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**MATERNAL MIGRATION AND UNDER-FIVE MORTALITY IN
THE KASSENA-NANKANA MUNICIPALITY AND KASSENA-
NANKANA WEST DISTRICT OF NORTHERN GHANA**

BY

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DECLARATION

I hereby declare that, except for reference to works by other people which has been duly acknowledged, this thesis is the result of my research work and has neither partly nor wholly been presented elsewhere for another degree.

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ACCEPTANCE

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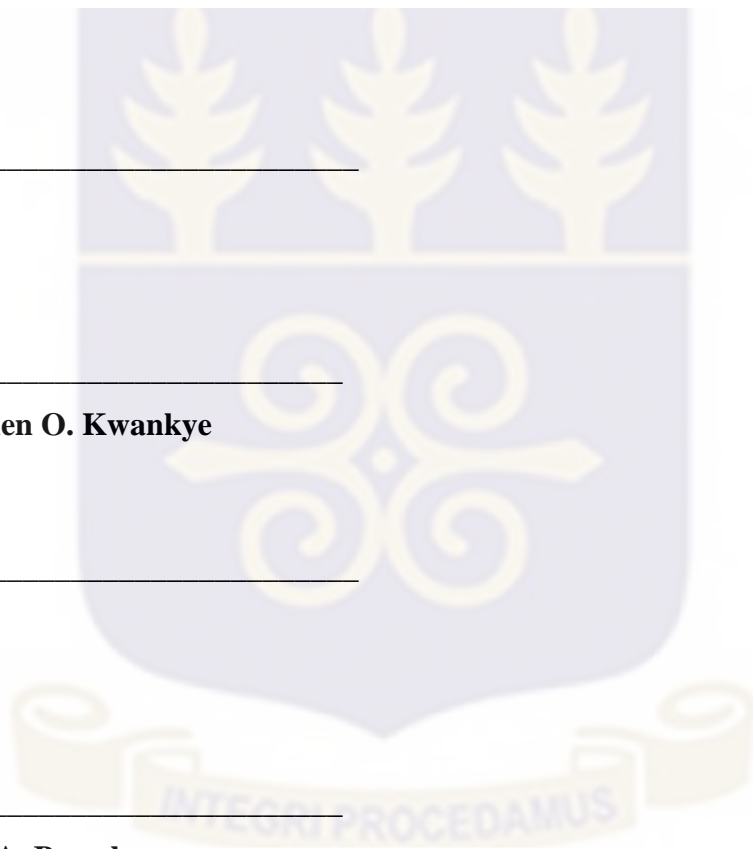
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DEDICATION

I dedicate this work to my wife, Teni Yinpok and the children Solomon, Kennedy, Prosper, Kingsley, Pascal Wak and my late parents, Mr. Pwarig Tee Wak and Madam Puzabyee Naabil.



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TABLE OF CONTENTS

Content	Page
DECLARATION.....	i
ACCEPTANCE.....	ii
DEDICATION.....	iii
ACKNOWLEDGEMENT.....	iv
TABLE OF CONTENTS	v
LIST OF TABLES.....	ix
LIST OF FIGURES	x
ABSTRACT	xi
CHAPTER ONