associated with household wealth (Houweling and Kunst, 2010), there are many plausible explanations for why education has additional direct effects on child mortality.

Hobcraft (1993) found that while the evidence is strong for higher prevalence of diseases among the children of uneducated mothers, the difference is much larger in treatment of diseases, when investigating data from 25 developing countries. In his study, educated mothers proved to have better knowledge about illnesses and were more

likely to take their children to a health facility when falling ill. Hobcraft (1993) also found evidence that children of educated mothers were less likely to be undernourished in terms of stunting, wasting, Mid-Upper Arm Circumference (MUAC). To what extent these differences translate into improved chances of survival for the children of educated mothers is not estimated in the article, but it is reasonable to assume that the two are positively related (Hobcraft, 1993).

2.4.5 Place of Residence

Place of residence of the mother affects the survival status and nutritional status of the living children in developing countries. This relationship is well established by several studies; Nannan, Bradshaw, Timaeus and Dorrington (2000): Mahmood (2002): Sastry (2004). The urban areas usually have better infrastructure for health services compared to non-urban areas. They are usually more developed. Machado and Hill (2005) showed that having a mother who lives in the highest developed community reduced the odds of neonatal deaths. They concluded that community infrastructure may improve hygienic practices. Furthermore, interactions between friends and neighbours in the communities may lead to changes in behavior regarding infant care and in this case better off communities may benefit from the overall level of community education (Machado and Hill, 2005). Kanaiaupuni and Donato (1999) even suggested that paved roads and female labour force participation were also important.

In South Africa, there has been an increase in rural-urban migration of the black population since 1994. This was because the apartheid laws which restricted the movement of the black population were abolished. However, a substantially large number of people move to informal settlements next to big cities. The informal settlements do not enjoy similar infrastructure as other formal urban areas. A child living in an informal settlement has totally different living conditions compared to the

one living in a formal area. Both could be classified as living in an urban area or in the same city, which will give biased results. Sastry (2004) concluded that in Sao Paulo, children from disadvantaged families were worse off in urban areas because the deleterious effects of being disadvantaged were much larger in urban areas than they were in rural areas.

2.4.6 Labour Market Status of the Mother

Labour market or work status of the mother is likely to affect child survival in both directions. The need to work, especially outside the home, may affect survival chances directly, simply by preventing the mother from caring for the infant. This may have substantial effects through lack of proper feeding and particularly breastfeeding early in life (Hobcraft, McDonald, and Rutstein, 1984). However, a working mother can also be associated with high family income which can increase a child's survival. Ibrahim, Aden, Omar, Wall and Person, (1994) observed that non-farming mothers in a household with fewer children were more active than farming mothers in using oral rehydration therapy (ORT). They concluded that mothers who had more time to give to child care were more likely to use ORT**.**

Short, Chen, Enstwisle and Fengying, (2002) identified that both work compatibility and work intensity reduce women's involvement in child care in China. However, they also pointed out that, if women with intensive work demands provide less child care, this does not necessarily hinder children's physical and psychological development. This is because in China, relatives or other members of the household assist in child care. Child care is not exclusively left to the mother. Alternative child caregivers such as grandmothers can reduce a mother's burden greatly.

In India, Krishnaji (1995) showed that working mothers experience a greater child loss than non-working mothers in respect of both male and female children.

Generally, a narrower gender differential in child mortality among working mothers was observed in most of the states, however in the north and the north-west, the work status of women had a greater impact on male children than on girls. To explain the case in the north and north west. The author argued that it is because in general there is a strong bias against girls in these states. The male children of non-working mothers are the best protected among all categories so that the withdrawal of this protection by working mothers if what is observed can be described so - has a greater impact for boys. He concluded that the narrower gender differential in child mortality among working mothers could be due to the exposure women get and thus changed attitudes towards girls.

2.4.7 Demographic Differences and Infant and Child Mortality

Many studies have shown that the infant and child mortality are influenced by a number of demographic factors such as sex of the child, mother's age at marriage, age at birth, birth order, preceding birth interval, breastfeeding practices and survival of preceding sibling(s) (Quamrul, Islam and Hossain, 2010).

Sunday, Clifford, Odimegwu, Latifat, Bob and Eunice (2010) in a multilevel analysis; Regional Inequalities in Under-five mortality in Nigeria, explained that a substantial regional disparity in childhood mortality exist in Nigeria. Consequently, this study investigates the socio-cultural dimension of things. However, evidence suggests that living in an economically and socially deprived community is associated with high risk of under-five mortality. Using 2008 Nigeria Demographic and health survey, he concluded that we contribute to the global discourse by examining the influence of community level characteristics (as opposed to individual level attributes) on childhood mortality in Nigeria.

Multi-level Cox proportional hazard analysis was performed on nationally representative sample of 28,647 children nested within 18,028 mothers of reproductive age who were also nested within 886 communities. Measures of association among characteristics were expressed using hazard ration (HR) with 95% confidence interval (CI). Result indicated that risk of death were almost twofold higher for children residing in the North-East and North-West region (HR: 1-90, CI: 1.35-2.70 P<0.001) compared with children in south west region of the country. Risk of death were lower for children of mothers attending prenatal care by a doctor (P<0.05) and for children of mothers who had hospital delivery (HR 0.70, CI.061, P<0.05).

Merrick (1993) showed that sex, and birth order of the child, maternal age at birth, birth interval, and survival of earlier sibling(s) has significant effect on infant and child mortality. However, the relative importance of these factors in relation to infant and child mortality risks varies with the level of social and economic well-being of the family and society at large. A number of studies conducted in different parts of the world by Hobcraft, McDonald and Rustein (1985) have revealed the influence of maternal age at delivery on the health and survivorship of children. Since a very young mother usually less than 20 years of aged mother is biologically not fully mature and the chances of pregnancy related complications are high and she might not be able to provide good care for the infants effectively. Woman with short birth intervals have insufficient time to restore their nutritional reserves, a situation, which is thought to be adversely affecting fetal growth. This situation may have a deficit on the nutrition of the young child (Boerma and Bicego, 1992). Uthman (2008) studied effects of multiple births on infant and mortality in Nigeria. Their findings show that multiple births are strongly negatively associated with infant survival and that children born multiple births

were more than twice as likely to die during infancy as infants born singleton, holding other factors constant.

2.4.8 Birth Order

High mortality has been associated with being the first born and with high birth order. Hobcraft, McDonald and Rustein (1985b), showed a clear excess of neonatal mortality for the first births and first born children continued to be at a disadvantage during the remainder of infancy. However, contrary to the general belief, there was no clear evidence of excess mortality for children of birth order four to six, nor even for those of order seven and higher, once the other factors in the regression model were controlled. This could suggest that mortality associated with births of high orders may be predominantly caused by other factors like birth intervals. However, it should be noted that the outcome of the first birth could be associated with the age of mother rather than the order. Hobcraft (1991) concludes that delaying the first birth until a woman is at least 18 years of age might reduce the risk of death for first born children by up to 20% on average and up to 30% in a few countries. Other researchers like Mohamed, Diamond, Smith, (1998) linked the death of the first born to low birth weight.

2.4.9 Birth Interval

A number of studies have demonstrated increased mortality risks among children born after short birth intervals. Some of these studies have investigated possible pathways through which preceding birth intervals may affect childhood survival. Boerma and Bicego (1992) provided possible pathways through which the relationship between preceding birth intervals and child survival might be affected, identifying prenatal and postnatal mechanisms. As far as prenatal mechanisms are concerned, it is believed that women with a short interval between two pregnancies have

insufficient time to restore their nutritional reserves, which might affect foetal growth. These researchers mentioned several studies which revealed increased risk of intrauterine growth retardation for shorter inter-pregnancy intervals. Both intrauterine growth retardation and prematurity lead to low birth weight, which is a strong determinant of infant mortality.

Postnatal mechanisms include poor nutrition of the mother, which may lead to impaired lactation and the inability to provide adequate care for the children. Sibling competition may also have an effect on the survival of the child. The results of Boerma and Bicego (1992) study suggest that prenatal factors are more significant than postnatal factors. Hobcraft, McDonald and Rustein (1985) concludes that short child spacing could be the dominant source of most of the apparent increase in risks at high birth orders and higher ages of the mother. Children born at very short intervals after preceding births (1 to 17 months) are about twice as likely to die as those born after intervals of 24 to 47 months: those born after 18-23 months experience an excess risk of about one-third (Hobcraft,1991).

Davanzo, Romani, Phillips and van Zyl (2004) summarize mechanisms that have been hypothesized to possibly contribute to the detrimental effect of a short birth interval on childhood survival as; (a) behavioural effect associated with competition among siblings, (b) the inability (or lack of desire) to give a child adequate attention if his or her birth came sooner than desired; and, (c) disease transmission among closely spaced siblings. Hobcraft, McDonal and Rustein (1985) in their quest to answer whether child spacing effects are real or artifactual, discussed the complex web of potential associations between breastfeeding, mortality and subsequent pregnancy. They concluded that the most plausible mechanism for the deleterious effect of short previous interval is maternal depletion. This results in a small baby, perhaps with increased risk

of prematurity. Low birth weight is associated with very poor survival chances. Some studies showed that the effects of birth spacing disappear if women attend prenatal care. For example Mahmood (2002), showed that for mothers with shorter previous birth intervals who have used prenatal care, their babies are significantly more likely to have better survival chances during the neonatal period than those mothers with the same short birth interval who did not receive prenatal care for the index child. This was earlier suggested by Boerma and Bicego (1992).

2.4.10 Age of the Mother

Some studies like those conducted by Hobcraft, McDonald and Rustein (1985): Rutstein (2000): Machado and Hill (2005) have shown some association between the age of the mother at birth and child survival. Hobcraft, McDonald and Rustein (1985) showed that mortality was clearly higher among children of teenage mothers. However, in their study there was nothing to suggest increased risks for children born to mothers at older ages, even those with mothers who were aged 35 or above after controlling for birth spacing. Mahmood (2002) on the contrary, observed that children of older women (30-39 years) were exposed to significantly higher neonatal and post-neonatal mortality.

In addition to her education level, a number of other characteristics of a child's mother are found to have significant effects on survival. Age at childbirth is one of these. In a study of determinants of child mortality in Malawi, Manda (1999) found risk of infant mortality to be considerably higher for relatively young and relatively old mothers. This could be explained by biological factors. While young women in their teenage years have increased risks of complications during delivery because they are not fully developed, older women have a higher risk of complications because their bodies and reproductive systems are "worn". Fertility characteristics such as the number and frequency of child births and the number of the child in the succession of births are also

found to have significant effects on child survival (Manda, 1999). These findings could also be accounted for by biological factors.

If child births occur with brief intervals, this could drain the mother of nutritional and reproductive resources and give her weak children, more likely succumb to infections. Under- and malnutrition is one of the largest direct causes of child deaths worldwide (World Health Organization, 2009a) and is closely related to another important maternal factor, namely breastfeeding. Breastfeeding is found to have a significant bearing on child mortality (Manda, 1999), and this can be explained by the fact that breast milk is very nutritious, contains antibodies that help protect the infant from infection causing diseases like diarrhea and pneumonia (World Health Organization, 2011a). All of these properties make breastfeeding especially important in low income settings where good alternatives to breast milk are not readily available and households have limited access to clean water. Like education, the maternal factors are generally worse for the least wealthy, with one exception: breastfeeding. Poor women with little or no education are usually breastfeeding their children for a longer period than the wealthier women (Alemayehu, Haidar and Habte, 2009: Houweling and Kunst, 2010). Last, but not least, use of health services, especially those directly related to pregnancy and delivery are important maternal determinants of child health. Closely related to this, is access to and quality of health services which are also important determinants of child health.

2.4.11 Sex of the Child

A number of studies have shown mortality differential by sex. Male mortality usually exceeds female mortality in the neonatal period, but this differential is reversed in the post-neonatal period. Higher female than male mortality continued through childhood and this is supported in studies by Bhuiya and Streatfield (1991): Arokiasamy (2002).

Son preference is most prevalent in East Asia, South Asia, Middle East and North Africa. Hesketh and Xing (2006) point out that son preference is manifest prenatally, through sex determination and sex selective abortion, and post-natally through neglect and abandonment of female children, which leads to higher female mortality. One would expect mother's education to intervene in sex discrimination. However, Bhuiya and Streatfield (1991) showed that the positive effect of mother's education on child survival is not similar for boys and girls in Bangladesh. The study revealed that for boys a change in mother's education from no schooling to 1-5 years of schooling resulted in a reduction in the predicted risk of 45%, while for girls it was only 7%. Furthermore, a change from no schooling to 6 or more years reduced the risk of dying by 70% for boys and by only 32% for girls. However, Eswaran (2002) concluded that the empowerment of women, which increases the bargaining power of wives relative to their husbands, results in a decline in fertility and in the mortality rate of children.

Although most studies show discrimination bias towards girls, Pande (2003) identified sex composition of siblings as a factor in selective discriminatory practices that affect the health of surviving children. The author identified that in rural India all girls do not face the same level of discrimination; the first girl born after two or more boys may face less discrimination than a boy who has two or more older brothers. On

the other hand, girls who were born into a family that already has two or more surviving daughters and no surviving sons are among the most likely to be severely stunted (38%) and are less likely to be immunized than are first daughters.

2.4.12 Environmental Health Determinants of Child Survival

Environmental conditions have long been considered to have a significant influence on mortality. These include access to sanitation, source of drinking water, source of energy and type of dwelling. Some of these factors are so interlinked that they will be discussed together rather than individually. For example Ezzati and Kammen (2002) argued that to understand the health effects of exposure to indoor smoke so that appropriate interventions and policies can be designed and implemented is a complex phenomenon. You have to isolate factors which determine human exposure, and their relative contributions of each factor to personal exposure. These factors include energy technology (stove-fuel combination), housing characteristics (e.g., the size of the house and the material it is built from, the number of windows, and the arrangement of rooms), and behavioural factors (e.g., the amount of time spent indoors or near the cooking area).

Studies conducted by Anderson, Romani, Phillips and van Zyl (2002) and Wichmann and Voyi (2006) have shown a strong association with access to clean water, sanitation, clean source of energy and with infant and child mortality. For environmental factors, source of drinking water, sanitation, housing materials and source of energy were investigated. Child mortality rates, more than doubled where the source of drinking water was other than piped water. Where poor sanitation existed child mortality rates are higher. The report also showed that there was a relationship between material used for the dwelling and source of energy with child mortality. Child mortality increased more than three times where other materials other than block/bricks are used for housing and also other sources of energy other than electricity were being used.

2.4.12.1 Source of Water and Access to Sanitation

Increased risk of potentially fatal diarrheal diseases is expected among households with no clean drinking water and/or with no safe sanitation. Some studies like Mahmood (2002) have shown a relationship between access to clean water and sanitation to under-5 mortality. Anderson, Romani, Phillips and Van (2002) in their study of black and coloured populations showed a hierarchy of needs in which without clean water, sanitation matters little. In their analysis they considered household social economic characteristic, access to and use of health care, environmental conditions and age of the mother.

The study by Anderson, Romani, Phillips and Van (2002) never took birth spacing into account when actually 5% of children born in the five years preceding the demographic and health survey fell in this category. This study included birth spacing as a control variable. Mahmood (2002) also found that families living in households with piped water connected in their houses have a significantly lower post neonatal mortality than those families which depend on wells for drinking water. However, the results did not show evidence of improved child survival in households that had flush toilets compared to those that did not have.

2.4.12.2 Sources of Energy

Cooking and heating with solid fuels on open fires or traditional stoves in poorly ventilated indoor environments leads to health hazards. Wichmann and Voyi (2006) suggested that exposure to cooking and heating smoke from polluting fuels is significantly associated with 1-59 months mortality in South Africa, after controlling for mother's age at birth, water source, asset index and household overcrowding.

Indoor pollution affects children more than it affects adults. Fitzgerald, Schell, Marshall, Carpenter, Suk, Jan and Zejda (1998) explain why children are more

vulnerable than adults. They argue that infants and young children have much greater surface-area to volume ratios than adults, thereby increasing the potential exposure through the skin. Infants and young children engage in oral exploratory behaviour and often play on the ground, thereby increasing potential ingestion of contaminants in soil and dust. Exposure through respiration may be increased because infants and children inhale air closer to the ground than adults do, increasing the potential intake of contaminants from the soil and dust. In addition, children are also more exposed to dietary sources of pollution.

2.4.12.3 Type of Dwelling

Anderson, Romani, Phillips and van Zyl (2002); Shehzad (2006) and Jacobs, Wilson, Dixon, Smith and Evens (2009) and established relationship between type of dwelling and child mortality has been established in a number of studies, namely: This is to be expected: brick houses are likely to be more hygienic than those built from informal material or scrap, as is often the case in informal settlements in South Africa. A house that is small and inadequately ventilated will have an adverse effect on a child's health. The situation becomes even worse where there is overcrowding: children become more prone to communicable diseases. Shehzad (2006) found that, in Pakistan, child illnesses such as diarrhoea, acute respiratory infections and fever are affected by family size, housing and parental education.

2.4.12.4 Access to and Quality of Health Services

Some studies do, however, exist; Lavy, Strauses, Thomas and de Vreyer (1996) find a negative relationship between access to public child health services and child mortality in Ghana, and a recent study of neonatal mortality in China shows large positive effects of delivering in hospital compared to delivering at home. This study also reveals large differences in chances of survival between hospital deliveries in urban

and rural regions, the rural mortality being much higher (Feng Guo, Hipgrave, Zhu, Zhan, Song, Yang and Ronsmans, 2011). The reasons for why access to and quality of health services matter are obvious. They play an important role in both prevention (for example immunization and health education of patients) and treatment of illness. Because most maternal and child deaths occur during or shortly after delivery, antenatal care, which serves to discover and treat micro-nutrient deficiencies and assess other risk factors, is of crucial importance to survival of both mother and child. So is the attendance of skilled personnel that have access to necessary equipment and medicines needed if complications occur during delivery. Follow-up services in the period after delivery are also central to detect and treat infections and other conditions that are likely to occur to mother and child postpartum (World Health Organization, 2009b).

2.4.13 Nutrient Deficiency as a Determinant of Child Survival

This proximate determinant relates to intake of the three major classes of nutrients calories, protein and micronutrients. Mosley and Chen (1984) pointed out that the survival of children is influenced by nutrients available not only to the child but also to the mother. Nutrient availability to the infant or to the mother during pregnancy and lactation can be measured directly by the weighing of all foods before consumption, accompanied by the biochemical analysis of food samples. The three indicators of nutritional status are stunting, which indicates chronic under nutrition in children, wasting which indicates acute under-nutrition, and finally the proportion of children who are under weight. According to Bomela (1999) stunting or chronic malnutrition is the most prevalent form of malnutrition amongst the under-5 in South Africa. Malnutrition is one of the important risk factors for mortality due to acute respiratory infections.

2.4.14 Healthy Seeking Behaviour as a Determinant of Child Survival

Unlike other determinants which affect the rate at which children move from health to sickness, which influences this rate (through prevention) and rate of recovery (through treatment), (Hill, 2003). For preventive measures this variable is commonly assessed by reported use of such preventive services as immunization, malaria prophylaxis, or antenatal care. For curative measures the providers of care and types of therapy taken for specific conditions are assessed (Mosley and Chen, 1984).

Rutstein (2000), in his comparison of DHS data from 62 developing countries, showed that increases in the percentage of births that received medical care at delivery were associated with decreasing mortality during the first year of life. An increase in prenatal care was associated with decreases in mortality among those under-5 years as well. Boerma and Bicego (1992) even linked prenatal care and birth intervals, in that they hypothesised that unlike pregnant women with short birth interval, pregnant women with longer birth intervals are more likely to attend prenatal care services which ultimately results in a healthy child birth.

Several studies have ascribed inadequate health facilities, lack of transportation to institutional care, inability to pay for services and resistance among some populations to modern health care as key factors affecting the country's high rate of maternal, newborn and child morbidity and mortality (UNICEF, 2008; Babalola and fatusi, 2009); Friedman, Richard, Knonmal, Newman, Diane and Bild, 2014) argued that all-cause mortality is the single best measure of health, noting that it is used worldwide as a key indicator of public health. Thus, we would obtain an incomplete perhaps even biased assessment of their predictive power if we used a specific disease or cause of death as the benchmark. In addition to strong validity, all-cause mortality avoids the possibility that studies of a single disease may mix some deaths that were

attributed to a different cause, but that resulted indirectly from the disease of interest (Friedman, Richard, Knonmal, Newman, Diane and Bild, 2014).

Rutstein (2000), pointed out that an increase in the percentage of children vaccinated against measles was associated with a decline in infant mortality and with mortality at ages less than one (1). The author stated that increases in the percentage of children receiving medical attention for diarrhoea; acute respiratory illness and fever were associated with the declines in mortality.

2.4.15 Income of the Parent

In "An Economic Analysis of Fertility" published in 1960, Becker classifies children as normal consumer goods; they are a source of emotional satisfaction and can provide the family with extra income. We could therefore also expect to see a higher "demand" for children when the wage rate is increased. This higher demand does not necessarily manifest itself in a higher number of children; it could also take the form of a higher desired level of child human capital "quality". According to Becker (1992), the income elasticity of the quantity of normal goods is usually small compared to the corresponding elasticity for the quality. If the classification of children as normal consumer goods is adequate, a household will respond to an increase in income by increasing expenditures on child human capital relatively more than on an increasing number of children. If the income elasticity of child human capital is sufficiently much larger than that of quantity, an increase in income will not bring about any increase in the number of children, only more investments in child human capital. In the model, an increase in income will, through this mechanism, improve child health and thus reduce mortality.

Wage affects child's human capital and health in the model through changing the opportunity cost of spending time on child rearing and the purchasing power of the

household. While the increase in opportunity cost will induce parents to work more and thus have fewer children, the higher purchasing power makes spending time on child-rearing more affordable to the household. The former is referred to as a substitution effect, and the latter as an income effect, in microeconomic theory, and our model does not provide an answer to which effect is dominating the other. In the case that a wage increase induces the parents to work more, time spent with children will decrease and the household budget will increase.

The theoretical backdrop and hypotheses reduction of t will, all other things being equal, lead to a lower level of child human capital. However, since parental utility is dependent on child human capital, it is likely that parents will make sure that that this decrease is (at least) compensated for. This compensation can be made either by spending some of the increased income on child consumption, or by reducing the number of children. Parents are likely to choose the latter if the expected return (increase in utility) from spending a given amount on one child excels the expected return of spending the same amount on several children. Choosing to have fewer children is also the most likely option if the wage raise reduces the need for financial security provided by children or if the costs of investing in child health are very high.

2.4.16 Breastfeeding and Immunization

Findings from several studies have shown the principal influence of breastfeeding and immunization on infant and child mortality. Breastfeeding is a natural way a mother pass nutrients and natural immunity to their children. Deribew, Tessema and Girma (2007) found that children who are not breastfed are 6 times more likely to die compared to those who are breastfed. However the advent of the prevalence of HIV/AIDS pandemic may have distorted the veracity of this claim. Yet uninfected breast milk, rich in nutrients and antigens, remain the most appropriate food for the

infant (Hobcraft, McDonald and Rustein, 1984; UNICEF, 2007: Mondal, Hassain and Ali, 2009: Kyei, 2011). Immunization, also called vaccination or inoculation is a method of stimulating resistance in the human body to specific diseases using microorganisms – bacteria and viruses – that have been modified or killed.

2.4.17 Mortality

Mortality and fertility affect each other in many ways – both directly and indirectly. It is reasonable to assume that parents care about the number of surviving children and not how many that are born. Child mortality in a household, i.e. the probability of a child passing away, will therefore affect the number of births required to reach the desired number of surviving children. This can be said to be an indirect effect of mortality on fertility; the probability of a child dying affects the household "demand" for children (Becker, 1992). A more direct effect of mortality on fertility comes through the influence on the cost of bringing up a surviving child. Carrying out a pregnancy and giving birth requires both time and money. Mortality affects the average number of births needed to get a surviving child, and a reduction in mortality will therefore reduce the cost of having a survivor. Hence, one should expect to see an increase in fertility when mortality falls. This is contrary to empirical evidence. An explanation could be that the reduction in mortality concurred with economic growth and the relative increase in the value of time and returns to investment in child human capital. Child mortality also has a direct negative impact on the health of mother and children if it leads to more children being born. Frequent pregnancies wear the woman's body out and increase the chance of complications, which have adverse consequences for both mother and child. High mortality leads to more pregnancies that in turn affect the initial child human capital negatively. In the model, the mortality rate would

manifest its effect on child human capital through a higher n which gives a reduction of child human capital.

2.4.18 Culture and Norms

The household decision about fertility is affected by the social environment that the parents reside in. Fertility choices made by neighbours and family influence preferences concerning the number of children in the household. If the social convention is to have large families, parents will probably prefer having more children. Norms about the number of children also affect relative prices through their influence on the demographic structure of the society and demand. Relative prices in turn affect fertility decisions. Social norms about gender and work are also likely to affect preferences about fertility.

A considerable drawback of the model is that it is based on the assumption that the choice of having a child is a rational and conscious one. However, pregnancy is often not planned for by the household, especially not in poor developing countries with low education levels and lack of contraceptives and family planning. Furthermore, many factors important to child health are not directly included in the model.

2.4.19 Overview of Malnutrition

Malnutrition results from imbalance between the body's needs and the nutrient intakes, which can lead to symptoms of deficiency, dependency, toxicity or obesity. Malnutrition includes over nutrition and under nutrition. It refers to disorders resulting from an inadequate diet or from failure to absorb or assimilate dietary elements (Bundy, 2002). This thesis deals only with under nutrition whereby not enough nutrients are taken in by the body. Under nutrition triggers an array of health problems in children, many of which can become chronic. It can lead to extreme weight loss, stunted growth, weakened resistance to infections and in worst cases even death. The effects can be

devastating in the first few years of life, when the body is growing rapidly and when the need for nutrients is greatest (Brown & Pollit, 1996). Over nutrition, on the other hand, is taking in too much of a given nutrient (Ocholla, 2004). The study sought to determine the nutritional status and levels of malnutrition of children under-five years in Kaduna State.

2.4.20 Protein-Energy Malnutrition in Children Under Five Years

Protein deficiency and energy deficiency go hand in hand. This combination, protein-energy malnutrition (PEM) is the most widespread form of malnutrition in the world today. Over 500 million children face imminent starvation and suffer the effects of severe malnutrition and hunger. Most of the 33,000 children who die each day are malnourished (World Bank, 2005). PEM is prevalent in Africa, Central America, South America, the Middle East, and East and Southeast Asia, but developed countries including the United States are not immune to it. Plate 2 in the appendix indicates the effect of malnutrition.

A PEM strike early in childhood, but it endangers many adults as well. Inadequate food intake leads to poor growth in children and to weight loss and wasting in adults. Stunted growth due to PEM is easy to overlook because a small child can look perfectly normal. The small stature of children in impoverished nations was once thought to be a normal adaptation to the limited availability of food; now it is known to be an avoidable failure of growth due to a lack of food during the growing years (Muoke, 2012).

PEM seems to take two different forms, with some cases exhibiting a combination of the two. In one form, the person is shriveled and leans all over, in others, a swollen belly and skin rash are present. In combination, some features of each type are present. The two main forms of PEM have two different disease names: Marasmus and kwashiorkor, respectively (WHO, 2014). Marasmus was once thought to be caused by

energy deficiency and inadequate food intake and therefore, inadequate energy, vitamins, and minerals as well as too little protein. Kwashiorkor may result from severe acute malnutrition, with too little protein to support body functions (World Bank, 2006). This study sought to determine dietary intake of children in the study area.

2.4.21 Marasmus and Kwashiorkor Among Children in the Urban Slums.

Marasmus occurs most commonly in children from 6 to 18 months of age in overpopulated city slums. The urban growth rates for African countries at 10- 12 per cent is the highest in the world (Muoke, 2012) and most of this growth is in the informal settlements, also called slums (World Bank, 2006). Children in impoverished nations subsist on a weak cereal drink with scant energy and protein of low quality; such food can barely sustain life, much less support growth. A starving child often looks like a wizened little old person just skin and bones. Without adequate nutrition, muscles, including the heart muscles, waste and weaken. Brain development is stunted and learning is impaired. Metabolism is so slow that body temperature is subnormal.

There is little or no fat under the skin to insulate against cold. Hospital workers find that children with marasmus need to be wrapped up and kept warm. They also need love because they have been deprived of parental attention as well as food. Ultimately, marasmus progresses to the point of no return, when the body's machinery for protein synthesis, itself made of protein, has been degraded. At this point, attempts to correct the situation by giving food or protein fail to prevent death. If detected before this time, however, the starvation of a child may be reversed by careful nutrition therapy. Kwashiorkor is the Ghanaian name for "the evil spirit that infects the first child when the second child is born." In countries where kwashiorkor is prevalent, each baby is weaned from breast milk as soon as the next one comes along. The older baby no longer receives breast milk which contains high-quality protein perfectly designed to support

growth, but is given a watery cereal with scant protein of low quality. Small wonder the just weaned child sickens when the new baby arrives.

Some kwashiorkor symptoms very much resemble those of marasmus, but often without severe wasting of body fat. Proteins and hormones that previously maintained fluid balance are now diminished, so fluid leaks out of the blood and accumulate in the belly and legs, causing edema, a distinguishing feature of kwashiorkor. The fatty liver loses some of its ability to clear melanin, the child's hair loses its colour; inadequate protein synthesis leaves the skin patchy and scaly; sores fail to heal. African countries lead among the worst countries in the world in terms of under five mortality rates.

2.4.22 Hunger and Realities of Under Nourishment

Hunger occurs in three different forms: acute, chronic and hidden. Most of the hungry, approximately 90 per cent are chronically undernourished. Chronic under nourishment is caused by a constant or recurrent lack of access to food of sufficient quality and quantity, good healthcare, and necessary caring practices. It results in underweight and stunted children- as well as high mortality rates due to associated diseases. Hidden hunger, caused by a lack of essential micronutrients (vitamins and minerals), afflicts more than 2 billion children worldwide, even when they consume adequate amounts of energy and proteins. Acute hunger is the worst and usually comes during drought and wars, manifests itself as kwashiorkor or marasmus and usually the world responds very fast to it (Muoke, 2012).

Unfortunately, chronic and hidden forms of hunger are not as dramatic as acute hunger, and receive much less global attention and support. Nearly one in six people worldwide is chronically undernourished –too hungry to lead a productive, active life. This includes one-third of the world's children. About 55,000 people die of hunger each day – two thirds of them children. Three million newborns in the developing world die

in the first week of life. Over half of all children are permanently blinded each year simply from lack of vitamin A. About 100 million-140 million children are deficient in vitamin A. Residents in developed countries spend more money on pet food, perfumes, and cosmetics than it would take to provide basic education, water and sanitation, healthcare and nutrition for all those now deprived of it (Pelletier, Olson and Frongillo, 2001).

Over the past twenty years, the proportion of the world's people who are hungry has declined from one-fifth to one-sixth, and the absolute number of hungry people has fallen slightly (Sanchez, Swaminathan, Dobie and Yuksel, 2005). However, 852 million people are still chronically or acutely malnourished (World Bank, 2006). Most of them are in Asia, particularly India (221 million) and China (142 million). Sub-Saharan Africa has 204 million hungry and is the only region in the world where prevalence of both general under nourishment and children's underweight status are increasing (Sanchez *et al*., 2005).

2.4.23 Anthropometric Indicators of Child Malnutrition

Anthropometry is the most widely used tool for assessing the nutritional status of children as well as to monitor their growth and development. (Beaton, Kelly, Kevany, Martorell and Mason, 1990). These measurements show clearly where there are chronic forms of malnutrition (WHO, 2014. For either growth or development, the anthropometric measurement is compared with a reference median and expressed as a percentile or a percentage of the median, or as a standard deviation scores (Z score) (Muoke, 2012). The most frequently used anthropometric indices of childhood malnutrition are Weight- for-Age, Weight-for-Height, and Height for Age. A low Weight-for-Age signifies a deficit in total body mass, that is, an underweight child. A low weight-for-age can arise when a child is short (stunted), thin (wasted), or both

(WHO, 2014). Studies strongly suggest that these diseases are more likely to be severe and fatal when they occur in children who are malnourished.

2.5 Relevant to the Reviewed Materials to the Study

Demographic and public health literature was found to be replete with studies on various outcomes of child health and survival. Several studies on infant and child mortality have yielded diverse findings on the causes and determinants of infant and child deaths. Literature consistently established that child health outcomes are generally poor in sub-Saharan Africa and South Asia; and that the two sub-regions are the major contributors to statistics on childhood mortality. Thus, to ensure clarity and to properly engage prior researches relevant to this study, review of literature in this chapter was presented under-five sub-headings: the overview of infant and child mortality in Nigeria especially in Kaduna state, the trends and determinants of infant and child mortality, as well as risks of childhood mortality and community contexts.

CHAPTER THREE

THE STUDY AREA AND METHODOLOGY

3.1 STUDY AREA

3.1.1 Location and Size

Kaduna State is located between Latitudes 9^0 02'N and 11^0 32'North of the Equator and between Longitudes 6^0 15'E and 8^0 50'Eeast of Prime Meridian (Figure 3.1). Kaduna State is bounded to the north by Katsina, Zamfara and Kano States, to the west by Niger State, to the east by Bauchi State and to the south by Plateau, Nasarawa and the Federal Capital Territory, Abuja. The State is divided into three senatorial zones, namely; Kaduna North, Central and South and it comprises twenty three (23) Local Government Areas with 255 political wards (NPC and ICF Macro, 2009).

3.1.2 Physical Setting

Kaduna State contains a striking range of natural environments from the forested Guinea Savanna and heavy rains in the southern part, to the Savanna scrub in the far north (Kaduna State Ministry of Health, 2014). The topography varies from the Kudaru Ring Complex Hills in the east, to the wide valley plains of the River Kaduna in the west.

The State has a landmass area of about 43,898 square kilo meters, which makes it the largest in the northwest geo-political zone and has about 4.7% of the Nigerian land area (NPC and ICF Macro, 2009). The longest distance by road from north to south is about 290 kilometers and from east to west is about 286 kilometers (Kaduna State Ministry Health, 2014).



Figure 3.1: Map of Kaduna State Showing the Study Area
Source: Adapted from the Administrative Map of Kaduna State, 2014

3.1.3 Climate

Kaduna State possesses a tropical continental climate with very marked seasonal variations. The area is influenced by two distinct air masses that have tremendous effect on the climate of the State. The northeasterly trade winds, which are usually dry and dusty, are pronounced between November and March. This period is usually referred to as the harmattan period. The second type is the moisture-laden tropical maritime air masses that originates from the Atlantic Ocean and brings rain with it. The variations in

the on-set of rainfall are attributed to the fluctuation of the boundary between these two air masses.

However, in Kaduna State, the seasonality is pronounced with the cool to hot dry season being longer, than the rainy season. Although there is less distinction in the average maximum temperature in the southern areas, the hottest month in the north are March and April, while the coldest are December and January. Rainfall is very heavy in the southern part of the State and with an average of over 500mm per month between April and September. Again, the spatial and temporal distribution of the rain varies, decreasing from an average of about 1530mm in Kafanchan-Kagoro areas in the Southeast to about 1015mm in lkara, Makarfi districts in the northeast. This pattern of temperature and rainfall determine the types of crops, animals and food production. The first rain of the year is usually experience in the state in March/April and usually falls in thunderstorm showers. The rain reaches its peak in August (Mamman, 1994).

Several studies (Obala, Kutima, Nyamogoba, Mwangi, Simiyu, Magak and Khwa-Otsyula, 2012; Bi, Yu, Hu, Lin, Guo, Zhou, Song, 2013; Ouma; Bashar and Tuno, 2014; Tonnang, Tchouassi, Juarez, Igweta and Djouaka, 2014) have been conducted to illuminate the effect of weather factors, mainly temperature and rainfall, on malaria vector proliferation. The mosquito vectors of malaria parasites are sensitive to changes in climate. Climatic variables such as rainfall and temperature are known to determine mosquito reproduction and mortality (Lindsay, and Birley, 1996).

A mathematical model exploring the relationship of temperature and progeny of malaria parasite in mosquitoes showed that at a temperature of 26 °C and 34 °C it would take between 22–23 days and 12–14 days, respectively, for the sporogony of Parasite falciparum. Research has estimated the mean temperature ideal for the development of

mosquito vectors to be 25–27 °C while the development terminates at 10 °C, and at 40 °C when vector survival rate is low. Rainfall affects vector abundance by providing breading sites for vectors and supporting vector development during the immature stages (Imbahale, Paaijmans, Mukabana, Van Lammeren, Githeko, Takken, 2011). Continuous rains result in flooding which in turn clears mosquito breeding sites, while intermittent rains with long spells of sunshine provide a suitable environment for mosquito vector proliferation (Maquins, Joacim, John, Mary, Amek, Frank, and Kayla, 2015).

3.1.4 Geology and Relief

Kaduna State is on a gentle undulating plain ranging from 457m to 609m above sea level. The bedrock geology is predominantly metamorphic rocks of the Nigerian Basement Complex consisting of biotite gneisses and older granites. In the southeastern corner, younger granites and bathyliths are evident. These rocks are hard resistant, although they have undergone variable weathering and erosion processes. These processes have resulted in the formation of inselbergs and huge rocky granites (Kaduna State Bureau of Land and Survey, 2001). Deep chemical weathering and fluvial erosion, influenced by the bioclimatic nature of the environment, have developed the characteristic high undulating plains with subdued interfluves (Bako, 2014). In some places, the interfluves are capped by high grade lateritic ironstone especially in the Northwest.

Although stream valley incisions and dissections of the high plains are evident in several areas, especially in the Zaria region, they are due more anthropogenic influences and climatic factors than regional geologic instability. The

land gradually slops down towards the west and the southwest and is drained by two dominant rivers (Rivers Kaduna and Gurara).

3.1.5 Soil and Vegetation

Generally, the soils and vegetation are typical red brown to red yellow tropical ferruginous soils and savannah grassland with scattered trees and woody shrubs. The soils in the upland areas are rich in red clay and sand but poor in organic matter. However, soils within the "fadama" areas are richer in kaolinitic clay and organic matter, very heavy and poorly drained, characteristics of vertisols. Fringe forests ("Kurmi" in Hausa) in some localities, and especially in the southern LGAs of the state, are presently at the mercies of increasing demands for fuel wood in the fast growing towns and urban centers.

3.1.6 Historical Developments

Kaduna State as a whole was widely scattered and sparse. Apart from Zaria, there was hardly any major area of high concentration. Most of the settlements were along the banks of the Kaduna River. The establishment of the base of the western African Fontier Force (WAFF) in Kaduna was an important landmark that led to migration into what is now Kaduna Metropolis and this mark the beginning of urbanization process and the creation of another complex city. Kaduna as a seat of regional government then became a pull factor that attracted migrants from all part of the country in search of green pastures and job opportunities. This contributed to the growth of the town, the development of infrastructures and increase in commercial activities (Dodo, 2008). The transfer of the capital of Northern Nigeria from Zungeru in Niger State to Kaduna was a very important landmark in the historical development of Kaduna town.

The growth of the major towns in Kaduna State is the result of their accessible to other towns in the country. Both towns are linked by very important railway lines trunk “A” roads. With the emergence of Abuja as the Federal Capital (indeed Kafanchan was initially propose by the Gowon regime) most of these towns, especially Kafanchan, have grown in importance

The political development of the north has Kaduna town and even the state as a whole as the nucleus. As the level of economic activities grew in Kaduna State the existing major cities like Kafanchan and Zaria, expanded in size and encouraged the growth of new cities that provide supplementary services. Some of these towns includes; Birnin Gwari, Kachia, Jaji, Pambegua, Giwa, Saminaka, Makarfi and Katabu (Bako, 2014).

3.1.7 Population Growth and Distribution

The population of Kaduna State comprises the major ethnic groups which are Kamuku, Gwari, Kadara in the west, Hausa and Kurama to the north and Northeast. "Nerzit" is now used to describe the Ham (Jaba), Bajju (Kaje), Koro, Kamanton, Atyap (Kataf), Morwa and Chawai instead of the derogatory term "southern Zaria people". Also, the term "Hausawa" is used to describe the people of Igabi, Ikara, Giwa and Makarfi LGAs, which include a large proportion of rural dwellers who are strictly "Maguzawas." According to National Population Commission (2006) Kaduna State has a total of 6, 113,503 with the male population of 3,090,438 and female population of 2,023,065 (NPC and ICF Macro, 2009) and with a growth rate of 3.0 per annum.

The concentration of government employment opportunities and infrastructures in the town attracted a lot of people from other parts of the country to Kaduna. The changing economic and commercial status of the town also attracted investors and other professional. There was equally the deliberate of government of attracting in-migrants into Kaduna in the attempt to secure enough labour to clear the surrounding bush and

there by free it from mosquitoes, tsetse fly and dangerous reptiles (Mamman, 2003). Kaduna town has long been known as a social melting pot because of the level of social integration due to the assemblage of people from different societies in Nigeria and Africa. Part of the internal population dynamics in Kaduna town is the high level of rural-urban migration.

3.1.8 The Economic Activities

The economy of Kaduna State is agricultural supplemented by various non-agricultural traditional industries. Some of the main agricultural crops include farming of yam, cassava, cocoyam, maize, cowpeas, guinea corn, millet and hungry rice (acha). Major crops cash cultivated in Kaduna State include cultivation of cotton, ginger, groundnut and soya beans. Indeed, the British American Tobacco (BAT) Industry in Zaria owes its existence to the high quality tobacco leaves cultivated everywhere around Zaria. Until the collapse of the cotton industry in Nigeria, Kaduna State dominated the cotton trade.

Kaduna State is ranked among the highest concentration of industries in Nigeria. The state has a dozen textile industries and the multi-purpose Kaduna Refinery and Petrochemicals Company (KRPC), International Brewery and Beverages Industries (IBBI), Peugeot Automobile of Nigeria (PAN), Nigerian Brewery PLC and several others (Laah, 2003). These industries have stimulated the commercial activities of the state, thus making it major player in commerce. The location of industries in Kaduna is heavily lopsided in favour of two local governments in the state; namely, Kaduna North and Kaduna South local government Areas. Private and public limited ownership accounted for 16% and 9% respectively. Most of these industries are made up of manufacturing (22.8%), private professional services (21%) and wholesale/retail trade accounted for 14% (Laah, 2003).

The rate of urban growth in Kaduna State due to massive influx of people into the town and the very buoyant industrial sectors, has led to the emergence of buoyant hospitality industry. The growing number of motor parks, eateries and drinking joints is the resultant effect of a growing population. Contrary to the expected role of the agricultural sector as a source of employment for a growing labour force, the sector has in fact been releasing labour at a higher rate than the non-agricultural sector can absorb. Excessive rural to urban migration also means that the urban economy cannot cope with the rate of job seekers. All over the State there is an army of unemployed youths roaming the streets. Although potentially great with a wide variety of industries and industrial activities it has over the years and very recently been in almost permanent crisis. Adeyemi, Raheem and Olorunfemi discovered that most deaths associated to children under the age of five are accounted for by these variables: expenditure on health as a percentage of gross domestic products (GDP) access to portable water and health care, female illiteracy rate, daily calorie per capital, total fertility rate and carbon dioxide emission.

3.1.9 Basic Infrastructure and Facilities.

The state government established state ministry of health, which is a body that oversees all the health institutions and activities in the state. In the local government area there is also health department to oversee health activities in the local government area. Healthcare services in Kaduna State are provided by the Federal, State and Local governments and the organized private sector. Kaduna State policy on health is closely tied to the Federal government's national policy on heath. There are many primary health centers (PHC) located in virtually all the local government areas with emphasis on preventive-community health care and environmental and personal hygiene. Kaduna State has 739 Local Government Health Facilities, 29 Secondary Care Facilities, five

(5) Tertiary Hospitals, 19 General hospitals, 656 Private Health Facilities and 2500 registered patent medicine shops. There are also eight academic institutions and four post-basic training programmes for human resources development within the Healthcare Service (Royal Times, 2014).

There are a wide range of tertiary institutions established to produce high skilled manpower for the state and the nation. About 17 tertiary institutions in Kaduna State, 12 are located in Zaria, they include Ahmadu Bello University (ABU), Federal College of Education (FCE), Nigeria College of Aviation Technology (NCAT), Kaduna State Polytechnic, College of Chemical and Leather Technology, Nigeria Institute for Transport Technology (NITT). Also worth of mentioning is the presence of only Military school in Nigeria, the army Depot and other military oufits.

Deficient and worsening housing conditions can trigger a range of diseases, including lung diseases, neurological disorders, mental and behavioural dysfunction, which mostly unduly affect children. Children are predominantly susceptible to housing-related hazards than adults since they spend comparably more time indoors. They are seen as a risk group because they require a higher amount of air inhalation than adults, and their organs are not fully developed. Children also have larger surface area to total body mass, thus causing increased exposure to pollutants (Thabethe, Engelbrecht, Wright and Oosthuizen, 2014).

3.2 METHODOLOGY

3.2.1 Reconnaissance Survey

A reconnaissance survey was carried out in order to identify the various locations of hospitals in the LGAs. During the reconnaissance survey, oral interviews were carried out on women of child bearing age to ascertain their health care seeking behavior which is where to seek health care assistance in times of illnesses, high risk behavior which is socio-cultural/Religious belief with respect to child birth and addressing infant and child illnesses, family head role and attitude towards infant and child health in the study area. This helped the researcher to get acquainted with the personnel in charge of delivery, pediatrics, gynecology and health extension workers in the hospitals and to determine relevant issues to be address in the questionnaire and also to ascertain the most appropriate sampling technique to be employed and the suitable statistical analysis for the data.

3.2.2 Types of Data

The types of data include:

-demographic and socio-economic data

-nature of sanitation

-nature of water sources

-type of residence by the respondents

-number of infants and children ever died by sex and

-causes of death.

3.2.3 Sources of Data

The data for this study was obtained from both primary and secondary sources.

3.2.3.1 Primary Sources

These were generated from respondents who provided the required information through the use of questionnaire and private health centers records, field observations, and Focus Group Discussions (FCDs) with respondents in the study area. The data were on demographic and socio-economic characteristics reflecting age, occupation, marital status, education, income, type of accommodation, residence, and source of water. It is design to obtain accurate and valid responses regarding infant and child mortality, number of live birth, and cause of the death.

The Focus Group Discussions (FGDs) is a participatory method which involves bringing six (6) to twelve (12) people to explore issues related to infant and child mortality in Kaduna State. The target population was household heads and women of reproductive aged 15–49. The discussions will be flexible in order to accommodate unexpected issues that may come up. Three (3) Focus Group Discussions were conducted, one each in the three selected LGAs.

3.2.3.2 Secondary Sources of Data

The secondary sources involved the hospitals records, literatures from relevant Non Governmental Organizations (NGOs), National AIDS Control Agency (NACA), and State Agency Control on AIDS (SACA). The secondary data for this research consist of medical records for a period of ten (10) years because Kaduna State Ministry of Health officially started the harmonization of medical death records in 2003 and also based on the estimated infant mortality rate of 115 deaths per 1,000 live births and child mortality rate of 205 deaths per 1000 live births in 2003 (PATHS, 2010), 91 deaths per 1,000 live births and 189 deaths per 1,000 live births for infant and child mortality respectively in 2009 (NPC and ICF Macro, 2009) and 88 deaths per 1,000 live births and 179 deaths per 1,000 live births for infant and child mortality respectively in 2010 (PATHS, 2010). Data from Federal and State ministries of health/planning and the

National Bureau of Statistics (NBS) were required for background information. Data was also obtained from the National Population Commission (NPC) publications, analytical reports and other commissioned papers.

3.2.4 Sample Frame

The selected LGAs has a total of population of about 265, 028 female which was projected to 2014 totaling 531, 277 female (NPC and ICF Macro, 1991). Kaduna state comprises of twenty three (23) Local Government Areas, grouped into three senatorial districts. Three Local Government Areas were selected for the study. The selection of these three LGA's was based on the hospital with up to date medical record of infant and child mortality in each of the senatorial districts was chosen. Therefore, the following Local Government Areas were purposively selected; Zaria, Kaduna South, Jema'a (see Table 3.1). The respondents of this study were the young mothers and older women that have experienced the lost of child/children under-five who can give information about infant and child mortality in the study areas. The information gathered cover the number of children ever born by a woman as a dependable variable while the independent variables were ethnicity, religion, household per capital income, household size, occupation, educational and literacy level, marriage type, locality, sex preference and first age at marriage. The study also utilized hospital records for the purpose of understanding trends and possible causes of mortality.

3.2.5 Sampling Techniques

Purposive sampling technique was used to select a local government area each from the three senatorial districts in the study area, with up to date medical records of infant and child mortality. Therefore the selected local government areas are Zaria, Kaduna South and Jema'a. The next stage was systematic sampling of wards in each of the selected LGA after arranging them alphabetically and every fourth-ward selected

totally nine (9) wards. In every of the selected ward, the households with children 5 years and below was identified with the help of a local guide who is resident in the ward and questionnaire administered to the mothers randomly. A number of models have been developed to estimate sample size. Yamane (1967) provides a simplified formula to calculate sample size with 95% confidence level and 5% sampling error assumption.

$$n = \frac{N}{1 + N(e)^2}$$

Where,

n= Sample size

N= Population size of the selected LGAs

e= Level of significance (set at 0.05 for this study)

The study used the above formula to obtain a total of 400 respondents to be administered questionnaire. To determine the proportion of the respondents, Yamane (1967) sampling method for determining of respondents was also used i.e.

Where:

$$\text{Sample size per ward} = \frac{\text{Selected LGAs Population x Sample Size}}{\text{Total Selected LGAs Population}}$$

Table 3.1: Sample Size by Local Government area

Senatorial District	Selected LGA	Ward	Population (1991)	Population Projected (2014)	Sample Size
Kaduna North	Ikara	Angwan Fatika	3,788	7,476	148
	Kubau	Angwan Juma	4,363	8,611	
	Kudan	Dambo	2,479	4,893	
	Lere	*Dutsen Abba	2,923	7,742	
	Makarfi	Gyellesu	8,832	17,431	
	Sobangari	Kauran Limanci	3,863	7,624	
	Soba	Kufena	9,407	18,566	
	*Zaria	*Kwarbai A	5,044	9,955	
		Kwarbai B	6,472	12,774	
		Kona	7,837	15,467	
		Tudun Wada	23,674	46723	
		*Tukurtukur	11,599	22,891	
		Wuciciri	8,151	16,078	
Kaduna Central	Birningwari	Asso	5,538	10,930	103
	Chikun	Atuku	2,479	4,893	
	Giwa	Angwan Sanusi	7,669	15,135	
	Igabi	*Badiko	6,472	12,774	
	Kaduna north	Barnawa	8,182	16,148	
	Kajuru	Kakuri Gwari	790	1,559	
	*Kaduna South	Kakuri Hausa	1,708	3,371	
		*Makera	9,182	18,122	
		Sabon Gari North	1,719	3,393	
		Sabon Gari South	1,348	2,660	
		Television	1,910	19,163	
		*Tudun Nuwapa	4,617	9,112	
		Tudun Wada North	3,993	7,881	
		Tudun Wada South	3,806	7,511	
		Tudun Wada West	2,409	4,754	
Kaduna South	Jaba	Barde	1,340	2,645	149
	*Jema'a	Gidan Waya	1,719	3,393	
	Kachia	Godogodo	27,305	53,889	
	Kagarko	*Jagindi	2,479	4,893	
	Kaura	Kagoma	12,881	25,422	
	Kauru	Kafanchan A.	17,019	33,589	
	Sanga	Kafanchan B.	23,674	46,723	
	ZangonKataf	*Koninkon	3,788	7,476	
		Maigizo	1,000	1,974	
		Takau	8,936	17,636	
Total			**265,601**	**531,277**	**400**

Source: Modified from NPC, 1991

* Selected LGAs and Wards

3.2.6 Data Analysis

The link between demographic characteristics in mortality of age, sex is first examined through quantitative analyses. Then, the connection between death and causes of death is explored through qualitative analyses.

To achieve objectives (i) and (ii)

Descriptive statistics was adopted for summary of data. This allow for the description of variables through frequency distribution, presentation of results in percentages, bar charts, tables and pie charts. Descriptive analysis that involves trend analysis was used in this study because of the importance of this strategy to health care administration and the need for health care planning. In estimating levels of infant and child mortality in Kaduna State, mortality rate was used to calculate deaths per 100,000 live births in a period (usually a year). The mortality rate is the most commonly use indicator of deaths.

The formula is $\frac{\text{number of deaths x 1000}}{\text{Total number of live birth}}$

This method is adopted by the researcher to measure mortality rates per 100,000 live births and to predict mortality levels and differentials which provide a pathway for future analysis and medical and demography research.

The first step in the data analysis is the rearrangement of all the statistical data according to the various years in their respective hospital records. The collected data were coded and entered into the Statistical Package for Social Sciences (SPSS) version 20.0 computer software.

The descriptive and inferential statistics was used to describe the socio-demographic characteristics using frequency distribution and presentation of results in percentages.

Objectives (iii) (iv) and (v), the inferential test such as, trend analysis was used to examine the variation of mortality with socio-demographic characteristics over time,

while Factor Analysis using the Statistical Package for Social Science (SPSS) was used in determining the demographical variables that account for the pattern of mortality over space. Factor Analysis has been widely used in both human and Economic Geography (Abumere, Okafor and Oluwatoyin, 1980). Regression and ANOVA analysis were considered useful although, there is always a problem of finding appropriate and adequate label for the factor groups, it is useful for arranging the complex nature of variables that account for the spatial disparity in the mortality amongst the socio-demographic characteristics. Moreover, it is also useful for extracting a smaller set of factors which accounted for most of the variance in the original data as well as re-organizing the data set in orthogonal form.

However, for the purpose of this study, all values with coefficient of 0.60 will be selected as factor defining variables. It is noteworthy that a fundamental problem of factor analysis is the inability to adequately categorize and name the factors into appropriate classification for mapping. This problem is managed by a careful consideration of the pattern of loading to name the factors. Stepwise Regression Analysis will be used to model the spatial pattern of these changes in the mortality trend of Kaduna State. The choice of stepwise regression is informed by its statistical power to establish a relationship between dependent and independent variables. The regression model is of the form: $Y=a+b_1x_1+b_2x_2+b_3x_3+b_4x_4+b_5x_5+b_6x_6+b_nx_n$ where

Y= Age (of various ages)

a, b_1 and b_2 are constants of regression.

x_1= Sex

x_2= Marital status

x_3= Religion

x_4= Occupation

x_5= Place of residence

x_6= Cause of death

e= error terms

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1 INTRODUCTION

The purpose of this study is to analyze infant and child mortality rends and differentials in Kaduna State. To achieve this purpose, the data obtained in the study was analyzed and computed using descriptive statistics and inferential statistics. The results are presented in this chapter. A total of 386 questionnaires were retrieved out of 400 questionnaires administered on 400 respondents (96.5%).

This Chapter also discusses the demographic and socioeconomic characteristics of respondents obtained from the field. The variables considered in the primary data source include mothers age at birth, current marital status, type of marital union and age at marriage others are age at first pregnancy, birth spacing, number of children ever born, ante natal care (ANC) attendance, immunization practices and breastfeeding practices. The rest are parent's tribe, religion, level of education, and postnatal care. Economic factors considered are parent's income level and employment status. Also considered are the environmental factors such as sources and use of water as well as the toilet types and liquid waste disposal methods.

4.2 DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS OF THE RESPONDENTS

4.2.1 Age and Ethnicity

Table 4.1 shows the distribution of respondents by age and ethnicity. The result reveals that majority of the respondents (64.3%) are between the ages of 20-34 years, while 9.7% are in the age group of 40-44 years of age.

Table 4.1: Age and Ethnicity of the Respondents

Age group	Frequency	Percentage
15-19	24	6.2

20-24	66	17.1
25-29	91	23.6
30-34	83	21.5
35-39	27	7.0
40-44	37	9.6
45-49	36	9.3
>50	22	5.7
Total	**386**	**100.0**
Ethnicity		
Igbo	68	17.6
Yoruba	51	13.2
Hausa/Fulani	142	36.8
Northern Minority	94	24.4
Southern Minority	31	8.0
Total	**386**	**100.0**

Source: Field Survey, 2015

This pattern of age distribution is to be expected as the pattern of age distribution of women of reproductive age usually show an n-curve, indicating that population usually peaks at age 25-29. This is in conformity with NPC and ICF Macro, (2009) at the ages of 40-45, reproductive ability by female parents ground to a stop and only a few male parents may engage in further child bearing at 55-59 years of age.

The ethnicity distribution in the areas shows that over 30% are Hausa/Fulani and minority ethnic group constitutes over 30% also (see Table 4.1). The relatively high percentage of Hausa/Fulani populations is expected because they constitute the majority in the study area followed by the northern minority tribes.

4.2.2 Religion of the Respondents

The distribution of respondents by religious affiliation in Figure 4.1 shows that majority (51%) of the women are Muslims, followed by Christians (45%), while the traditionalist make up 4%.

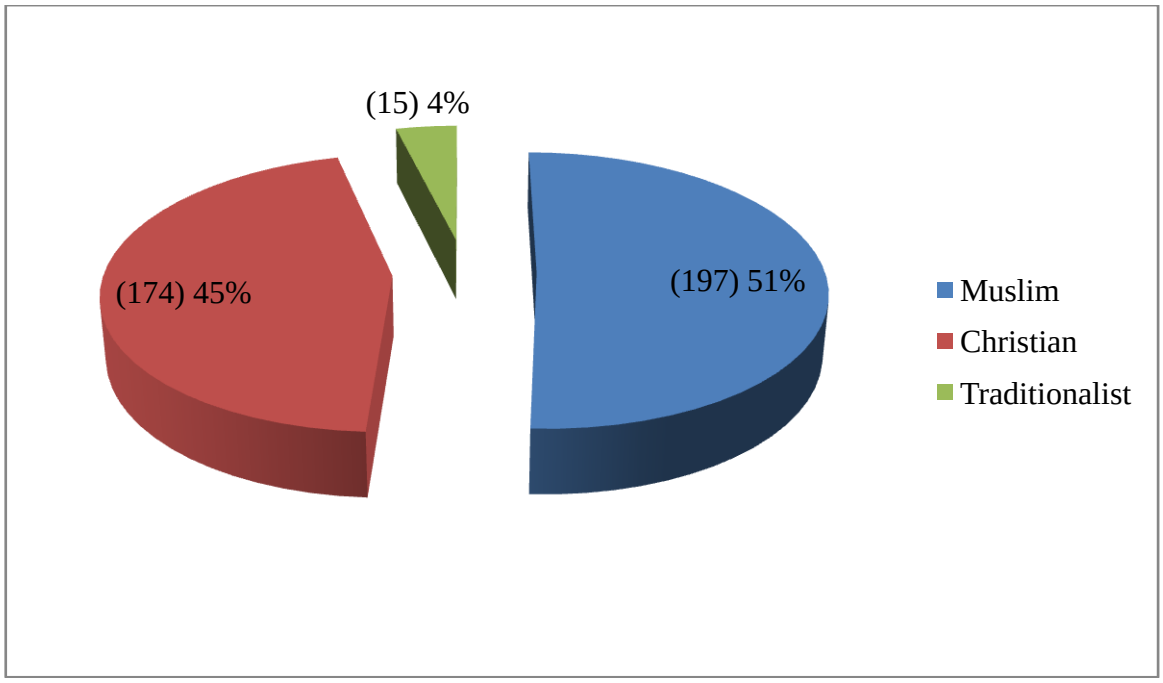


Figure 4.1: Distribution of Respondents by Religion
Source: Field Survey, 2015

The religious background of respondents determined the different kind of consumed in the household and to a large extent determines the type of nutrition children are exposed to. The amount and quality of food consume, increases the body immune system and reduce the incidence of diseases. Agada (2008) in a study of nutritional intake of children in Kawo, agrees that the consumption of balance diet reduces the incidence of diseases amongst children nutritional intake with the above.

4.2.3 Education, Occupation and Income of the Respondents

Parental education is an important factor in childhood mortality reduction; more education is associated with a lower risk of child death (Kabagenyi and Rutarewa, 2013). In this study, mothers were categorized into five educational categories; no formal education, primary education, Quranic, secondary and tertiary as shown in Table 4.2.

Table 4.2 Distribution of Respondents According to Education, Occupation and Income

Education	Frequency	Percentage
None formal education	49	12.7
Primary school	75	19.4
Quranic school	105	27.2
Secondary school	111	28.8
Tertiary institution	46	11.9
Total	**386**	**100.0**
Occupation		
Business/Petty Trader	64	16.6
Civil servant	76	19.7
Full Time House Wife	102	26.4
Farmer	68	17.6
Unemployed	34	8.8
Student	31	8.1
Others (Specify)	11	2.8
Total	**386**	**100.0**
Monthly Income		
<₦10,000	86	22.3
₦10,001-₦20,000	47	12.2
₦20,001-₦30,000	45	11.7
₦30,001-₦40,000	84	21.8
₦40,001-₦50,000	63	16.3
>50,001	27	7.0
Do not Know	34	8.8
Total	**386**	**100.0**

Sources: Field Survey, 2015

This shows that most of the respondents (28.8%) have secondary school education and 12.7% had no formal education. Majority of the respondents have post-primary education (60.1%), this means that most of the respondents have formal education in the study population. These educated women may also tend to live in more economically

developed areas that are rich enough to have schools and access to good medical facilities (Doctor, Bairagi, Findley: Helleringer, Abuqamar, Coomans, Louckx, 2011).

This is in consonance with reports in earlier researches that education has an implicit effect on the health of children, where health is interpreted in its broadest sense as complete physical, psychological, social, emotional, developmental and environmental well-being (Arab World Congress, 2004). Evidence from studies show that child mortality rates are higher among less educated mothers compared with mothers who have higher levels of education (Nath, Land and Singh, 1994; Houweling, Kunst, Moser and Mackenbach, 2006; Nath, Land, and Singh, 2007; Worku, 2009). The importance of maternal education is based on the fact that education increases a mother's level of knowledge and skills, thus enabling her to effectively understand and utilize available information and resources critical for child health and survival. Mother's education is an important factor in childhood mortality reduction as more education is associated with lower risk of child death. This study showed that infant and under-five children born by educated mothers have a lower mortality risk.

Table 4.2 also shows the distribution of respondents by occupation. It reveals that full time house wives constitute 26.4%. The proportions of respondents who are full time house wives were high because the study areas are partially in rural centers. During FGD, discussants were asked on whether these categories of occupations were on permanent basis, most of the discussants in Muslim areas due to socio-cultural and religious factors, agreed that they are in *Purdah* and hence are mostly full-time housewives. According to them "Full time house is the only option left for us because most of our husbands do not allow us to go out any how" (Hajia Zuwaira from Zaria). Also the low level of education amongst the women means that they are unable to get professional jobs, as one of the discussants alluded "Most of us did not go school in

other to be gainfully employ, house wives is good for us" (Mallama Rabi from Kaduna South).

Table 4.2 again shows the distribution by monthly income. It shows that respondents who earn less than N30,000 have the highest proportion of 38.1%, while those who earn above 50,000 constitutes 7%. The high proportion of the unemployed respondents is probably responsible for the high proportions that earn less than N10, 000 per month. This invariably is tied to the level of education which is directly related to earning capacity of respondents.

This notwithstanding, the distribution by income indicates clearly that 38.1% of the respondents are generally poor, given the fact that they earn less than N20,000 (or US $63) monthly. This is to be expected as many of the women are full time house wives with relatively low level of education (see Table 4.2). Also, business/petty trading accounted for 16.6% and petty trading as argued by Usman (2011), is one of the informal activities whose returns is considered very low.

4.2.4 Marital Status of the Respondents

Table 4.3 revealed the marital status and union of respondents. The nuptial pattern of the respondent reveals that 39.4% are currently married and are living with their husbands. This is followed by married women but not living with their husbands (18.1%). It is expected that children whose mothers are in a stable relationship (currently in union) have lower risks of mortality than those whose mothers are not married. The children from mothers who are not currently in union are likely to suffer from lack of parental care which may easily expose them to high risk of diseases or death.

Table 4.3 Distribution of Respondents by Marital Status, Age at first Marriage and Age at first Birth

Marital Status	Frequency	Percentage

Never Married	34	8.8
Married but not Living with Spouse	70	18.1
Married and Currently Living with Spouse	152	39.4
Separated	25	6.5
Divorced	59	15.3
Widowed	46	11.9
Total	**386**	**100.0**
Age at First Marriage		
15-19	94	24.4
20-24	122	31.6
25-29	67	17.4
30-34	54	13.9
35-39	15	3.9
40-44	21	5.4
45-49	13	3.4
Total	**386**	**100.0**
Age at First Birth		
15-19	86	22.3
20-24	112	29.0
25-29	58	15.0
30-34	44	11.4
35-39	36	9.3
40-44	23	6.0
49-49	27	7.0
Total	**386**	**100.0**

Source: Field Survey, 2015

Marriage is generally associated with fertility because it exposes women to the risk of pregnancy. The duration of exposure to the risk of pregnancy depends primarily on the age at which women first marry.

4.2.5 Age at Marriage

A significant number (29%) of women in Kaduna State entered into marital union at the ages of 20-24 while 19.1% entered their first union at between the ages of 25 and 29 years (see Table 4.3). The proportion decreases for women who entered marriage at 30 years and above thereafter. Thus the proportion of women entering a marital union after 40 years was very small (5.2%). Although recent data from Nigerian societies indicates that early and universal marriage is common, there is convincing evidence that age at first marriage is increasing. Therefore, an early age at marriage could lead to increase child bearing that may also lead to high infant and child mortality. In 2010, Kaduna State has one of the highest mortality rates of infant and child mortality of 88 deaths per 1,000 live births and 179 deaths per 1,000 live births respectively.

4.2.6 Age at First Birth

Table 4.3 also shows the distribution of the sampled population by age at first birth. It is obvious that most respondent gave birth early when they got married as 29.0% gave birth between the ages 20-24 years while 1.8% gave birth at age 45-49 years. This result shows that most of the women gave birth the very year they got married. This means that there are high chances of infant and child mortality as most of them possibly give birth to premature babies due to their young age.

4.2.7 Type of Marital Union

Women were asked the type of their marital union. Figure 4.4 shows the distribution of respondents by type of marital union. The polygamous has the highest percentage with 65.0% and monogamy account for 35.0%

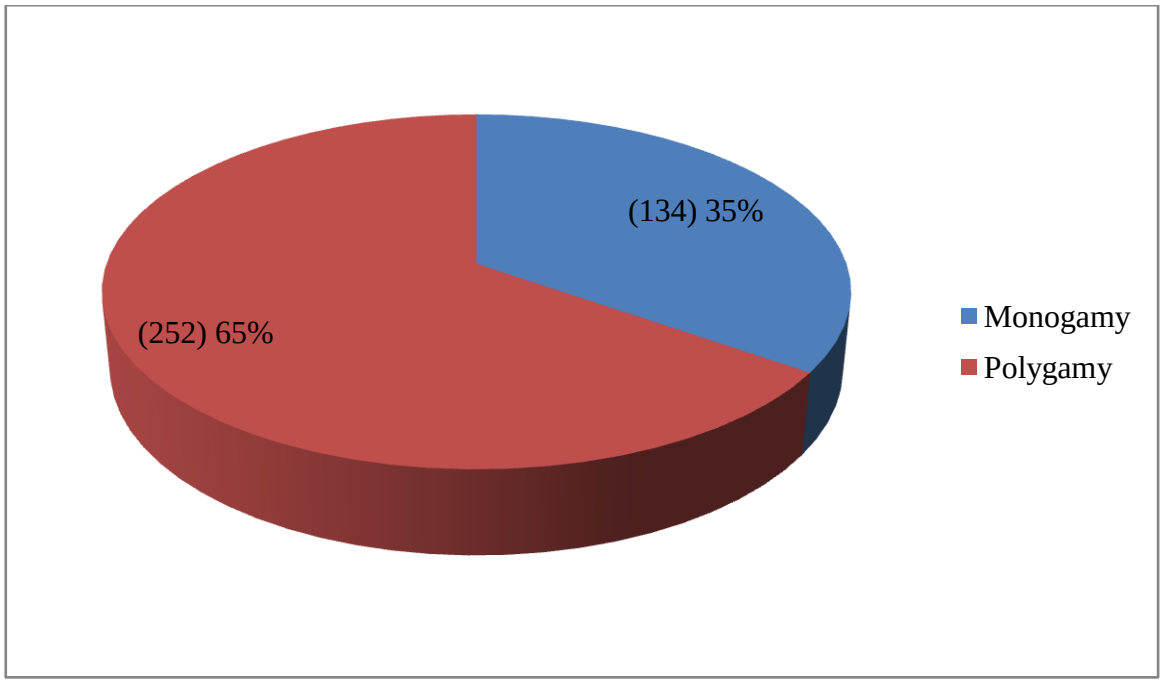


Figure 2.2: Distribution of Respondents by Type of Marital Union

Source: Field Survey, 2015

This result is to be expected because polygamy is more prevalent among the Muslims who form a large proportion of the study population. This is in line with 18.0% of the respondents are married but living with their spouses whereby encouraging polygamy (see Table 4.3)

4.2.8 Household Size of the Respondents

The result in Table 4.4 reveals that a large percentage (31.4%) of the households had populations ranging from 6 – 10 persons while the lowest household size is that of 16-20 persons with 9.8%. this is in concomitant to figure 2.2 as 65.0% of the respondents are in polygamous marriage. This also agrees with the NPC and ICF Macro

(2008) report where rural areas had population up to nine persons or more. International Medical Corps (IMC) and Centre for Refugee and Disaster Response at Johns Hopkins Bloombergy School of Public Health (JHSPH), (2009) report in Liberia also came up with a similar result on family size in which household sizes ranged from 1–24 and an average size of 6.6 persons per household in rural and urban areas. In another study in Botswana Mahgoub *et al,* (2006), found out that household populations range between 3–8 members with an average of 5 members per household.

Table 4.4: Household Size of the Respondents

Household Size	Frequency	Percentage
1-5	96	24.9
6-10	121	31.4
11-15	77	19.9
16-20	38	9.8
21 and above	54	14.0
Total	**386**	**100.0**

Source: Field Survey, 2015

The household size in Table 4.4 shows that most families have larger populations which have implications on food quantity and quality. A large household implies that more of the family resources may be spent on social amenities, medical, education among others at the expense of food which may consequently affect the living standard of the family thereby reducing the survival chances of the infants and children. In an event of a contagious disease, those families with high number of children may probably be worst hit compared to those with fewer children. Large family size with many children increases the probability for infection at low age. Low age at infection, in turn may be associated with a high mortality rate in infectious disease.

4.2.9 Number of Children in the Household

Figure 4.3 reveals the number of children in households. The distribution shows that 42.5% of the respondents had only one child while only 2.5% had children up to three. The households that tend to have many children will demand so much care and attention, whereby increases the household expenditure for special diets and other requirements necessary for their medical care eventually increases the chances of their death.

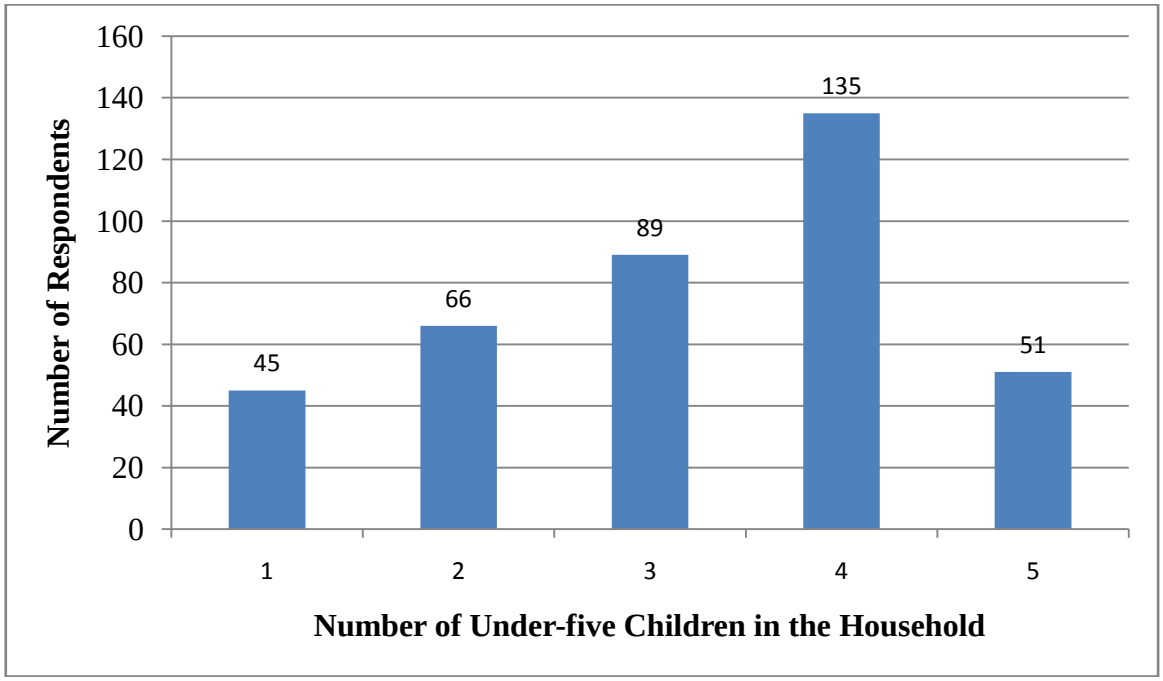


Figure 4.3: Percentage Distribution of Respondents by Number of children

Source: Field Survey, 2015

A study by Maghgoub *et al* (2006), in Botswana revealed that households with two children under three years old experience under nutritional symptoms (underweight more than those with one). This further shows that households with more infants and children experience nutritional deficiencies more than those with less number. This might have been as a result of stress on food and other social amenities due to the large population.

4.2.10 Number of Surviving Children

The distribution of respondents according to the number of surviving children is presented in Table 4.5.Majority of the respondents (28.2%) are the people with children up to four (4) that are alive.

Table 4.5: Distribution of Respondents by Number of Surviving Children

Number of Surviving Children	Frequency	Percentage
None	39	10.1
One	45	11.7
Two	66	17.1
Three	76	19.7
Four	109	28.2
Five	51	13.2
Total	**386**	**100.0**

Source: Field Survey, 2015

followed by three children 19.7%, two children with 17.1% and no surviving child represent 10.1%. The result revealed that none surviving children have a significant percent that will translate into more children dead than the survivors.

4.2.11 Sex Preference

Table 4.6 shows that most of the respondents in the study area prefer females more than male's children because females are more caring than the males (26.9%), followed by males are more caring than the females with 23.6%. this agrees to Table 4.1 (page 61) over 35.0% of the respondents are from Hausa/Fulani ethnic group.

Table 4.6: Distribution of Respondents by Reasons for Sex preference

Reasons for sex preference	Frequency	Percentage
Females help at home	29	7.5
Females are more caring than males	104	26.9
Males are more caring	91	23.6
Prefer males for inheritance	80	20.7
All of the above	35	9.1
Total	**386**	**100.0**

Source: Field Survey, 2015

During the focus group discussion, most women said "it is all Gods" wish but definitely they would prefer to have a boy because, they would grow up to take care of them" (Hannatu from Jema'a LGA). So it is concluded that women have multifarious tasks to perform. Women have to take care of themselves, children, the family and society at large. The group of women felt that the role of men is only to earn money and make a woman pregnant.

4.2.12 Type and Ownership of Accommodation

The place of residence of the mother affects the survival and nutritional status of children. Table 4.7 revealed the distribution of respondents by type of accommodation. The distribution reveals that 130 respondents (33.7%) live in one room apartment, 96 respondents (27.5%) live in a compound house, 65 respondents (19.2%) lived in a modern flat, 49 respondents (12.7%) lived in a mud house, and 51 respondents (13.2%) did not specify the type of accommodation they live in the type of accommodation influences the health of the child which also affects child survival. As 68.0% of the respondents have a relatively income of less than 40,000 monthly can only afford either compound house or room apartment to live in (see Table 4.2)

Table 4.7: Distribution of Respondents by Type and Ownership of Accommodation

Type of Accommodation	Frequency	Percentage
Modern Flat	74	19.2
Room Apartment	130	33.7
Compound House	106	27.5
Duplex	15	3.9
Others (Specify)	51	13.2
Total	386	11.0
Ownership of Accommodation		
Self-Owned	114	29.5
Rented	108	30.0
Family House	82	21.2
Squatting	25	6.5
Official	21	5.4
Others (Specify)	36	9.3
Total	**386**	**100.0**

Source: Field Survey, 2015

The percentage distribution by ownership of accommodation is presented in Table 4.7. The results revealed that those in rented accommodation account for 30%, self-owned account for 29.5%, those in family house account for 21.2%, official/government quarters account for 5.4% and 9.3% of the respondents do not specify their accommodation type. Generally, the type of place of residence is also an important determinant of child survival. Since majority of the respondents live in rented houses, the implication is that compound may be dirty and the children may be expose to all kinds of diseases that may eventually killed them.

4.3 HEALTH CARE FACILITIES IN KADUNA STATE

4.3.1 Ante-Natal Clinic Visitation and Health Care Centre Patronage

The distribution of respondents by accessibility to antenatal care in Table 4.8 shows that most of the respondents in the study area have access to antenatal care (ANC) service with 87.3% while 12.7% don not.

Table 4.8: Distribution of Respondents by ANC Visitation and health Care Centre Patronized

Ever Visit Health Care centre	Frequency	Percentage
Yes	337	87.3
No	49	12.7
Total	**386**	**100.0**
Type of Health Care Type Patronized		
General Hospital	114	33.8
Private Hospital	60	17.8
Pharmacy	52	15.4
Dispensary	20	5.9
Traditional Birth Attendance	75	22.3
Others (Specify)	16	4.7
Total	**337**	**100.0**

Source: Field Survey, 2015

The results indicate that the mother's having access to ante-natal care (ANC) will help to reduce the risk of mortality for both infants and children. However, the findings confirm that Antenatal care (ANC) attendance is an important element of a comprehensive maternal health strategy (Henry, 2011).

Mrs Bello in Jama'a LGA had lost her sister two months back due to pneumonia after delivery and not much care could be taken in the village. According to one participant "*lack of awareness about health care centre, especially among married woman seemed to be the main cause of large number deaths of children"* (Mary Kaduna South LGA).

On the contrary, Adamu and salihu (2002), found out that the poor ANC is in consistent with earlier studies conducted in 2000 in rural Kano State of northern Nigeria where 12% of the women were reported to have attended ANC (Adamu and Salihu 2002). The relative high percentage of traditional birth attendance 22.3% corresponds high level of illiteracy of the respondents of non-formal education 40.0% (Table 4.2) This also agrees with a study by Kabir, Iliyasu, Abubakar and Sani (2005) that in addition, 30 per cent of women receive no antenatal treatment at all, with adolescent mothers and those who live in rural areas particularly unlikely to receive care. The World Health Organization recommends at least four such visits in the course of a pregnancy, since recent empirical evidence has shown that four visits suffice for uncomplicated pregnancies, and more visits are only recommended in case of complications (Villar, 2001).

Also the level of patronage shows that 33.8% of the respondents patronize general hospitals while 4.7% did not patronize any health care centre. Utilization of ANC provides opportunities for a full range of health promoting services that may include weight and blood pressure measurement, screening and treatment for syphilis, preventive and presumptive treatment of malaria in pregnancy and health education, prevention of mother-to-child transmission of HIV. Most importantly, ANC represents an opportunity to counsel women about possible serious complications of pregnancy and delivery and to promote institutional delivery. At each ANC visit, women are asked whether they have experienced any of these complications and they can be reminded what to do if any occur.

4.3.2 Postnatal Care Visitation and Reason for Health Care Centres Patronage

Table 4.9 reveals that 61.9% go for postnatal care, while 38.1% do not. Majority of the respondent attend post-natal care, this goes a long way to reduce the incidence of

infant and child mortality. Bello and Joseph (2014) revealed that post-natal care shows an inverse relationship with child mortality, the result however conform to a priori criteria and also based on the result, a 1% increase in post-natal care will reduce child mortality rate with about 105%.

Table 4.9: Distribution of Respondents by Postnatal Care Visitation and Reasons for Patronizing Health Care Centers

Ever Attend Postnatal Care	Frequency	Percentage
Yes	239	61.9
No	147	38.1
Total	**386**	**100.0**
Reasons for not Attending Postnatal Care		
I do not like hospital services	13	8.8
No husband permission	20	13.6
Delay at the hospital	41	27.9
Unfriendly health workers	20	13.6
Lack of money	29	19.7
Hospital too far	16	10.9
Others (Specify)	08	5.4
Total	**147**	**100.0**

Source: Field Survey, 2015

Respondents were also asked why they do not like going for postnatal care? Table 4.9 shows that 27.9% of the respondents said that the delay in the hospital is not encouraging, followed by lack of money for hospital bills with 19.7%. Distance to the health care facilities is also another factor attributed for not going for postnatal care with 10.5%, I do not like hospital services account for 8.8% and 5.4% did not respond.

When women do receive ANC, it is generally not before the second trimester. Post-natal care attendance does not provide women with a chance of benefiting fully from preventive strategies, such as iron and folic acid supplementation, and intermittent preventive malaria treatment in pregnancy among others. The high proportion for treatment implies that majority of the respondents use an Antenatal Care Center (ANC) for treatment. In comparison with findings by Monir and Sachiyo (2009) and Tawiah (2011), the challenges above recorded a slight rise in the proportion of women who

reported to have encountered serious problems in accessing health care. This leaves us with the question of what could have happened five years prior to 2006.

4.3.3 Distance to and Means of Mobility to Health care Facilities

The distance of antenatal facility is revealed in Table 4.10 where 24.9% agreed that the distance to the nearest health care facility is 8-10km while 2.8% did not respond.

Table 4.10: Distribution of Respondents by Distance and Means of Mobility to Health Centre

Distance	Frequency	Percentage
Less than 2km	85	22.0
2-4km	69	17.9
5-7km	110	28.5
8.10km	96	24.9
11-13km	15	3.9
No response	11	2.8
Total	**386**	**100.0**
Means of Mobility		
On foot	114	29.5
Motorcycle	108	30.0
Car/Bus	82	21.2
Others (Specify)	25	6.5
Total	**386**	**100.0**

Source: Field Survey, 2015

It is observed from the record that the distance to health care facility is moderate, although few respondents suffer to get to health care facilities due to long distance. In Jema'a Local Government Area during the Focus Group Discussions, one of the participants complained about the lack of health facilities in the village. In the absence of a medicine shop or doctors, one had to travel for 15-20 km to reach the dispensary. Majority of the respondents acknowledged that the primary health care facility is far away from their reach. The implication here is that under critical conditions before reaching the PHC the child would have die because of the distance of PHC.

Out of the total of 386 respondents, 30% used motorcycles as means of transportation to health care facilities while 6.5% do not specify the nature of their mobility. Mode of transportation also seems to be one of the problems of the respondents as majority of them either use motor cycle or trek to the PHC. When there are no good means of transportation when the child is being taken to the health care centre, he/she may die on the way before reaching the hospital.

4.4 Water Supply and Type of Toilet Facilities

Table 4.11 shows the distribution of sources of water supply to the family members/households. This shows that 30.3% of the respondents obtain their domestic water supply from wells and 8.8% do not specify their source of water supply.

Table 4.11: Distribution of Respondents by Sources of Water Supply and Type of Toilet Facilities

Sources of Water Supply	Frequency	Percentage
Pipe Borne Water	104	26.9
Well	117	30.3
Bore-hole	61	15.8
Stream	20	5.2
Water Vendor	50	13.0
Others (Specify)	34	8.8
Total	**386**	**100.0**
Type of Toilet Facilities		
Flush Toilet	102	26.4
Pit Toilet	116	30.1
Bush	79	20.5
Others (Specify)	89	23.0
Total	**386**	**100.0**

Source: Field Survey, 2015

This analysis reveals that only 42.7% of the respondents obtain water from improved sources (boreholes and public pipe borne water) while bulk of the respondents (57.3%) used traditional sources. This proportion is much smaller than the value for rural areas in Nigeria (45.6% (NPC and ICF Macro, 2009). About 84% of all children's deaths are attributed to water (Eneh, 2011), therefore, poor and contaminated water supply may result in high levels of morbidity and mortality.

This result compares favourably with Benson and Shekar (2006), where less than 47% had access to improve water supply sources in Africa. Use of unimproved sources of water leads to frequent diarrhea especially in children (NAFDAC, 2001; Huicho and Hilton, 2008). The fact that most of the communities in the study area lack good sources of domestic water implies a higher risk of diarrheal diseases whose effect is more pronounced among the more vulnerable group (infants and children).

The data in Table 4.11 shows the percentage distribution by toilet facilities. Pit toilet 116 (30.1%), flush toilet 102 (26.4%), bush toilet 79 (20.5%) and others account

for the remaining 23%. A member of the parents/guardians at one of the FGD session, from one of the Local Government Areas commented on copping with the burden of excreta in the community as follows:

> *Majority of the adults use pit toilets where they are available while a significant number of the population still use the surrounding bushes to excrete and for the children, most of them excrete behind the house (back yard) hence most of them cannot use the pit toilets while the parents of infant and children use napkins or pampas for waste management* (Iyah, Gidan waya).

4.5 NUTRITION

4.5.1 Breast Feeding Practices

Table 4.12 shows the distribution of respondents by breast feeding practices. About 78% of the respondents practice exclusive breast feeding, 22.0% practice non-exclusive and 8.5% do not specified. The proportion of women (22.0%) not practicing exclusive breast feeding is due to the relative percentage of non-formal education (39.9). The impact of EBF on infants cannot be over emphasis as the early initiation of breast milk that contains colostrums is very vital to the child's health. Most of the women lack proper information due to low level of illiteracy and patronized traditional birth attendance do not value EBF whereby risking the life of the baby. Babies not exclusively breastfed for the first six months of life are at an elevated risk for under-nutrition and disease which may eventually lead to dead. Exclusive breastfeeding for the first six months has the capability to prevent 13% of all under five deaths in developing countries (UNICEF, 2014). Poverty and lack of adequate information and support on food feeding practices can also cause infant and child mortality.

Table 4.12: Distribution of Respondents by Breast feeding Practices

Type of Feeding	Frequency	Percentage
Exclusive Breast Feeding	301	78.0
Non-exclusive	85	22.0
Total	**386**	**100.0**
Length of Breast Feeding		
0-6 Months	66	17.1

7-12	94	24.3
13-18	107	27.7
19-26	79	20.5
>27	40	10.4
Total	**386**	**100.0**

Source: Field Survey, 2015

This distribution shows high dependency on exclusive breast feeding which makes a child's body to be strong and not to be susceptible to any kind of diseases thereby reducing the chances of child's death. Not practicing exclusive breast feeding is likely to affect the child's health which may lead to faltering health condition that may result in death of the affected child. Bello and Joseph (2014), revealed that exclusive breast feeding reduces child mortality in Atiba Local Government Area of Oyo State. After 6 months of age, breast milk should be complemented by other solid or mushy food to provide adequate nutrition to the child (PAHO, 2002).

The information on Table 4.12 can be compared with Choji's (2005) finding in Gwol, Plateau State where in his study, found that exclusive breast feeding method was practiced by only a small percentage of the population while majority of the respondents used the non-exclusive method. The survey result also compare favourably with the NDHS survey of 2008 in which 13% of mothers in Nigeria practice exclusive breast feeding method for infants below six months of age (NPC and ICF Macro, 2009).

Table 4.12 also revealed that the lengths of breastfeeding vary from one woman to another. It shows that for obvious reasons, some mothers had to stop breast feeding within the first six months which may be as a result of illness or medical advice. The highest proportion of breast feeders lasting between 13-18 months was practiced by 27.7% of the respondents.

Children that are fed through the exclusive method for a longer duration are likely to enjoy healthier growth if other determining factors also are favourable and

those children that do not enjoy such privilege of longer duration of breastfeeding are likely to be prone to ill-health problems if other conditions like provision of supplementary food and hygienic environment among others are not favourable. These findings are similar with that of Agada, (2008) and NPC and ICF Macro, (2009).

4.5.2 Introduction of Solid Food

The supplementary food introduction varies greatly. Table 4.13 shows that 23% of the respondents introduce supplementary feeding within the first month and only 23.1% do so within the fifth month. About 19.4% introduce supplementary food after 6 months.

Table 4.13: Distribution of Respondents by Introduction of Solid Food

Time of Introduction of Solid (In Month)	Frequency	Percentage
1	09	2.3
2	12	3.1
3	95	24.6
4	106	27.5
5	89	23.1
>6	75	19.4
Total	**386**	**100.0**

Source: Field Survey, 2015

The introduction of supplementary food within six months may lead to high chances of infant and child mortality compared to those that introduce supplementary food after six months. This distribution further confirmed that exclusive breastfeeding method is not widespread in the study area.

4.5.2 Supplementary Feeding

Figure 4.4 shows the distribution by type of supplementary food provided to the children based on respondents' preference. It revealed that there are varieties of supplementary foods provided, which include pap, baby formular, beans, staple food (Tuwo) and others such *tom brown, pete,* gruel, and fura.

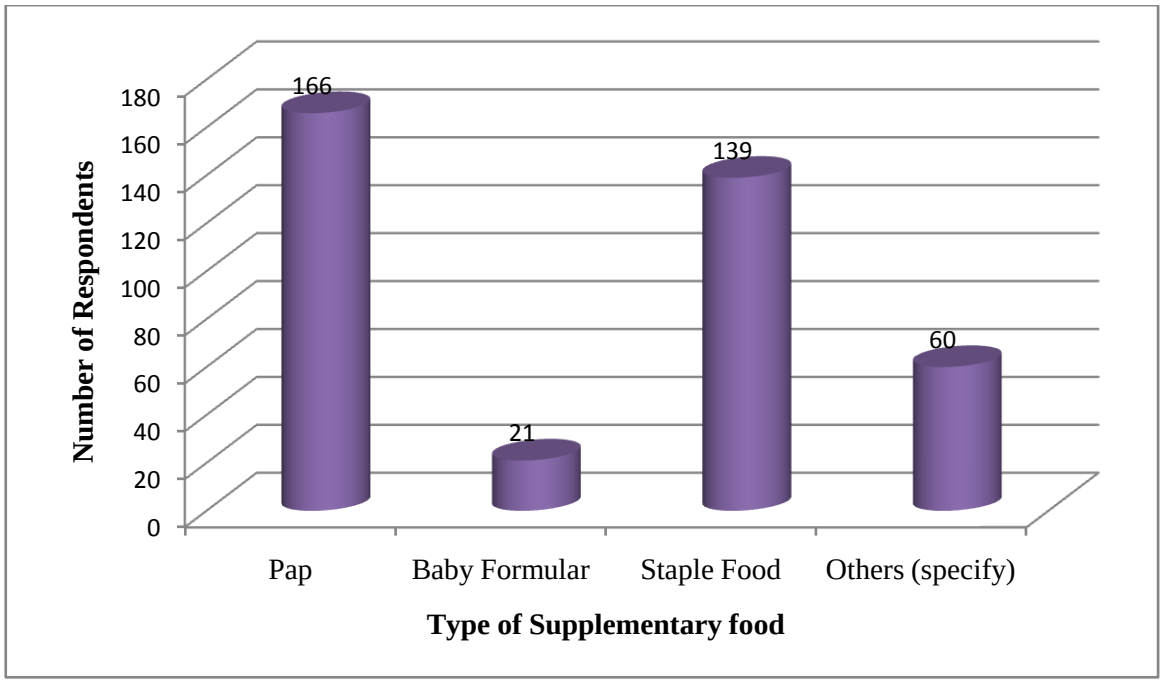


Figure 4.4: Percentage Distribution of Respondents by Type of Supplementary Food to U5

Source: Field Survey, 2015

The percentage distribution by child food shows that 30.1% feed their children with pap while 15.5% used other means which may include mineral and other vitalities that are required in small quantities. Most of these supplementary foods given to children have devastating health effect that can lead to death.

Daniel, (2006) stated that the bulk of the crops produce by the women in Kagoro were mainly maize, guinea corn and yams among others. The use of maize as the most staple food in the North West region agrees with Yahaya (2000) in his study of Nutrition Status of children under-five in Bunkure LGA of Kano State where he found that 100% of children weaned live mostly on "eko" (maize gruel) with other supplements provided occasionally. The introduction of supplementary feeding to the child very early in life is detrimental to the child's health hence the system is not well developed to digest the supplements introduced (Ergin, Okyay, Alssoylu and Beser,

2007). The inability of the digestive system to digest the food may result in malnutrition whose outcome expresses itself in mal-development, sickness or death of the affected child. Malnutrition can also affect the survival, growth and development of infant and child mortality.

Agada (2008), in her study found very high percentages of supplements like infant formula (29.0%) and pap (maize gruel) 20%. The large percentage of respondents (42.6%) who provide their children with mainly maize gruel shows that protein supplements are either deficient or absent. This may constitute a health problem to the child that may consequently lead to recurring ill-health problems if other factors also are negative.

4.5.4 Under-five Feeding Period

Table 4.14 shows that 47.2% of the respondents feed under-five once per day, 16.1% feed twice a day, 21.5% three times a day and 10.4% feed occasionally. This invariably is tied to the level of education which is directly related to earning capacity of respondents will definitely affect the feeding habit (see Table 4.2). The distribution reveals that consumption of balanced diet (food that contain require amount of essential nutrient) in the study area by under-five is very irregular which means that majority of the respondents (63.3%) feeding does not contain the essential nutrients required by the body for healthy growth and development of the child occasionally.

Table 4.14 Distribution of Respondents by Frequency of Eating Balance Diet

Time of Intake	Frequency	Percentage
Once	182	47.2
Twice	62	16.1
Three times	83	21.5
Occasionally	40	10.4
Others (Specify)	19	4.9
Total	**386**	**100.0**

Source: Field Survey, 2015

Eating poor nutrition (particular nutritional food) or one meal during pregnancy is harmful for the foetus growth and development and is directly related to the stunted or wasted, low birth weight babies and complications for the mother. The distribution according to percentage of respondents that eat balanced meal, agrees with Agada's (2005) findings, where 68% indicated that they eat balanced meal occasionally and 12.0% eat protein daily. The distribution also shows that majority of the respondents do not eat balanced diet regularly in the household which is likely to result in Protein Energy Deficiency (PEM) which support the findings for the Sub-Saharan African (SSA) region, (DFID, 2009; UNICEF,2006; Ogbonnaya and Aminu, 2009; Neumann, Gewa and Bwibo, 2010). This is expected as many of the women are full time house wives with relatively low level of income (see Table 4.2). These also studies revealed the protein deficiency in the children's diet which increases the morbidity incidence thereby resulting in the high death rate in the area which further confirms the Protein Energy Malnutrition (PEM) that is a major cause of death in SSA (Zere and McIntyre, 2003).

CHAPTER FIVE

INFANT AND CHILD MORBIDITY AND MORTALITY

5.1 INTRODUCTION

This Chapter discusses the result of the analysis of the data obtained from the field. Levels, trends and mortality differentials were also analyzed.

5.2 TYPE OF MORBIDITY

Table 5.1 shows the shows the types of sickness afflicting children in the study area. It reveals that the major causes of morbidity are malaria with 27.0% occurrence with diarrhea account for 20.7%. This invariably is tied to the level of education which is directly related to earning capacity of respondents in the environment that is prone to many diseases (see Table 4.2). This is also tied to the type of accommodation which is directly related to ownership of accommodation of respondents (see Table 4.7).

Table 5.1: Distribution of Respondents by Type of Children Morbidity

Nature of Sickness	Frequency	Percentage
Malaria	104	27.0
Diarrhea	80	20.7
Pneumonia	51	13.2
Whooping Cough	34	8.8
Measles	42	10.9
Others (Specify)	75	19.4
Total	**386**	**100.0**

Source: Field Survey, 2015

The Table 5.1 reveals that malaria and diarrhea are the most common types of ailments in the study area. Malaria happens to predominates probably due to the poor drainage system within the settlements which provides breeding sites for the mosquito (vector) and availability of grass and plantations within the settlements which provide hiding places for the mosquito among others. This is also corresponds of the source of water and type of toilet facilities used by the respondents in Table 4.11. Diarrheal cases also rank high which may be as a result of poor domestic water sources or poor hygiene

and other related sanitary conditions which may threaten the survival of the infants and children.

5.3 IMMUNIZATION

Figure 5.1 shows that 55% of the respondents reported that the children were fully immunized while 22% did not. This is to be expected as many of the women are have relatively low level of education that to partial or non immunization (see Table 4.2).

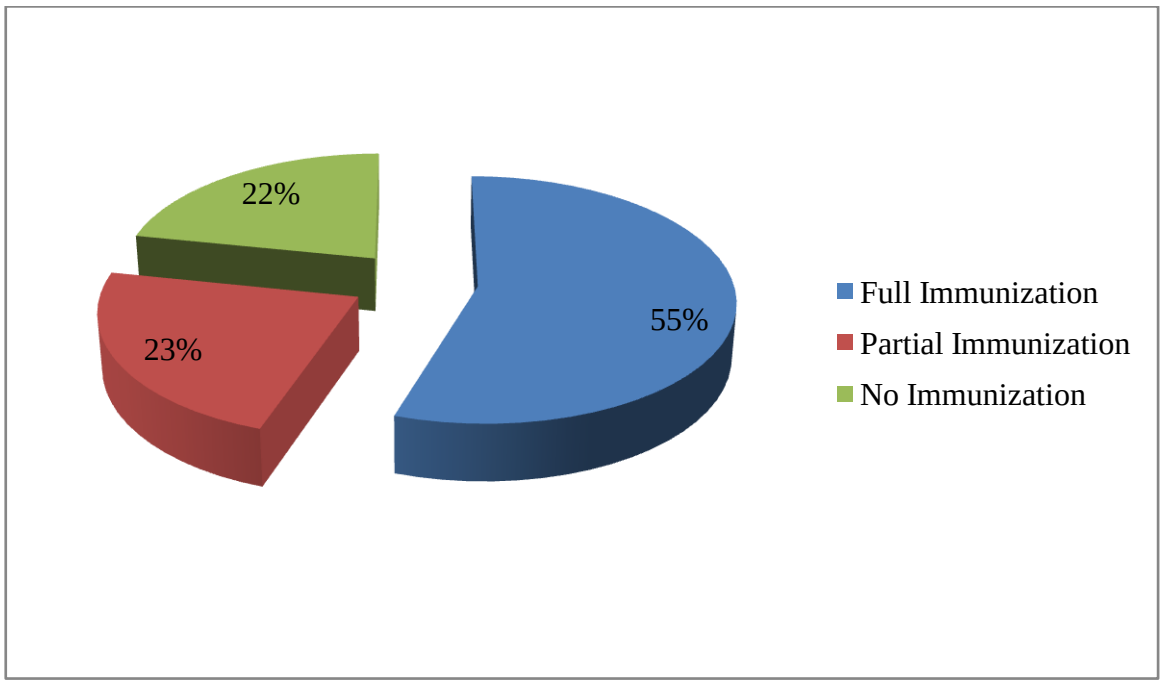


Figure 5.1: Percentage Distribution of Respondents by Immunization Coverage

Source: Field Survey, 2015

The high rate of immunization means that infant and children are protected from the child killer diseases such as polio, measles and diphtheria among others. Lack of immunization exposes the children to child killer diseases and also makes them susceptible to other diseases whereby increasing the chances of their dyeing. If these immunizations are taken properly, then infant and child mortality causes are partly controlled and this may reduce the rate of morbidity among the children which also has the potential to reduce mortality rate.

5.4 USE OF MOSQUITOES NETS

Table 5.2 shows the percentage distribution of respondents by the use of mosquitoes net. About (55.7%) confirmed the used of mosquitoes nets (18.7%) do not while (25.6%) did not respond. The low level of illiteracy among the respondents results to the non usage of the treated insecticide nets as only 40.0% are literate. Despite the effort of government and Non-Governmental Organizations (NGOs) to provide mosquito nets for the populace especially pregnant women and nursing mothers, majority of them (55.7%) used mosquitoes' nets so as to prevent their children from malaria and any other related diseases.

Table 5.2: The use Insecticide Treated Nets by the Respondents

Uses of ITNs	Frequency	Percentage
Yes	215	55.7
Partially	72	18.7
No	99	25.6
Total	**386**	**100.0**

Source: Field Survey, 2015

Bako (2012) noted the ineffective use of Insecticide Treated Nets (ITN) and other control measures the reasons for the high prevalence of malaria.

5.5 CAUSES OF INFANT AND CHILD MORTALITY

As in many populations, the death of a child remains a common feature in the family building process, with the result that there is a sizeable disparity between the number of children who are born alive and the number who survive to adulthood. Most African people belief that the causes of death are immaterial since the result may not give back the life that has been taken by death. Table 5.3 shows the distribution of the causes of infant and child mortality. Malaria has the highest percentage (30.1%) while others account for 6%, which include HIV/AIDS, accidents and cerebrospinal

meningitis (CSM) among others in Table 5.3. This is to be expected as many of the women have few surviving children (58.0%) (see Table 4.5). Also, most of the women depend on food that did not contain the essential nutrients require for survival and developmental growth of the child (see Figure 4.4).

Table 5.3 Causes of Infant and Child Mortality

Cause of Death	Frequency	Percentage
Malaria	116	30.1
Diarrhea	82	21.2
Sepsis	25	6.5
Dehydration	48	12.4
Diphtheria	19	4.9
Pneumonia	36	9.3
Measles	37	9.6
Others (Specify)	23	6.0
Total	**386**	**100.0**

Source: Field Survey, 2015

More often researchers have relied on ‘‘verbal autopsy’’ techniques to determine the probable causes of death particularly those that were not attended to by trained medical personnel (Gray, Cambell, Apelo, Eslam, Zacur and Ramos, 1990).

Diarrhea on the other hand is associated with causes other than infection. Most mothers belief that diarrhea is a manifestation of further growth by the child or a reaction to the consumption of excessive sugary or sweet items. This position is supported by Asakitikpi (2007), who, while quoting statistics obtained from UNICEF (2003) and WHO (2001), explained that diarrhea alone killed about three million children below the age of five annually. According to him, the campaign against this great killer disease may be a wide goose chase in Nigeria if there is no effort to understand the problem from the perspective of the indigenous population who see the disease which they call igbe gbuuru as a milestone in the development of children below the age of five.

Achieving low rates of infant and child mortality is of central importance for social wellbeing and human development. Despite the fact that the major childhood killer diseases have been identified and modern technology to combat them developed, yet children from urban and rural Nigeria die in large numbers from the attack of diseases (Ogujuyigbe, 2004).The distribution of children according to the cause of mortality closely resembles the regional findings in Sub-Saharan Africa (SSA) by Rao, Rao, Lopes and Hamed (2006) where the leading cause of death were malaria (10.1%), Diarrhoea (6.5%), Lower Respiratory infection (9.8%), measles (4.1%) and HIV/AIDS (20.4%). Although the distribution may be similar in hierarchy, it also shows a remarkable difference in absolute figures. The difference might be as a result of the fact that this research work was carried out within the months of August and November that coincide with high malaria prevalence (Sitas, Parkin, Chirenje, Stein, Mqoqi and Wabinya, 2006). In another finding by Choji (2005), in Gwol, Barkin Ladi, Plateau State, he found that nutrition related illnesses are the major child killer diseases in his study area. The NDHS survey results of 2008 however found that malaria fever is the main cause of under-five mortality (NPC and ICF Macro, 2009).

WHO (2013) noted that the main clinical causes of under-5 mortality, which includes neonatal, post neonatal and infant mortality are **malnutrition** (56%), and on the premises of malnutrition are the following, **malaria (**25%), **diarrhoeal disease** (16%), **measles** (6%), **HIV** (5%), **pneumonia** (21%) and **neonatal causes** (26%); which are further broken down into its constituent factors as **diarrhoeal disease** (4%), **birth asphyxia** (26%), **severe infection** (23%), **tetanus** (10%), **preterm birth** (23%), **congenital problems** (7%), and others (6%).

5.6 LEVELS, TRENDS AND DIFFERENTIALS IN INFANT AND CHILD MORTALITY

5.6.1 Introduction

In identifying the major determinants of infant and child mortality rates it is worthwhile to see the levels and trends of infant and child mortality rates that have resulted from the socio-economic and health changes in the study area over time. Figure 5.2 presents levels in infant and child mortality rates from 2005 to 2014 (Kaduna Ministry of Health, 2014). The figures pertain to the average mortality in the ten-year period preceding the survey, not to the situation in the survey year itself.

The influence of socio-economic differentials in infant and child mortality has been of interest to demographers, other social scientist and policy makers for quite some times. This section focuses on some selected variables which were cross tabulated in order to understand the infant and child mortality differentials among respondents. The variables are age at first marriage, age of the mother, marital status, educational attainment, occupation, income, ethnicity, religion and length of breast feeding.

5.6.2 Levels of Infant and Child Mortality

Child mortality has become the burning issue and a topic of interest to population research owing to its obvious direct link with lack of health facilities and indirect relationship with poverty. One of the targets of the Sustainable Development Goals (SDGs) is to reduce under-five mortality to 64 deaths per 1,000 live births and infant mortality to 30 deaths per 1,000 live births by 2015 as against the under-five mortality rate of 157 deaths per 1,000 in 2008 (Federal Republic of Nigeria, 2010).

The finding suggested differences in infant and child mortality rate across the years, with the widest differences in 2007 and 2008 in the study area. In Figure 5.1 the estimated levels of infant and child mortality in 2014 is 187/1000, 155/1000 respectively. This figure is far above the average obtainable in the state. Kaduna state has an estimated average rate of 58/1000 infant mortality in 2014 (KMOH, 2015).

Infant mortality shows that 187 per 1000 live births expected to die in the study area before celebrating their fifth birth day. The highest infant mortality decline is observed in 2007 which declined from 811 deaths per 1000 live births to 187 death per 1000 live births in 2014 and that of child mortality is in 2008 which declined from 414 deaths per 1000 to 127 death per 1000 in 2011. This could probably be due to the public awareness by either NGOs or state government to the populace or improvement in the provision of health facilities in the state.

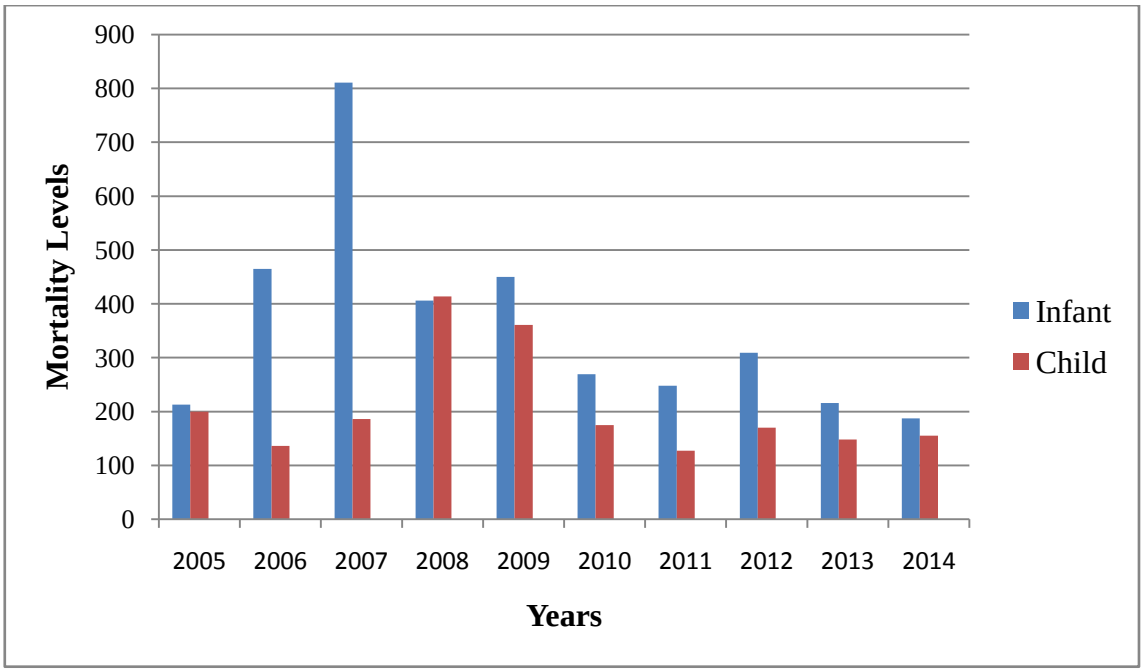


Figure 5.2 Levels of Infant and Child Mortality Per Year

Source: Hospital Records, 2015

On the average, 70% of child deaths in Africa are attributed to a few mainly preventable causes such as acute respiratory infections, diarrhoea, malaria, measles, malnutrition and neonatal conditions which include suffocation, prematurity and low birth occurring singly or in combination. More children die in Nigeria from these simple preventable and curable health conditions. Malaria alone accounts for about 24% of child deaths annually in the country. More than one million children die annually in the country before their fifth birthday with malnutrition as the underlying cause for more than 50% of these mortalities (UNICEF, 2014).

IMR and maternal mortality are not disconnected. Till date, maternal and child health (MCH) outcomes in Nigeria are among the worst in the world (Doctor, Bairagi, Findley and Helleringer, 2011; Ashir, Doctor and Afenyadu, 2011). Several studies have ascribed inadequate health facilities, lack of transportation to institutional care centers, inability to pay for services and resistance among some populations to modern

health care as key factors behind the country's high rate of maternal, newborn and child morbidity and mortality (Babalola and Fatusi, 2009: UNICEF, 2008).

Attention to clean and hygiene delivery practices and the provision of essential care for the newborn are important interventions which can improve health outcomes of all infants whether born at home or in a health facility (Lackritz, Campell, Reubush, Hightower, Wakube and Stekete, 1992; Ernest, Anunobi and Adeniyi, 2002; Obidike, 2004; Adekanmbi, Ogunlesi, Olowu and Fetuga, 2008). Practicing exclusive breastfeeding may be insufficient; an early initiation to breast feeding and exclusive breastfeeding practice will reduce infant deaths. A 2006 study in rural Ghana showed that early initiation to breastfeeding within the first hours of birth could reduce 22% of neonatal deaths, and initiation within the first day would prevent 16% of deaths (Adekambi, Ogunlesi, Olowu and Fetuga, 2008).

5.6.3 Under-five Mortality

Figure 5.3 shows the under-five mortality levels in Kaduna state from 2005 - 2014. The results revealed that 2007, 2008 and 2009 have the highest mortality levels of 256/1000, 411/1000, and 390/1000 live births respectively with the least recorded in 2011 (158/1000 live births). These figures do not look plausible. Although, under-five mortality has shown a continuous steady reduction from 2013 to 2014 (163/1000 per live births). This findings suggest that, the under-five mortality level is above the state average of (157/1000 live births) by (UNICEF, 2010). Under-five mortality is closely linked to poverty with malnutrition as an underlying contributor in over half of these deaths. Factors associated with these problems include, poor socio-economic development, weak health care system and low socio-cultural barriers to care utilization (Ibeh, 2008). Malnutrition is the underlying cause of morbidity and mortality of a large

proportion of children under-5 in Nigeria. It accounts for more than 50 per cent of deaths of children in this age bracket (UNICEF, 2014.

The high rate of under-five mortality is 2007 to 2009. This is as a result of HIV prevalence, malnutrition, exclusive breast feeding and manipulation of data for political reasons.

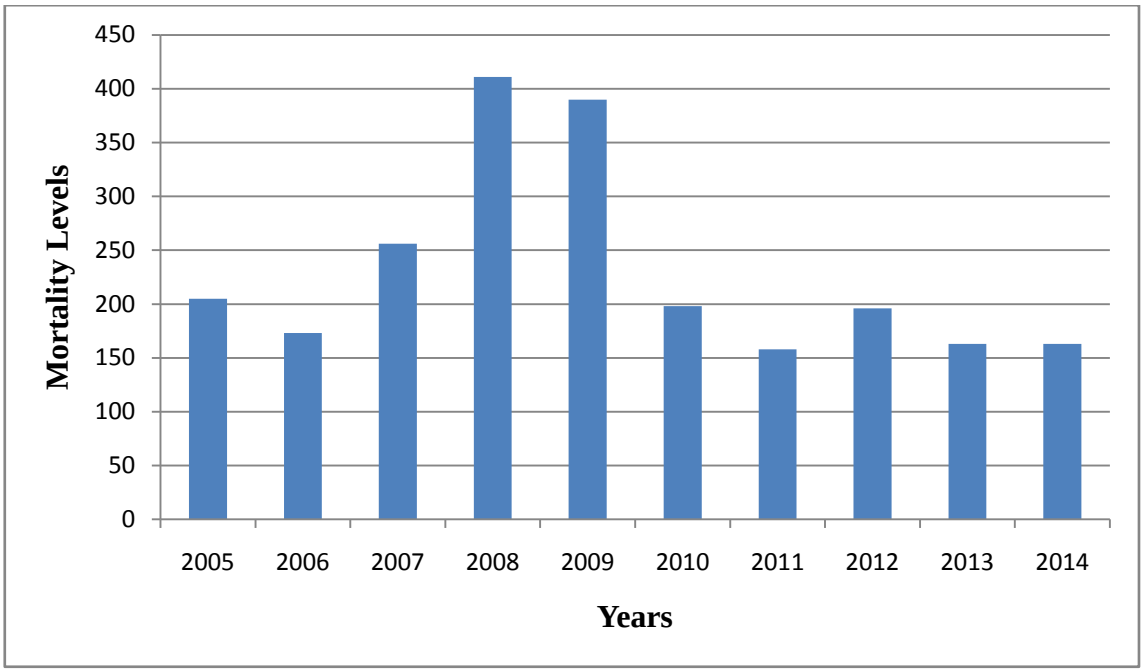


Figure 5.3 Levels Under–five Mortality Per Year

Source: Hospital Records, 2015

In Nigeria, under-five mortality rate in 2012 was 94 (per 1000 live births) which positively reduced to 89 (per 1000 live births). However, Nigeria still has a long way to go to achieve the SDG target of reducing the under-5 mortality to 64 deaths per 1,000 live births and the infant mortality to 30 deaths per 1,000 live births by 2015 (Government of Federal Republic of Nigeria, 2010). According to the UN inter-agency group for child mortality estimation, Nigeria has achieved only an average of 1.2% reduction in under-five mortality per year since 1990; it needs to achieve an annual reduction rate of 10% per year from now until 2020 to meet SDG (IGME, 2010). Nigeria has achieved so low to meet the SDGs due Poor planning and funding by the

government, limited inter-sectoral approaches and lack of decentralised management capacity and also non-sustainability of donor-funded and inadequate monitoring and evaluation.

This is due to the fact that, child survival in Nigeria is threatened by nutritional deficiencies and illnesses, particularly malaria, diarrhea diseases, acute respiratory infections (ARI), and vaccine preventable diseases (VPD), which account for the majority of morbidity and mortality in childhood (UNICEF, WHO, World Bank, UNPD, 2010). In addition to all these are childhood malnutrition, poor immunization status, household poverty, and food insecurity, while other factors includes maternal illiteracy, poor living conditions (housing, water, and sanitation), and poor home practices for childcare during illnesses. Also, the alarming rise in prevalence of HIV/AIDS among pregnant women with resultant mother-to-child transmission (MTCT) adds to the burden of child mortality and morbidity in Nigeria.

Nigeria has a population of 140 million people with women of child bearing age constituting about 31 million and children less than five years of age constituting 28 million (FMOH, NPHCDA, 2009; National Bureau of statistics, 2010). Children under five years of age therefore constitute a significant percentage of the nation's population. Nigeria, which constitutes just 1% of the world population, accounts for 10% of the world under-five mortality rate.

5.6.4 Trends of Infant and Child Mortality

Death of children under five is a factor that defines the well-being of a population and it is usually taken as one of the development indicators of health and socioeconomic status which indicate the quality of life of a given population, as measured by life expectancy (Bello and Joseph, 2014). Figure 5.4 revealed the trends of

infant and child mortality. The figures indicate that there was an increased trend in infant and child mortality in 2009 and 2008 respectively.

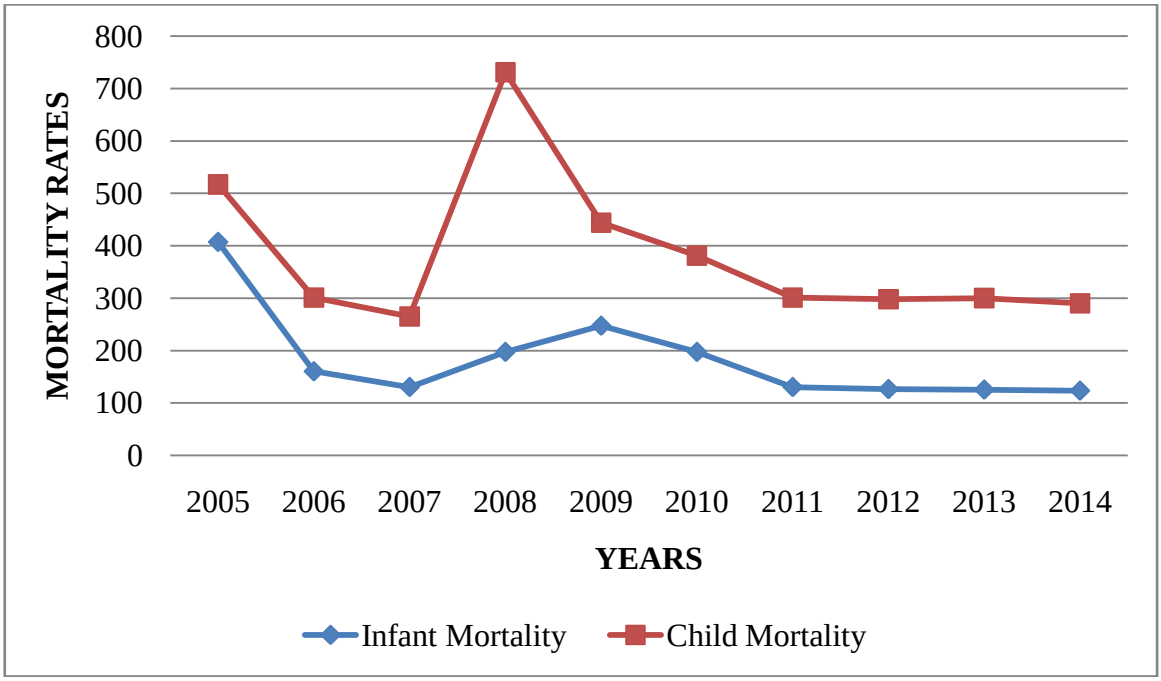


Figure 5.4 Trends in infant and child Mortality Rates, 2005-2014
Source: Hospital Records, 2005-2014

That is why reduction of infant and child mortality is a worldwide target and one of the most important key indices among Sustainable Development Goals (SDGs) in reducing infant and under-five child mortality rates by two-thirds from the 1990 levels by 2015 (Desta, 2011). Health indices are poor as can be seen in the maternal mortality ratio of 1025/1000 live births, infant mortality and child mortality rates are 114 and 269/ 1000 live births respectively (FMOH, 2012). The prevalence of HIV and TB are on the increase and non communicable diseases are increasingly becoming public health problems. This, in part is because of low coverage of high impact cost-effective interventions. For example, only 22% of children are fully immunized, less than 20% of women deliver in a health facility and only a fifth have their deliveries supervised by a trained health professional (FMOH, 2012). United Nations Children's Fund (UNICEF) has revealed that malnutrition accounts for Over 50% of under-five mortality of children and women in Nigeria especially the Northern part of the country said the North-west

has 53% malnutrition prevalence according to 2014 Multiple Indicator Cluster Surrey (MICS). Malnutrition is another cause of morbidity and mortality in Nigeria, it accounts for at least 50% of children's deaths. Poor environmental hygiene, low access and utilization of quality health care services by women and children are additional factors.

5.6.5 Trends of Under-five Mortality

Figure 5.5 shows the trends of components of under-five mortality that is infant mortality rate (IMR) and child mortality rate (CMR) according to the various hospitals in the study areas for ten years periods from 2004-2014. The state recorded the highest infant and child mortality in 2008 due HIV/AIDS prevalence that was high in the State, with adverse consequences on the weak health care delivery system.

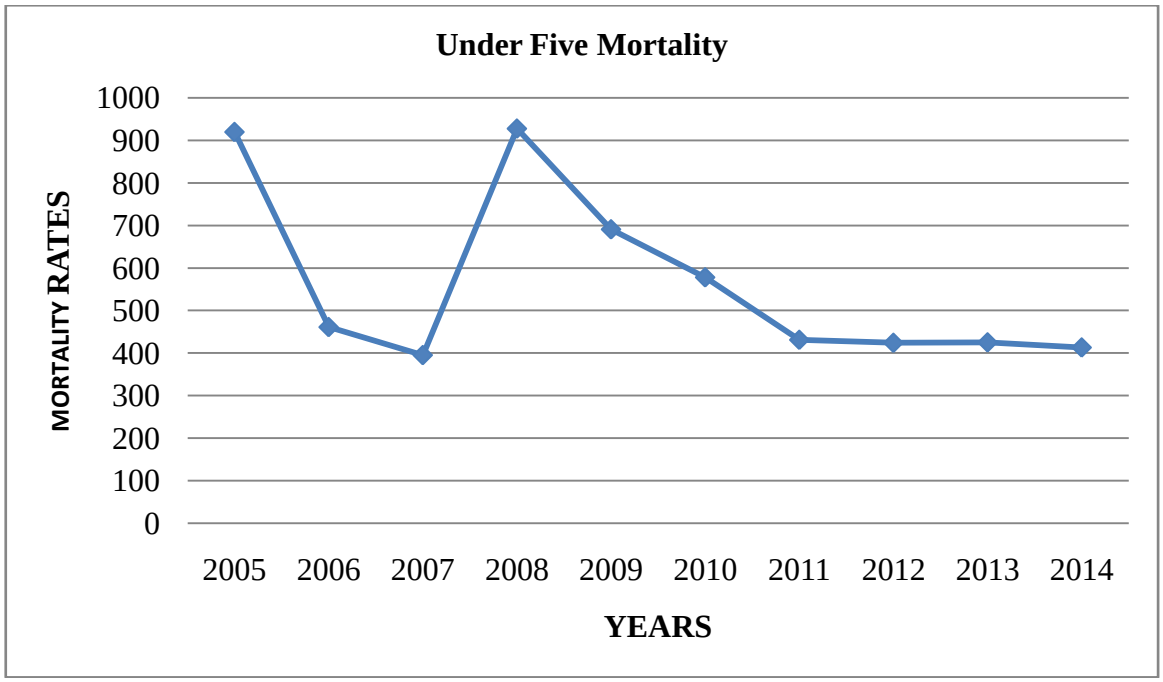


Figure 5.5 Trends of Under-five Mortality (2005-2014)
Source: Hospital Records 2005-2014

Between 1991 and 1999, there was an exponential increase in the sero-prevalence rate of HIV in Kaduna State and after a period of decline after 1999, the rate increased to 7% in 2008, the highest state rate in the NW zone that could probably skyrocket the death of infant and child mortality (FMOH, 2009). Another reason is as a result of human factor or political reasons where data can be manipulated by the

hospital for selfish interest. Although, during data gathering there was inconsistent, duplicate, missing of record book or record keeping by the some of the hospitals. Many children were not immunized to low coverage, exposing them to disabilities or premature death. This is in concomitant with that of Bryce, Terreri, Victora, Mason, Daelmans and Bhutta, (2015) noted that while some people believed that the polio vaccine was contaminated by anti-fertility substances, others questioned the focus on polio when measles and malaria were considered to be dagerous. Some also distrusted claims about the safety of Western biomedicine. These concerns relate to questions about the appropriateness of vertical health interventions, where levels of routine immunization are low. Malnourishment could also be the cause of high infant and child mortality since there is over 57% of children that are malnourished in the state. Female illiteracy adversely affects child survival rates and is also linked to early pregnancy. The lack of primary education and lack of access and distance to health care contribute significantly to child mortality statistics. Women who complete secondary education are more likely to delay pregnancy, receive prenatal and post natal care and have their birth attended to by qualified medical personnel. UNICEF also notes that discrimination and exclusion of access to health and nutrition services due to poverty, geographic and political marginalization are factors in mortality rates as well (Saraki, 2008).

Overall, the under-five mortality indicators declined steadily in the past 10 year's period (2004-2014) and maximum decline was observed in 2011. In 2007 and 2011 most of the hospital did not have under-five mortality records due to either fire outbreak, wind disaster or due to change in government. This could be as a result of increase in immunization awareness by the state and the local government areas. There is also increased awareness by the state and local government. Although, the toll of under-five deaths over the past decade is staggering: between 2005 and 2014. The

magnitude of decline varied across components of under-five mortality by years. Among the ten (10) years, four (4) years: 2011, 2012, 2013 and 2014 saw steady declined or no change in infant and child mortality. Kaduna State did not key into the National Health Sector Reform Programme of 2003 to 2007, on its own and with the support of development partners notably PATHS, undertook some reforms in recent years in the State to strengthen her health care delivery system (FMOH, 2012). The State implemented the Medium Term Health Plan for the period 2008 -2011 that probably led to the steady decrease in infant and child mortality. However considering the trends in under-five mortality in Kaduna State since 2005, there is no doubt that the trends has been on the decrease, although the decrease is small over the years up to 2014. However, despite the fact that under-five mortality has decreased between 2005 and 2014, the State still witness a reversal in the achievement made so far as the under-five mortality increase from 140 to 201 per1,000 live births between 1999 and 2003 (NPC and ICF Macro, 2003; UNICEF, 2010). Though, recent progress has been made towards reducing under-five mortality from 201 to 157 between 2003 and 2008 according to NDHS 2008 reports and UNICEF 2010 reports.

The infant and child mortality rates are 114 and 269/1000 live births respectively (NPC and IPC Macro, 2003), twice the rates in the southern zones of the country. The high infant and child mortality are from diseases that can be prevented or treated at low cost; they include diarrhea, malaria, malnutrition, measles and acute respiratory tract infections. Infant and child mortality increase in 2008, 2010, 2013 and decreased in 2009, 2011 and 2014 in almost all the hospitals (See figure 5.5). This result is similar to the findings of Antai (2011). The above findings are consistent with the conclusions reached by Adedini, Odimegwu, Masiku, Ononokpono and Ibisonu (2013). During the same period, the under-five mortality rate declined from 135 deaths to 96

deaths per 1000 live births (29% decline) and infant mortality rate declined from 91 deaths to 62 deaths per 1000 live births (32% decline).

The data indicates that all the five childhood mortality indicators have been steadily declining over the last decades. The magnitude of decline varies among the component rates that combine to form the under-five mortality. This is also supported by Kaduna State Ministry of Health (2015) which revealed that there was 50% reduction in child mortality from its current level 2010-2013. The high infant and child mortality are from diseases that can be prevented or treated at low cost; they include diarrhea, malaria, malnutrition, measles and acute respiratory tract infections.

5.6.5 SPATIAL TRENDS OF INFANT AND CHILD MORTALITY

Figure 5.6 shows the spatial trends of components of under-five mortality that is infant mortality rate (IMR) and child mortality rate (CMR) according to the various hospitals in the study areas for ten years periods from 2005-2014. Overall, the under-five mortality indicators declined steadily in the past 10 year's period (2005-2014) and maximum decline was observed in General hospital Jemma'a and Hajiya Gambo Suwaba hospital.

Although, the toll of under-five deaths over the past decade is staggering: between 2005 and 2014. The magnitude of decline varied across components of under-five mortality by hospitals. Among the five (5) hospitals, two (2) hospitals (St. Gerald hospital and Dantsoho hospital Tudun wada) saw steady declined or no change in infant and child mortality between 2010 and 2014. However considering the trends in under-five mortality in Kaduna State since 2005, there is no doubt that the trends has been on decrease, although the decrease is small over the years up to 2014.

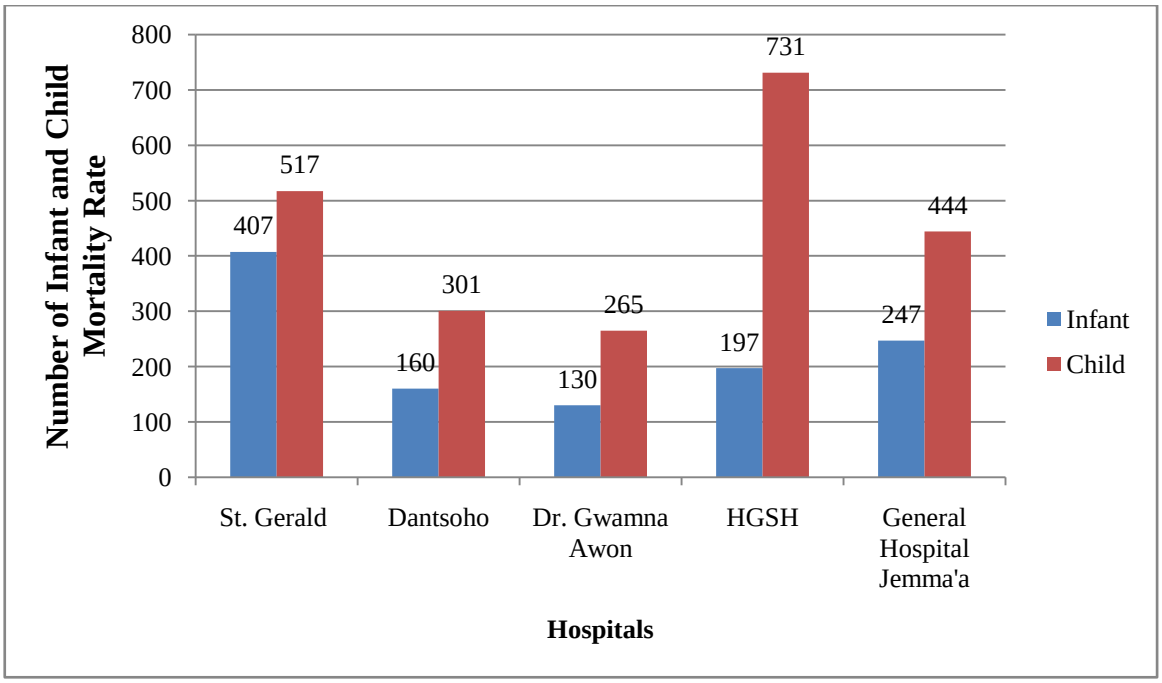


Figure 5.6: Spatial Trends of Under-five Mortality (2005-2014)
Source: Hospital Records 2005-2014

However, despite the fact that under-five mortality has decreased between 2005 and 2014, the State still witness a reversal in the achievement made so far as the under-five mortality increase from 140 to 201 per1,000 live births between 1999 and 2003 (NPC and ICF Macro, 2003; UNICEF, 2010). Though, recent progress has been made towards reducing under-five mortality from 201 to 157 between 2003 and 2008 according to NDHS 2008 reports and UNICEF 2010 reports.



Figure 5.7 Spatial Location of Under-five Mortality
Source: Field Survey, 2015

5.6.7SOCIO-ECONOMIC DIFFERENTIALS OF INFANT AND CHILD MORTALITY

To understand the determinants of infant and child mortality differentials, some selected socio-economic variables were analyzed as shown in Table 5.4. The analysis shows that infant and child mortality is higher with mothers below the age of 29 years than any other age among age at first marriage. Among the mothers who are married between 25-29 years of age, they have experience more deaths with 4.8% than any age group. The average under- five mortality is 2.42% among the age at first marriage. The results depicted that there is high rate of under-five mortality amongst those who got married at early age (less than 19) than adult age in the study area. Similar findings have been observed in general population (Pandey *et al.*, 2004; Paul, 2011: Saha, van Soest, and Bijwaard, 2014). Also as observed, the age of the mother at the time of the first birth is an important factor for infant and child survival. This means the excess higher risk of dying among children born by young mothers could be partly due to physical immaturity, lack of child care skills and access to health care service. Increasing effect of low age of mother at birth on mortality could be due to wide gap in utilization of the mother and child health (MCH) care services.

To determine the differentials of under five mortality rate, analysis of variance was used using SPSS (See Table 5.6)

Table 5.4 Socioeconomic Differentials of Under-five Mortality

Variables	U5 Mortality (%)
Age at first marriage	
15-19	2.2
20-24	2.9
25-29	4.8
30-34	1.9
34-39	1.4
40 and above	1.3
Average	**2.4**
Current marital status	
Never married	1.5
Married but not with spouse	2.4
Married with spouse	1.7
Separated	2.0
Divorced	3.5
Widowed	2.0
Others specify	0.9
Average	**2.0**
Income	
<10,000	2.5
10,001-20,000	3.6
20,001-30,000	2.0
30,001-40,000	1.8
40,001-50,000	1.8
>50,000	1.0
Average	**2.1**
Level of education	
None	3.2
Primary education	2.4
Quranic school	3.6
Secondary education	1.3
Tertiary education	0.9
Others specify	1.3
Average	**2.1**
Length of Breast Feeding	
0-6 months	2.1
7-12 months	1.3
13-18 months	2.5
19-24 months	1.4
25 months above	0.4
Average	**1.5**

Source: Field survey, 2015

The current marital status of the respondents shows that infant and child mortality seems to be higher with married women not currently living with spouse

compared. This could be probably due to lack of support from the former husbands and children lacking parental care since they are not longer staying together. This therefore shows that single parents experience more infant and child mortality probably due to low socioeconomic status vis-a-vis lack of means for transportation to institutional care, inability to pay for services and resistance among some populations to modern health care are key factors behind the high rate of child mortality and morbidity.

Also, this confirms United Nations (UN, 2010) possible explanation that, socio-economic status is higher among married women than any marital category as a result of higher family income. Widowhood and divorce are associated with substantial stress both economic and social, which in turn affect infant health and survival. Household income is one of the most important determinants of standard of living, economic and social welfare. Table 5.6 also shows the average income level among the respondents who have experienced infant and child mortality. It is observed that young women with less ₦30,000 have experienced infant and child mortality (8%) than older mothers who earn ₦40,000 and above (4%). This shows that mothers with higher income tend to take care of their children especially when they are sick than mothers with lower income. Therefore, household economic status which is often measured in terms of household per capital income influence infant and child survival through access to the goods and services that affect the health of children. Such goods and services include access to adequate food supply, health and medical services, clothing, good shelter and ownership of certain goods. This result is in accordance with Mahfouz, Adil, David and Abdelrahim (2009) who found that low income affects the accessibility of medical services. This implies that income level determine child mortality in the study area. These results are similar to the findings of past studies (Houweling and Kunst, 2010; Anyamele, 2011).

Education is one of the most influential factors in differentiating the infant and child mortality among the socioeconomic subgroups. Mother's education seems to be directly related with the health of a child (Anyamele, 2011). Those mothers with little or no formal education (3.60%) experience more infant and child mortality than those with formal education (0.86%). There is no doubt that an educated mother can provide better care of child than the mother with no education or a lower level of education. Education makes a mother socially advanced, free from traditional values and changes her pattern of behaviour and attitude.

It can be deduced from the analysis that those mothers with little or no education experiences high infant and child mortality compare to the educated mothers. The average infant mortality is 3.2 higher than that of the child mortality amongst the literate mothers. It was also revealed by Mamman (1992) that education has been identified as a major correlate of infant and child mortality variation even though the exact direction of the association (negative or positive) has not been universally established. It is believe that education acts as an inhibiting factor on infant and child mortality has led to studies in a number of African countries seeking to identify infant and child mortality by educational attainment. During the Focus Group Discussion, the number of infant and child mortality is negatively related to the level of education of the women interviewed. It was seen that the women with no education on the average had more children than women with secondary or higher educational background. The observed distribution of education shows that the mothers with no formal education have more cases of infant mortality.

Thus a negative relation between education and fertility has been established from the above statistics. This is in accordance with some studies (Hobcraft, 1993; Mahzous, 2009) that show that the higher the level of maternal education, the lower the

incidence of infant and child mortality. Maternal education has been identified as one of the most important socioeconomic determinants of infant and child mortality. Many studies showed that the higher the level of maternal education the lower the incidence of infant and child mortality. In addition to these they are more likely to have received antenatal care to have birth with some medical attendance, and to have taken their children at some time to see a physician (Mahfouz, 2009).

However, some studies have shown that the association between mother's education and child survival were weaker in sub-Saharan African than in Asia or particularly Latin America, where socioeconomic differentials were generally higher. The reason for this kind of association is unknown. However Hobcraft (1993), suggested that perhaps health infrastructures are weaker in sub-Saharan Africa, thereby inhibiting the ability of more educated mothers to take advantage of their human capital in the health environment. Different researchers suggest pathways whereby mother's education might enhance child survival. Cleland (1990) concluded that education may have a modest effect on health knowledge and belief. Children whose mothers and fathers had no education or had primary education were found to have higher chances of dying before their first birthday in the two zones studied and this chance is much higher in the NE. This is in consonance with reports in earlier researches that education has an implicit effect on the health of children, where health is interpreted in its broadest sense as complete physical, psychological, social, emotional, developmental and environmental well-being (Abuqamar, Coomans and Louckx, 2011). These educated women may also tend to live in more economically developed areas that are rich enough to have schools and access to good medical facilities (Palloni, 2009).

The length of breast feeding of the child is known to be significantly associated with mortality (Bhalotra and van Soest, 2008). The average infant mortality

differential shows that, infant mortality is among those that breast feed within six (6) months compare to child mortality (see Table 5.6). It can be concluded that mothers that breastfeed their children in less than six month usually experience more deaths than those who breast feed for more than 7 months. Increaed length of breast feeding was found to be positively associated with child mortality (Pandey, Roy, Sahu and Achanya, 2004). The steady increase in child mortality with the birth order may reflect competition in economically disadvantaged populations. Length of breast feeding analysis also revealed that. This finding gives credence to previous studies (Anyamele, 2011; Caldwell, 1979; Kabagenyi and Rutaremwa, 2013; Mosley and Chen, 1984).

5.6.8SELECTED DEMOGRAPHIC ANALYSIS OF INFANT AND CHILD MORTALITY DIFFERENTIALS

The age of the mother is also an important variable to be analyse to determine the infant and child mortality differentials. It is observed that the average under-five mortality is 2% is lower than that of the age at first marriage. This means that there are more cases of under-five death among the young women than the older women. From the analysis it can also be seen that young women tend to have high infant and child mortality than the older mother women. This could be probably due to the experienced and the knowledge of the older women who know how to take care of their babies than the younger women. Mondal, Hassain and Ali (2009) using multivariate logistic regression analysis found that the most significant predicators of neonatal and child mortality levels are mothers' age at birth along with other covariates such as immunization, ever breast feeding and birth interval.

The proportion of children ever born who have died is indicators of child mortality and can yield robust estimates of childhood mortality level. Table 5.5 shows the distribution of infant and child mortality differentials by number of children ever

born (CEB). It reveals that mothers with more children have experienced more infant and child mortality. The average infant mortality differential is higher than that of the child mortality differentials among child ever born (see Table 5.5). The observed mortality differential between infant mortality and the children ever born is statistically significant. This implies that a child ever born contributes to mothers experiences in taking care of their children (Cleland, 1990).

Table 5.5 Demographic Analysis of Infant and Child Mortality Differentials

Variables	Infant Mortality (%)
Age of mothers	
15-19	2.7
20-24	3.8
25-29	2.5
30-34	1.7
35-39	1.9
40 and above	1.0
Average	**2.1**
Children Ever Born (CEB)	
One	0.3
Two	3.4
Three	1.4
Four	3.9
Five	2.6
Average	**3.8**
Children Surviving	
One	2.1
Two	0.6
Three	1.2
Four	4.2
Five	0.8
Average	**1.8**
Antenatal attendance	
Yes	1.2
No	3.4
Average	**2.3**
Immunization	
Yes	0.2
No	4.4
Average	**2.0**

Source: Field survey, 2015

Among the children surviving in Table 5.5, the average infant mortality differentials revealed, high number of surviving children is within the older women. In the case of child mortality, the situation is not different from that of the infant mortality. As observed, those with few children ever born had more number of infants and children under-five year compared to mothers with more children ever born. We can that there is a significant association between children ever born and child mortality.

This is consistent with Mojekwu, (2012) findings that in certain cultures, women appear to be more likely to state duration of marriage correctly than to give correct information

It can be deduced in Table 5.2 that mothers who received antenatal care from care providers have greater chances of having surviving children than those who did not. Expectant mothers who receive antenatal care from experienced care providers have greater chances of having normal and healthy children than those who, though illiterates and ignorant, remain at home depending on faith or chance. This finding is in accordance with that of Adetunji (1994) who carried out a study on the place of birth of the child. His study showed that irrespective of mother's education and region of residence a child born in a modern health facility and guided by an experienced health care giver has greater chances of survival than those born at home. The reason for this may not be farfetched. At ante-natal care, complications in the pregnancy are detected early and medical advice/treatment provided for correction. Conversely, risk is higher of child loss in situations where complications occur and this is not detected early. Moreover, there is no special pattern pregnancies take as each child has its peculiar mode of health needs even at every stage of pregnancy. Children born in formal health facilities have greater chances of survival than those born at home (Mojekwu, 2012). On the contrary, the traditional birth attendants may not be knowledgeable enough to detect signs of imminent infection and morbidity associated with infants.

Immunization was also found to be part of the selected demographic variables to determined infants and child mortality differentials. The analysis in Table 5.7 revealed that mothers who immunize their children have higher chances of surviving children than those who did not. It can be concluded that infant with immunization have fewer cases of deaths then those without immunization. It is so pertinent that many household heads with no education still close their doors at health workers who go round for the

vaccination and immunization of their children in the study area. Health care providers and the Government of Kaduna State face the herculean task of contending the social stigma imposed on modernization and immunization in these localities. UNICEF, (2007); Hobcraft, McDonald and Rustein (1984); Mondal, Hassain, and Ali, (2009): Kyei, (2011) found a strong relationship between immunization and child survival. Immunized children have greater chances of survival than those depending absolutely on immunity from their mother's breast milk.

5.6.9 FACTORS THAT DETERMINE INFANT AND CHILD MORTALITY

To determine the factors that affect infant and child mortality using multiple regression analysis. This method essentially tends to eliminate the weakest variable, so that only the strongest variables are left. All the variables were entered in the equation and only thirteen variables identified to show positive relationship for predicting infant and child mortality rates. The method used in this case is step-wise multiple regressions. The researcher is particularly interested in how much of the variation in infant and child mortality is accounted for by the joint linear influences of distance to health facility, age at first marriage, age of mothers, current marital status, level of education, length of breast feeding, child sleep under net, type of occupation, type of healthcare centre, cause of death, postnatal attendance, monthly income and age at first birth

The variables are: distance to health facility, age at first marriage, age of mothers, current marital status, and level of education, length of breast feeding, child sleep under net, type of occupation, type of healthcare centre, cause of death, postnatal attendance, monthly income and age at first birth. (Table 5.6) shows the percentage variance of mortality explained by the factors of distance to health facility, age at first marriage, age of mothers, current marital status, level of education, length of breast feeding, child sleep under net, type of occupation, type of healthcare centre, cause of

death, postnatal attendance, monthly income and age at first birth using multiple regression method.

Infant and child mortality rates in the past five years are 69 and 128 deaths per 1,000 live births, respectively. In Kaduna State infant and child mortality was 88 deaths per 1,000 live births and 179 deaths per 1,000 live births respectively in 2010. Infant mortality has declined by 26% over the last 15 years, while child mortality has declined by 31% over the same period. This situation is now clearly changing and the search is underway for effective policies to reduce excessive mortality in order to affect a decline in the rates of population growth. This will also contribute such understanding by providing an assessment of the proximate determinants of infant and child mortality levels and differentials in Kaduna State

The result in Table 5.8 shows the percentage variance of infant and child mortality explained the factors of distance to health facility, age at first marriage, age of mothers, current marital status, level of education, length of breast feeding, child sleep under net, type of occupation, type of healthcare centre, cause of death, postnatal attendance, monthly income and age at first birth using multiple regression method. The percentage variance of infant and child mortality explained by the factors is 77%. There are strong variables which explain for infant and child mortality up to about 66%. However, the contribution of distance to health facility, age at first marriage, age of mothers, current marital status, level of education and length of breast feeding are surprising important to explaining variation in parity when used in combination with the other independent variables.

Table 5.6: Regression Analysis Under Five Mortality

Variables	Multiple R Square	Adjusted R Square	Change Statistics		
			R Square Change	F Change	Sig. F Change
1	.144	.142	.144	66.805	.000
2	.267	.263	.123	66.859	.000
3	.403	.399	.136	90.286	.000
4	.488	.483	.085	65.697	.000
5	.583	.578	.095	89.355	.000
6	.668	.663	.085	100.392	.000
7	.699	.694	.032	41.250	.000
8	.733	.727	.033	48.954	.000
9	.761	.755	.028	45.813	.000
10	.770	.764	.009	14.966	.000
11	.775	.769	.005	9.366	.002
12	.779	.772	.004	6.595	.011
13	.786	.778	.007	11.736	.001

Source: Field Survey, 2015

Key: 1. Distance from the health care center 2. Age at first marriage 3. Age of the mother 4. Current marital status 5. Level of education 6. Length of breast feeding 7. Child sleep under net 8. Occupation 9. Type of health care center 10. Cause of death 11. Post natal attendance 12. Monthly income and 13. Age at first birth.

Table 5.8 also reveals the contribution of each of the determinants of infant and child mortality. For the purpose of this analysis, the multiple R and R^2 values would yield the appropriate information.

"R" indicate the direction of the relationship, whether positive (+) or negative (-). The absolute "r" can be used as an index of the relative strength of the relationship.

"$R^{2"}$ indicate the proportion of variation in parity explained by the independent variables.

The Table 5.8 shows that the adjusted r-squared value was 0.778, meaning that 78 percent of the variance in mortality rate are explained by the model. The standardized beta coefficient and beta weights presented in Table 5.8 suggest that distance to health facility, age at first marriage, age of mothers, current marital status, level of education, length of breast feeding, factor contribute most to predicting mortality rate and that child sleep under net, type of occupation, type of healthcare centre, cause of death, postnatal attendance, monthly income and age at first birth factor also contribute to this prediction. For robustness, a stepwise regression was conducted as model selection technique in order to ascertain the major determinant factors contributing to mortality rate prediction

Table 5.7 Anova of Under Five Mortality

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	57.941	1	57.941	66.805	.000[b]
	Residual	345.193	398	.867		
	Total	403.134	399			

	Regression	107.696	2	53.848	72.359	.000[c]
2	Residual	295.438	397	.744		
	Total	403.134	399			
	Regression	162.548	3	54.183	89.184	.000[d]
3	Residual	240.585	396	.608		
	Total	403.134	399			
	Regression	196.857	4	49.214	94.240	.000[e]
4	Residual	206.277	395	.522		
	Total	403.134	399			
	Regression	234.990	5	46.998	110.127	.000[f]
5	Residual	168.144	394	.427		
	Total	403.134	399			

Source: Field Survey, 2015

Key:

1. Dependent Variable: number of children lost

2. Predictors: (Constant), distance from house to hospital for antenatal

3. Predictors: (Constant), distance from house to hospital for antenatal, age at first marriage

4. Predictors: (Constant), distance from house to hospital for antenatal, age at first marriage, age of mothers

5. Predictors: (Constant), distance from house to hospital for antenatal, age at first marriage, age of mothers, current marital status

The combination of the household environmental factor significantly predicts mortality rate, $F = 131.655$, $p < .001$(see Table 5.9) with the distance to health facility, age at first marriage, age of mothers, current marital status, level of education, length of breast feeding factor significantly contributing to the prediction. The adjusted r-squared value was 0.778. This indicates that 78% of the variance in mortality rate was explained by the model.

The data in Table 4.23 also shows that of the six variables, distance from the health facility had the most significant correlation (.379), followed by age at first marriage (.138), the age of mother was also significant. This is to be expected as most mothers complaint about the far distance to the health facilities in the study area. Most health facilities are not located within the reach of the respondents. According to one of the respondents (mother) who prefers to be anonymous during the Focus Group Discussion in Zaria Local Government Area affirmed that "she spent not less than ₦300 on transportation to reach a health care facility and that at times she ended up trekking or alternatively had to visit a traditional healer who is more closer to her locality".

The results showed that the maturity of women before marriage help in proper nursing and caring for their offspring. It was found out that young maternal age of mothers affect children survival as IMR reduced considerably as maternal age increased in both NE and SW thou IMR among NE children whose mothers had first birth at age 30 years or more were significantly higher than those who had it before age 13 years. This finding disagreed with a report that young maternal age was not an independent risk factor for adverse birth outcomes where they attributed increased risky child health to other factors that were related to teenage pregnancy such as: unmarried status, low socioeconomic status, inadequate prenatal care and low education level (Rogers, Peoples-Sheps, and Suchindran, 1996).

From the result, maturity of a woman before nursing a child will reduce child mortality to 0.118, current marital status (.064), educational attainment (.064) and breast feeding as part of the factors that reduce under-five mortality. The result shows that exclusive breast feeding reduces child mortality in Kaduna state. From the analysis of the result, it means that improvement in exclusive breastfeeding will help to reduce child

mortality with about 0.54. It is noted that religion, ethnicity and antenatal care did not seem very relevant. We note that these variables operate indirectly on the infant and child mortality levels through other variables which are directly related to infant and child mortality levels

It is very important to note that other variables such as ever given birth at home, monthly income, source of water, antenatal attendance, postnatal attendance, type of healthcare centre, age at first birth, religion denomination, distance to health facility, introduction of supplementary food, ethnicity, cause of death, child sleep under net, immunization within the last six months, length of breast feeding, toilet facility, spaced children did not seem very relevant. We note that these variables operate indirectly on the infant and child mortality through other variables which are directly related to mortality levels.

At the level of individual variables, most of our prior expectations relating to the variable behaviours were validated. For instance, our expected behavior on the impact of mother's age, age at first birth, age at first marriage, length of breast feeding, and current marital status were validated. This validation also corroborates part of existing literature on the relationship between access to health care facilities and its impact on infant and childhood mortality. Within such studies, access and quality has been linked to infant and childhood mortality with household access to an individual water supply emerging as significant among water variables (Bradley, Stephens, Harpman and Caincross, 1992). Even with this assertion, there exists conflicting findings within the water-child health literature. While Victoria, Banks, Huttly, Teixeira and Vaughan (1992) found that infants from households using public standpipes or wells were 4.8 time more likely to die of diarrhea than those from households with in-house piped water; Merrick (1983) noted that

although infant mortality declined by 20% with the advent of increased access to water in Brazil; maternal education accounted for 34% of the decline. In this study, access to water and health contradicted our expectations that higher access would result in lower under-five mortality, this could be hinged on the fact that access to water may be high, the water quality even from government taps are poor.

This finding in the study is suggesting that easy accessibility to health care centers is high enough as to lead to low mortality. This contends here that high access to poor quality of water is as dangerous for child and adult health as drinking from other sources other than the tap. To corroborate this position, female literacy rate is discovered to possess a positive relationship with under-five mortality. Put together, the findings on access to water and the female literacy rate suggests that where access is high with lower quality maternal education is also not sufficient as to encourage water treatment, etc. the access to health parameter also indicates this relationship.

In developing countries of Africa, high access to public health facility does not presuppose high usage (Raheem, 2000). This is because health seeking is related to illness occurrence where as access to health facility is expressed as the percentage of the total population not the sick. In relative terms, it is not unlikely for a different pattern to emerge after controlling for illness factors. Secondly, the political economy of care inherent in Nigeria in particular and Africa in general is characterized by pluralistic health care alternatives. This reduces the use of public health care to a matter of choice, even when access among a total population is high. Other variables (Expenditure on Health, female illiteracy Rate, Daily Calorie per capital, Carbon-dioxide emission and total fertility rate are indicative of the weaknesses in the policy environment of developing countries. To date, expenditure on health in Nigeria remains very low compared to other sectors even in the

presence of high domestic ‘lipservice’ to camouflage this failure. Lack of or no education is also very high with many mothers ‘lockup’ in rural places with high level of ignorance unimaginable of the 21st century. In Nigeria, a conservative estimate puts the percentage increase in vehicular population between 1999 and 2003 at about 500% due largely to various economic and political reforms which allowed a greater access to financial resources as well as the role of mortgage and thrift societies in giving loans to customers for the purchase of cars. The qualities of these cars are easily rated low in many countries when compared on the basis of their combustion and emission rates. This development has also increased carbon-dioxide emission in many folds to the detriment of child and adult health in Nigeria.

The implications of the above findings is that if future development plans will give top priority to age at first birth, increased labour force participation, especially females, and later age of at first marriage, infant and child mortality can be reduced. In the context of the findings of the present and earlier studies, this implies that fertility rates will decline in the course of economic development as the economy becomes more industrialized in Nigeria.

5.6.10 TESTING OF HYPOTHESIS

H_0: There is no significant difference between infant and child mortality rates across socio-demographic sub groups in the study area.

H_1: There is significant difference between infant and child mortality rates across socio-demographic sub groups in the study area.

The hypothesis stated above examines the relationship between socio-demographic sub groups and infant/child mortality in Kaduna State. It was tested by conducting multilevel Cox proportional regression analysis. The significance of this relationship was tested by examining the p-value corresponding to the estimated hazard ratios, with the p-value set at 95% significance level (α=0.05). Multilevel Cox proportional hazard models were fitted to examine the effects of socio-demographic sub group variations in infant and child mortality in Kaduna State. To do this, socio-demographic sub groups were first considered separately in the multilevel analysis, followed by inclusion of variables at various levels of operation into the multilevel analysis. The tabulated 163.00 and the calculated value is 174.95 with 14 degree of freedom. Results from analysis indicated that high proportion of women who had secondary or higher education was significantly associated with lower risks of infant and child mortality at 5% level of significance (thereby leading rejection of null hypothesis), with community education having significant effects for regional variations in child mortality and overall for under-five mortality, but not for infant mortality.

Generally, it could be said that the findings of this study confirmed the hypothesis 1 - that a lower risk of infant and child mortality is significantly associated with socio-demographic sub groups that had a high proportion of women with secondary or higher education. However, results of this hypothesis testing showed that a socio-demographic sub

group was more important in explaining regional variation in child mortality than infant mortality.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 SUMMARY OF FINDINGS

Evidence from the hospital survey showed that the level of under-five mortality in Kaduna state has remained high since the past ten (10) years with an estimated U5MR of 163/1,000 live births. The above U5M ratio may be higher than the average estimated for the north-West zone of Nigeria. The major findings of the study reveal that major cause of morbidity in the study area is malaria (26.9%), major causes of death in the study area are malaria (30.1%) and it also showed that 39% of the children are within the ages of 0-1year. Mortality also varies with the marital status of the respondent, where the high rate of mortality was experienced by mothers who are married but not living with their husbands and widows.

The major factors that determined mortality in the study area is distance to the health facility. These factors have influence on the levels of U5M. The result shows that the rates and levels of U5M vary with levels of mother's education, income, employment, access to and use of health facilities, attitude to immunization, breastfeeding and distance to health facilities. In specific terms the findings show that children mothers with no education have greater risk of dying before their fifth birthday than those born by educated mothers. This is because educated mothers have higher confidence in reaching out for medical attention for their children but have better income and more independence in tackling matters of ill health in the family. Therefore, it should be noted that the challenges we face today regarding the health of under-five Nigerian children cannot be put off, since they are not insurmountable. That is, we have the tools, resources, and knowledge to

address our nation's most critical child survival problems and build on the considerable achievements that have made since the World Summit for Children in 1990. In general, progress in reducing under-five mortality depends on the commitment by academics, governments, international agencies, health care professional associations, donors and non-governmental organizations to work together towards achieving Sustainable Development Goals.

An analysis of the major characteristics of respondents revealed that majority of the women sampled are mostly young (35 years and below) as against their older counterparts. The background characteristics of the respondents reveal that majority (64.3%) are between the age group 25-34 years. This is observed to be a reflection of the rate of infant and child mortality in the study area. Infant and child mortality appeared to be rather on the high side. The level of infant and child mortality is rather too high compared to what is obtainable in the state. The rather high level of under-five mortality is a reflection of early age at marriage.

Marital status has been able to bring about differences in infant and child mortality in the study area. The results of the survey revealed that significant proportions (34.4%) were married and currently living with their husbands. Married women who are not currently living with their husbands and widows experience more under-five mortality compare to those living with their husbands.

The analysis by infant/child mortality and income per month shows that respondents who earned less than ₦30,000 per month had the highest mortality of five and above infants and children who are under five years, however, respondents without income per month do not experience neither infants nor child mortality. This is a sharp contrast with

Mahfouz, Adil, David, Abdelrahim (2009) that low income affects the accessibility of medical services.

For infant/child mortality and children ever born, it was observed that those with few children ever born had more number of infants and children less than five year compared to those respondents with more children ever born. However, this high proportion with no infant mortality and child mortality among most respondents could be as a result of under reporting of death. This is consistent with United Nations (2010) findings that in certain culture, women appear to be more likely to state duration of marriage correctly than to give correct information about their age, so the estimation procedure based on data classified by duration of marriage may be preferred.

Evidence from the hospital survey showed that the level of under-five mortality in Kaduna state has remained high since the past 10 years with an estimated U5MR of 163/1,000 live births even after considering a myriad of factors, including heterogeneity in study design.

Considering the trends in under-five mortality in Kaduna State since 2005, there is no doubt that the trends has been on the decrease, although the decrease is small over the years up to 2014 in which 2011, 2012, 2013 and 2014 saw steady declined or no change in the trends of infant and child mortality.

Six variables were found to be the most contributing factors of infant and child mortality in the study area and they are distance to health facilities, age at first marriage, age of the mother, marital status, educational attainment, and breast feeding.

6.2 CONCLUSION

The primary aim of this paper was not to calculate U5MR for Kaduna State but to see the trend in the progress made since 2005, which will serve as a wake -up call assessment towards achieving the 2020 SDGs target and to examine the under-five morality differentials and factors that contributes to infant and child mortality rate in the state. Any society wishing to make material and spiritual progress must assure that women are fully integrated into its productive, educational, cultural and political activities. The goals of development include improving standards of living minimizing poverty, increasing access to education and employment, and reduction in social inequality, and women as a group deserve special attention and consideration of their problems. Their low economic status, marrying at younger age and marital instability are some of the causes of high infant and child mortality. Involving women in the nation's development is essential to reducing fertility rates

Higher levels of education, employment outside the home, lower infant and child mortality and increased income are among the factors that can increase the level of economic development in the country. Perhaps, the most significant factor is improving in the status of women, which is important in its own right above and beyond any influence it has on mortality. This has to be given particular attention in the nation's population policy.

A child's right to survival is fundamental. It is the building block towards the realization of a child's potential and on it hinges other basic rights of the child. Yet, many children do not enjoy this right. In Kaduna state infant and child mortality ratio (163/1,000 live births) is extremely high representing one of the country's development challenges. National estimates of U5MR is 157/1,000 live births. As Nigeria intends to lower its under-five mortality to meet up the SDG by 2020 it is therefore a wake-up call for a more concerted effort to be made in order to bring down the observed high rate of infant and

child mortality. If this be the situation in the state then government must double its effort at combating the challenge particularly in the rural areas where health facilities are totally absent and access to urban settlements is difficult due to distance to the location of the health facilities.

6.3 RECOMMENDATIONS

The critical correlates of infant and child mortality therefore are age of the mother, age at first marriage, level of education, type of occupation and type of accommodation. This analysis suggests the need for more research to determine the additional variable needed to further reduce the observed infant and child mortality levels, since only 95% of their variance can be ascribed to the selected socio-economic indicators considered here.

Providing more basic health facilities within the urban and in rural communities and raising the level of girl-child education hold the key to our rapid advance to meeting the millennium development goals.

i. Kaduna State Government should bring health services nearer to the communities especially in Jema'a Local Government Area so that mothers will have access to both during pregnancy and after. The impact of delivery a child with the help of a medical professional is enormous.

ii. Government of Kaduna state is called upon to sincerely encourage girl-child education through focused advocacy by religious leaders and traditional rulers. More girls' secondary Schools should be established in all the Local Government Areas.

iii. Increase the availability and accessibility of life saving services in health facilities in all the three Local Government Areas. This can be done through increasing coverage and quality of existing new born health programmers and packages, by strengthen the continuum of care and by honoring its previous commitments to more funding resources and accountability.

iv. Kaduna State Government should develop integrated approach to child health-tackling under-five mortality will need an integrated approach to child health. These essential interventions can be implemented through a mix of delivery channels that are already in wide use, including outreach and community and facility-based services, while also taking advantage of longer-term opportunities such as community capacity to deliver integrated services. This will help address neonatal causes of under-five mortality and diseases that still have high mortality rates, most notably malaria, pneumonia and diarrhea.

v. Girls in Jema'a and Zaria LG areas should be encouraged to go to school up to at least secondary level. This will first of all increase age at first birth and therefore reduce child deaths at first birth order. It will also increase the survival of their children since child survival is found to increase with maternal age and level of education in the study area.

vi. State Government should embark on enduring process of institutionalizing PHC in the state with the provision of necessary skills, management techniques, and capacity building through the active involvement, participation, and sense of ownership by communities at village and districts levels.

vii. If SDG to be achieved and needless loss of under-five child death prevented, it is essential that national governments, international agencies and civil societies increase attention to systematically preventing and tracking under-five deaths. Partners must work together now to increase their efforts and resources, focusing not just on one intervention or cause but on developing a functional continuum of basic services that save lives and improve health for millions of newborns and children.

viii. Government should collaborate with ministry of health to develop strategies to improve adequate breast feeding, vaccinations, zinc and vitamin A supplementation, insecticide-treated mosquito nets, oral rehydration therapy, antibiotic treatment of infection and treatment of malaria across the state.

ix. Community leaders (spiritual and temporal) in the state are called upon to engage in advocacy for the sensitization of mothers with no education who are locked away from modern practices by cultural practices such as the *puda* system. Focus should be on antenatal care, intra-partum cares, post-natal care, extra care for sick new born and referral systems.

x. Political consideration and regional pride in the state should be set aside when issues of data collection storage and release for academic use research purposes especially in Kaduna South Local Government Area.

xi. Government at all levels should support the Midwifes Service Scheme (MSS) to recruit and deploy midwives, with emphasis in all the Local Government Areas in the state.

6.3.1 Recommendation(s) for Further Research

- As a future work, determinants of mortality risk among children between the ages 1-5 in Kaduna State in addition to the determinants of infant mortality risk can be analyzed. Factors associated with child mortality risk might be different than those associated with infant mortality. Therefore explanatory variables other than the ones used in this study can be included to the model.
- A further study may examine the impact of public health provision, income, inequality, and female education on under-five mortality within different areas in the state. In addition, a question also arises if public spending on health could effectively reduce under-five mortality when health care is profit-oriented. How commercialized health care system influence public sector performance should be carefully considered.
- Further studies on other contextual factors such as socio-cultural factors influencing infant and child mortality are needed in Nigeria.

- The influences of contextual determinants on infant and child mortality need to be further explored with the use of qualitative data.

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APPENDIX I: QUESTIONNAIRE
ANALYSIS OF INFANT AND CHILD MORTALITY TRENDS AND DIFFERENTIALS IN KADUNA STATE

Dear Sir/Madam,

This questionnaire has been designed to gather data in infant and child mortality rend and differentials Kaduna State and the data is solely for academic purposes and will be treated with outmost confidentiality. Please read the questions below and tick or write the correct answer where appropriate. Thank you.

Thank you.

INSTRUCTION: Please tick (✓) in the appropriate column that suits your assessment.

SECTION A: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

1. Age of Mothers
   a. 15 -19 years ( )
   b. 20 -24 years ( )
   c. 25 -29 years ( )
   d. 30-34years ( )
   e. 35 -39 years ( )
   f. 40 - 44 years ( )
   g. 45 - 49 years ( )

2. Ethnicity**?**
   a. Igbo ( )
   b. Yoruba ( )
   c. Hausa/Fulani ( )
   d. Northern Minority ( )
   e. Southern Minority ( )
   j. Others (Specify) _____

3. What is your religion?
   a. Islam ( )
   b. Christianity ( )
   c. Traditional ( )
   b. Others Specify)_____

4. Highest level of Education?
   a. None ( )
   b. Primary School ( )
   c. Quranic School ( )
   d. Secondary School ( )
   e. Tertiary Institution ( )
   f. Others (Specify)_____

5. What is your monthly income?
   a. <₦10,000 ( )

b. ₦10,001 - ₦ 20,000 ( )
c. ₦20,001 – ₦ 30,000 ( )
d. ₦30,001 – ₦ 40,000 ( )
e. ₦40,001 -₦ 50,000 ( )
f. >₦ 50,001 ( )
g. Do not know ( )

6. Fathers highest level of Education?
a. None ( )
b. Primary School ( )
c. Quranic School ( )
d. Secondary School ( )
e. Tertiary Institution ( )
f. Others (Specify)_____

7. What is your occupation?
a. Business/Petty trader ( )
b. Civil Servant ( )
c. Full time house wife ( )
d. Farmer ( )
e. Unemployed ( )
f. Student ( )
e Others (Specify)_____

8. Father's average monthly income?
a. <₦10,000 ( )
b. ₦10,001 - ₦ 20,000 ( )
c. ₦20,001 – ₦ 30,000 ( )
d. ₦30,001 – ₦40,000 ( )
c. >₦40,000 -₦ 50,000 ( )
d. >₦ 50,000 ( )
e. Do not know ( )

9. What is your husband's occupation?
a. Business/Petty trader ( )
b. Civil Servant ( )
c. Farmer ( )
d. Unemployed ( )
e. Student ( )
f. Others (Specify) _____

10. Curently working**?**
a. Yes ( )
b. No ( )

SECTION B: Marriage History

11. What is your current marital status?

a. Never married ( )
b. Married but not living with spouse ( )
c. Married and currently living with spouse ( )
d. Separated ( )
e. Divorced ( )
f. Widowed ( )
g. Others specify ( )

12. Age at first birth**?**
a. 15 -19 years ( )
b. 20 -24 years ( )
c. 25 -29 years ( )
d. 30 -34years ( )
e. 35 -39 years ( )
f. 40 - 44 years ( )
g. 45 - 49 years ( )

13 Age at 1st marriage
a. 15 -19 years ( )
b. 20 -24 years ( )
c. 25 -29 years ( )
d. 30 -34years ( )
e. 35 -39 years ( )
f. 40 - 44 years ( )
g. 45 - 49 years ( )

14. How many wives does your husband have?
a 1 ( )
b 2 ( )
c 3 ( )
d 4 ( )

15. Total number of children ever born
a. 1 ( )
b. 2 ( )
c. 3 ( )
d. 4 ( )
e. 5 ( )
f. >5 ( ).

16. How many number of children surviving/
a. None ( )
b. 1 ( )
c. 2 ( )

d. 3 ( )
e. 4 ( )
f. > 5 ( )

17. How many number of children have died?
a. None ( )
b. 1 ( )
c. 2 ( )
d. 3 ( )
e. 4 ( )
f. > 5 ( )

18. At what age did they died?
a. <1 ( )
b. 1 ( )
c. 2 ( )
d. 3 ( )
e. 4 ( )
f. > 5 ( )

19. What was the cause of death?
a. Malaria ( )
b. Diarrhea ( )
c. Measles ( )
d. Pneumonia ( )
e. Tetanus ( )
f. Injury ( )
g. AIDS ( )
h. Congenital Anomalies ( )
i. Others (Specify)_____

20. How many are males?
a. None ( )
b. 1 ( )
c. 2 ( )
d. 3 ( )
e. 4 ( )
f. > 5 ( )

21. How many are females?
a. None ( )
b. 1 ( )
c. 2 ( )
d. 3 ( )

e. 4 ( )
f. > 5 ( )

22. What sex of children do you prefer?
a. Males ( )
b. Females ( )
c. Both ( )

23. If males, why?
_____
_____
_____

24. If females, why?
_____
_____
_____

SECTION C: ACCESS TO HEALTH CARE SERVICES

25. Do you attend antenatal clinic during pregnancy
a. Yes ( )
b. No ( )

26. If No, What is your reason?
a. I don't like hospital services but traditional care ( )
b. My husband does not permit me to go ( )
c There is no money for hospital services ( )
d. Delay at hospital ( )
e. Unfriendly health workers ( )
f. Hospital too far ( )
g. Others (Specify)_____

27. Do you attend postnatal care after delivery?
a. Yes ( )
b. No ( )

28. If no, what is your reason?
a I don't like hospital services but traditional care ( )
b My husband does not permit me to go ( )
c There is no money for hospital services ( )
d Others (Specify)_____

29. What are the health care facilities available in your community?
a. General hospital ( )

b. Private hospital ( )
c. Pharmacy ( )
d. Clinic ( )
e. Dispensary ( )
f. Traditional birth attendance ( )
g. Others

Specify_____

30. Which health facility do you go to?
a. General hospital ( )
b. Private hospital ( )
c. Pharmacy ( )
d. Clinic ( )
e. Dispensary ( )
f. Traditional birth attendance ( )
g. Others

Specify_____

31. Why do you prefer one of the above mentioned?
a. They have specialized doctors ( )
b. Because it is closer to my house ( )
c. Because the doctors and nurses give more attention and treatment ( )
d. My husband chose it for me ( )
e. Others (specify)_____

32. Have you ever give birth at home?
a. Yes ( )
b. No ( )

33. If yes, why?
a. Because of lack of money ( )
b. Because of far distance to the hospital ( )
c. Because I had traditional birth attendants around me ( )
d. No people to help me to the hospital ( )
e. Others (specify)_____

34. Who decides on the treatment you take during pregnancy and childbirth?
a. Only you ( )
b. Only your husband ( )
c. Both of you ( )
d. Others (specify)_____

35. How are the charges for pregnant women in the hospital both for antenatal and delivery?

a. Very expensive ( )
b. Expensive ( )
c. Not expensive ( )
d. Free ( )
e. Others (specify)_____

36. How far is the hospital you attend for antenatal and delivery from your place of residence?

a. Very far ( )
b. Far ( )
c. Not far ( )
d. Others (specify)_____

SECTION D: HOUSEHOULD ASSETS

37. What type of accommodation do you live in?

a. Modern flat ( )
b. Room apartment ( )
c. Compound house ( )
d. Duplex ( )
e. Others

Specify_____

38. Ownership of accommodation?

a. Self owned ( )
b. Rented ( )
c. Family house ( )
d. Squatting ( )
e. Official ( )
f. Others (Specify)_____

39. Sources of water

a. Pipe borne ( )
b. Well ( )
c. Bore-hole ( )
d. Stream ( )
e. Others

_____

40. What type of toilet facility does your household have?

a. Flush toilet ( )
b. Pit toilet ( )
c. Bush ( )
d. Others (Specify) _____

SECTION D: NUTRITION INTAKE

41 During the baby's 1st six months, what type of feeding did you provide?
- a. Exclusive breast feeding ( )
- b. Non-exclusive ( )

42 How long did you breastfeed your child?
- A. 0-6months ( )
- b. 7-12 months ( )
- c. 13-18 months ( )
- d. 19-24 months ( )
- e. 25 months and above ( )

43 What is your staple food?
- a. Maize ( )
- b. Guinea corn ( )
- c. Yams ( )
- d. Millet ( )
- e. Rice ( )
- f. Others Specify.....

44 What is your main source of protein?
- A. beans [ ]
- b. meat [ ]
- c. eggs [ ]
- d. Vegetables [ ]
- e. Others [ ]

45 How often do you eat these protein foods?
- a. Daily ( )
- b. Twice per week ( )
- c. Once a week ( )
- d. Occasionally ( )

46 What supplementary foods do you provide mainly to the child?
- a. Eggs ( )
- b. beans ( )
- c. fish ( )
- d. milk ( )
- e. Soya bean products ( )
- f. Maize gruel ( )
- g. Others (Specify).....

47 When do you introduce your child to supplementary food?
a. at birth ( )
b. after one month ( )
c. after two months ( )
d. after three months ( )
e. after four months ( )
f. after five months ( )

48 On which food do you mainly feed your child?
a. Pap ( )
b. Baby formula ( )
c. Breast milk ( )
d. Staple food ( )
e. Others (specify).....

49 What do you use mainly for cooking?
a. Electricity ( )
b. Cooking gas ( )
c. Kerosene ( )
d. Charcoal ( )
e. Wood ( )
f, Others (specify).....

50 How is the baby's food preserved for future use?
a. in a wormer/flasks ( )
b. in the pot ( )
c. others (specify).....

51 What is your main source of drinking water?
a. Public pipe borne water ( )
b. Hand dug well ( )
c. River/Stream ( )
d. Bore hole ( )
e. Water Vendors ( )

52 How often do you boil water for the child's consumption?
a. very often ( )
b. Often ( )
c. Not often ( )
d. Not at all ( )

53 How often do you wash your hands or breasts before feeding the child?
a. Always before feeding ( )
b. Not always ( )
c. Occasionally ( )

54 Does your child have three square meals always?
a. Yes ( )
b. No ( )

55 How often do you eat a balanced meal?
a. Once per day ( )
b. Twice per week ( )
c. Once a week ( )
d. Occasionally ( )

56 How often do you eat meat?
a. Once a day ( )
c. Three times a week ( )
d. Once a week ( )
e. Occasionally ( )

57 Is the child restricted from eating certain foods?
a. Yes ( )
b. No ( )

58 If yes, what type of restriction?
a. Religious ( )
b. Medical ( )
c. Socio-cultural/Traditional ( )
d. lack of money ( )

SECTION E: INFANT AND CHILD MORBIDITY AND MORTALITY

59 Has the child suffered from any major illness in the last six months?
a. Yes ( )
b. No ( )

60 If yes, what type of disease?
a. Malaria ( )
b. Measles ( )
c. Diarrhoea ( )
d. Kwashiorkor ( )
e. Poliomyelitis ( )
f. Whooping Cough ( )
g. Meningitis ( )
h. Pneumonia ( )
i. Others Specify .....

61 Who diagnose the disease?

a. Medical personnel ( )
b. Traditional Healer ( )
c. Home observation ( )
d. Others (Specify).....

62 Where did the child obtain treatment?
a. Specialist Hospital ( )
b. General Hospital ( )
c. Private Hospital ( )
d. Clinic/Dispensary ( )
e. Chemist/Pharmacy ( )
f. Herbal Clinic ( )
g. Faith base Clinic ( )
h. Others (Specify).....

63 How often does he/she suffer from this disease condition?
a. Very often ( )
b. Often ( )
c. Not often ( )
d. Not at all ( )

64 Has the child received any immunisation within the last six months?
a. Yes ( )
b. No ( )

65 If yes, TICK the vaccines that the child received within the last six months?
a. Polio ( )
b. Vitamin A ( )
c. Measles ( )
d. Whooping cough ( )
e. Diphtheria ( )
f. Meningitis ( )
h. Others specify.....

66. If yes, where did you go for treatment?
a. General hospital ( )
b. Private hospital ( )
c. Pharmacy ( )
d. Clinic ( )
e. Dispensary ( )
f. Traditional birth attendance ( )
g. Others
Specify_____

67. Why did you go to the health facility you went to?

a. The care givers are friendly. ( )
b. The centre is close to my home. ( )
c. My husband directed me to go there. ( )
d. The care giver is trusted/experienced. ( )
e. Other reasons (Specify)_____

68. How did you go?
a. On foot ( )
b. Motorcycle ( )
c. Car/Bus ( )
d. Others Specify_____

69. How far is the health facility from your residence?
a. Les than 2km ( )
b. 2-4km ( )
c. 5-7km ( )
d. 8-10km ( )
e. 11-13km ( )
f. Above 14km ( )

70. Have you lost any child in the last four years?
a. Yes ( )
b. No ( )

71. If yes at what age did he/she died?
a. <1 ( )
b. 1 ( )
c. 2 ( )
d. 3 ( )
e. 4 ( )
f. > 5 ( )

72. Do you immunize your children?
a. Yes ( )
b. No ( )

73. If no, why _____
_____

74. If yes, do you complete the immunization process?
a. Yes ( )
b. No ( )
c. I do not know ( )

75. If no, why?
_____
_____
____

76. Do you breastfeed your children?
    a. Yes ( )
    b. No ( )

77. When do you start breastfeeding your children?
    a. From the first day ( )
    b. When the white milk starts flowing ( )
    c. I don't breastfeed. ( )

78. How long do you breastfeed your children before weaning?
    a. Less than Six months ( )
    b. Six months to one year ( )
    c. A year - a year and six months ( )
    d. Two years ( )
    e. More than Two years ( )

79. How many children have you had in the last five years?
    a. 1 ( )
    b. 2 ( )
    c. 3 ( )
    d. 4 ( )
    e. 5 ( )
    f. >5 ( )

80. Completed Vaccination
    a. No ( )
    b. Yes ( )

81. Do your child sleep under the mosquitoes net?
    a. Yes ( )
    b. No ( )

82. How have you spaced your children?
    a. Every twelve months ( )
    b. Every eighteen months ( )
    c. Every twenty four months ( )
    d. Every thirty months ( )
    e. Every thirty six months ( )
    f. More than thirty six months ( )
    g. I have not practiced child spacing ( )

APPENDIX II: FOUCS GROUP DISCUSSION GUIDE

TOPIC: AN ANALYSIS OF INFANT AND CHILD MORTALITY TRENDS AND DIFFERENTIALS IN KADUNA STATE, NIGERIA

S/N	General Question	Probe for business activities
1	What are your views on infant and child mortality in this area?	Probe for: awareness, cause of action and intervention
2	What do you think is the major cause of infant and child mortality	Probe to find out the level of awareness on health related issues
3	What reasons will you attribute to the change you have observed regarding under-five morbidity and mortality in this area?	Probe: for linkage with SDG goals, societal intervention, parents role
4	If parents/guardians wish to see their children live healthily, what advice will you want to give them?	Probe for: symptoms, knowledge of the related diseases
5	In your opinion, what are the common types of diseases that affect children under five in this area?	Probe for: childhood diseases common in the area, those associated with under nutrition
6	What is immunization?	Probe for: awareness, attitudes of parents, health personnel, other LGA officers
7	Have you witness an unfortunate loss of a child?	Probe for: role of the parents, nutritional implications, health care personnel/facilities, environmental factors, governments role
8	What advice will you give to other parents in order to save the lives of their children?	
9	Do you think that gender preference plays a major role in child care in this community?	Probe for: the role of mothers, the role of fathers and societal role
10	Which gender in your opinion is more prone to Incidence:	A Morbidity B Mortality

APPENDIX III: FOCUS DISCUSSION GROUP GUIDE FOR MEDICAL PERSONNELS

1 What is your view on the prevalence of infant and child mortality in this area?

2 With evidence from the cases of infant and child mortality you have received in your health facility, which nutrition related diseases are the most common in your community?

3 What strategies do you think if parents should adopt can reduce infant and child mortality problem?

4 In your opinion, does the source of domestic water supply constitute a health problem for infants and children in this community?

5 What will you say about the facilities provided by the government towards child care in this community? (Note: Probe for availability, usage, security and storage)

6 What would you say about the laboratory/diagnostic services provided in actually detecting this problem? (Note: Probe for availability, usage, security and storage)

7 In your opinion, do you feel that some elements of gender prejudice are shown by some parents of infants and children in health seeking behaviour?

8 Which gender seems to be prone to:

- A Morbidity
- B Mortality

9 What are the common illnesses frequently brought for treatment in your facility?

10 Comment on food supplementation for infants and children in terms of

- A Time of supplementary food initiation
- B Quality of the supplementary food provided
- C Storage of these foods

11 What other aspects do you feel that this piece of research would have included that are related to infant and child mortality?

APPENDIX IV: COEFFICIENTS OF UNDER FIVE MORTALITY

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.464	.158		21.898	.000
	distance from house to hospital for antenatal	-.498	.061	-.379	-8.173	.000
2	(Constant)	4.119	.167		24.665	.000
	distance from house to hospital for antenatal	-.512	.056	-.390	-9.072	.000
	age at first marriage	-.243	.030	-.351	-8.177	.000
3	(Constant)	3.450	.167		20.719	.000
	distance from house to hospital for antenatal	-.448	.051	-.341	-8.702	.000
	age at first marriage	-.418	.033	-.603	-12.831	.000
	age of mothers	.239	.025	.450	9.502	.000
4	(Constant)	3.949	.166		23.760	.000

	distance from house to hospital for antenatal	-.353	.049	-.269	-7.178	.000
	age at first marriage	-.469	.031	-.677	-15.206	.000
	age of mothers	.258	.023	.487	11.026	.000
	current marital status	-.219	.027	-.306	-8.105	.000
	(Constant)	5.052	.190		26.554	.000
5	distance from house to hospital for antenatal	-.373	.044	-.284	-8.402	.000
	age at first marriage	-.376	.030	-.543	-12.726	.000
	age of mothers	.278	.021	.524	13.058	.000
	current marital status	-.289	.026	-.405	-11.339	.000
	level of education	-.364	.038	-.368	-9.453	.000
	(Constant)	4.173	.191		21.805	.000
6	distance from house to hospital for antenatal	-.354	.040	-.270	-8.905	.000
	age at first marriage	-.371	.026	-.535	-14.027	.000
	age of mothers	.321	.019	.605	16.464	.000
	current marital status	-.293	.023	-.410	-12.851	.000
	level of education	-.356	.034	-.360	-10.351	.000

	length of breast feeding	.235	.023	.305	10.020	.000
	(Constant)	4.682	.199		23.555	.000
	distance from house to hospital for antenatal	-.407	.039	-.310	-10.502	.000
	age at first marriage	-.375	.025	-.541	-14.884	.000
7	age of mothers	.322	.019	.607	17.339	.000
	current marital status	-.278	.022	-.389	-12.730	.000
	level of education	-.352	.033	-.356	-10.739	.000
	length of breast feeding	.310	.025	.402	12.298	.000
	child sleep under net	-.533	.083	-.207	-6.423	.000
	(Constant)	4.865	.189		25.680	.000
	distance from house to hospital for antenatal	-.407	.037	-.310	-11.112	.000
	age at first marriage	-.330	.025	-.477	-13.436	.000
8	age of mothers	.311	.018	.587	17.708	.000
	current marital status	-.361	.024	-.505	-15.179	.000
	level of education	-.432	.033	-.437	-13.099	.000
	length of breast feeding	.262	.025	.339	10.566	.000

	child sleep under net	-.604	.079	-.235	-7.641	.000
	Occupation	.168	.024	.235	6.997	.000
	(Constant)	5.326	.192		27.748	.000
	distance from house to hospital for antenatal	-.383	.035	-.292	-10.997	.000
	age at first marriage	-.327	.023	-.472	-14.024	.000
	age of mothers	.309	.017	.582	18.532	.000
	current marital status	-.396	.023	-.555	-17.143	.000
9	level of education	-.449	.031	-.455	-14.327	.000
	length of breast feeding	.252	.023	.326	10.720	.000
	child sleep under net	-.679	.076	-.264	-8.976	.000
	Occupation	.172	.023	.241	7.557	.000
	type of healthcare centre	-.097	.014	-.178	-6.769	.000
	(Constant)	5.655	.207		27.341	.000
	distance from house to hospital for antenatal	-.407	.035	-.310	-11.707	.000
10	age at first marriage	-.338	.023	-.488	-14.646	.000
	age of mothers	.345	.019	.651	18.256	.000
	current marital status	-.423	.024	-.592	-17.821	.000

	level of education	-.516	.035	-.522	-14.611	.000
	length of breast feeding	.232	.024	.300	9.777	.000
	child sleep under net	-.654	.075	-.254	-8.759	.000
	Occupation	.217	.025	.303	8.609	.000
	type of healthcare centre	-.101	.014	-.186	-7.182	.000
	cause of death	-.060	.016	-.132	-3.869	.000
	(Constant)	5.907	.221		26.776	.000
	distance from house to hospital for antenatal	-.413	.034	-.315	-11.977	.000
	age at first marriage	-.322	.023	-.465	-13.758	.000
	age of mothers	.337	.019	.635	17.804	.000
	current marital status	-.453	.025	-.634	-17.781	.000
11	level of education	-.526	.035	-.532	-14.984	.000
	length of breast feeding	.231	.023	.300	9.880	.000
	child sleep under net	-.569	.079	-.221	-7.219	.000
	Occupation	.230	.025	.321	9.083	.000
	type of healthcare centre	-.087	.015	-.160	-5.923	.000
	cause of death	-.066	.015	-.144	-4.260	.000

	postnatal attendance	-.204	.067	-.096	-3.060	.002
	(Constant)	5.938	.219		27.069	.000
	distance from house to hospital for antenatal	-.413	.034	-.314	-12.056	.000
	age at first marriage	-.333	.024	-.481	-14.093	.000
	age of mothers	.334	.019	.629	17.707	.000
	current marital status	-.446	.025	-.624	-17.521	.000
	level of education	-.543	.036	-.550	-15.303	.000
12	length of breast feeding	.246	.024	.319	10.276	.000
	child sleep under net	-.639	.083	-.248	-7.711	.000
	Occupation	.213	.026	.297	8.192	.000
	type of healthcare centre	-.083	.015	-.154	-5.703	.000
	cause of death	-.078	.016	-.171	-4.856	.000
	postnatal attendance	-.212	.066	-.100	-3.197	.002
	monthly income	.062	.024	.085	2.568	.011
	(Constant)	5.597	.238		23.501	.000
13	distance from house to hospital for antenatal	-.467	.037	-.356	-12.517	.000
	age at first marriage	-.419	.034	-.605	-12.233	.000

age of mothers	.295	.022	.556	13.561	.000
current marital status	-.418	.026	-.585	-15.805	.000
level of education	-.459	.043	-.465	-10.732	.000
length of breast feeding	.261	.024	.339	10.876	.000
child sleep under net	-.645	.082	-.251	-7.887	.000
Occupation	.184	.027	.257	6.844	.000
type of healthcare centre	-.081	.014	-.149	-5.607	.000
cause of death	-.058	.017	-.128	-3.471	.001
postnatal attendance	-.209	.065	-.099	-3.190	.002
monthly income	.109	.027	.151	3.971	.000
age at first birth	.148	.043	.176	3.426	.001

Source: Field Survey, 2015

APPENDIX V: ANOVA OF UNDER FIVE MORTALITY

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	57.941	1	57.941	66.805	.000[b]
	Residual	345.193	398	.867		
	Total	403.134	399			
2	Regression	107.696	2	53.848	72.359	.000[c]
	Residual	295.438	397	.744		
	Total	403.134	399			
3	Regression	162.548	3	54.183	89.184	.000[d]
	Residual	240.585	396	.608		
	Total	403.134	399			
4	Regression	196.857	4	49.214	94.240	.000[e]
	Residual	206.277	395	.522		
	Total	403.134	399			
5	Regression	234.990	5	46.998	110.127	.000[f]
	Residual	168.144	394	.427		

	Total	403.134	399			
6	Regression	269.202	6	44.867	131.655	.000[g]
	Residual	133.931	393	.341		
	Total	403.134	399			
7	Regression	281.954	7	40.279	130.298	.000[h]
	Residual	121.180	392	.309		
	Total	403.134	399			
8	Regression	295.438	8	36.930	134.077	.000[i]
	Residual	107.696	391	.275		
	Total	403.134	399			
9	Regression	306.759	9	34.084	137.929	.000[j]
	Residual	96.375	390	.247		
	Total	403.134	399			
10	Regression	310.330	10	31.033	130.078	.000[k]
	Residual	92.804	389	.239		
	Total	403.134	399			
11	Regression	312.517	11	28.411	121.648	.000[l]

	Residual	90.617	388	.234		
	Total	403.134	399			
12	Regression	314.035	12	26.170	113.668	.000[m]
	Residual	89.098	387	.230		
	Total	403.134	399			
13	Regression	316.664	13	24.359	108.738	.000[n]
	Residual	86.469	386	.224		
	Total	403.134	399			

Source: Field Survey, 2015

a. Dependent Variable: number of children lost

b. Predictors: (Constant), distance from house to hospital for antenatal

c. Predictors: (Constant), distance from house to hospital for antenatal, age at first marriage

d. Predictors: (Constant), distance from house to hospital for antenatal, age at first marriage, age of mothers

e. Predictors: (Constant), distance from house to hospital for antenatal, age at first marriage, age of mothers, current marital status

f. Predictors: (Constant), distance from house to hospital for antenatal, age at first marriage, age of mothers, current marital status, level of education

g. Predictors: (Constant), distance from house to hospital for antenatal, age at first marriage, age of mothers, current marital status, level of education, length of breast feeding

h. Predictors: (Constant), distance from house to hospital for antenatal, age at first marriage, age of mothers, current marital status, level of education, length of breast feeding, child sleep under net

i. Predictors: (Constant), distance from house to hospital for antenatal, age at first marriage, age of mothers, current marital status, level of education, length of breast feeding, child sleep under net, occupation

j. Predictors: (Constant), distance from house to hospital for antenatal, age at first marriage, age of mothers, current marital status, level of education, length of breast feeding, child sleep under net, occupation, type of healthcare centre

k. Predictors: (Constant), distance from house to hospital for antenatal, age at first marriage, age of mothers, current marital status, level of education, length of breast feeding, child sleep under net, occupation, type of healthcare centre, cause of death

l. Predictors: (Constant), distance from house to hospital for antenatal, age at first marriage, age of mothers, current marital status, level of education, length of breast feeding, child sleep under net, occupation, type of healthcare centre, cause of death, postnatal attendance

m. Predictors: (Constant), distance from house to hospital for antenatal, age at first marriage, age of mothers, current marital status, level of education, length of breast feeding, child sleep under net, occupation, type of healthcare centre, cause of death, postnatal attendance, monthly income

n. Predictors: (Constant), distance from house to hospital for antenatal, age at first marriage, age of mothers, current marital status, level of education, length of breast feeding, child sleep under net, occupation, type of healthcare centre, cause of death, postnatal attendance, monthly income, age at first birth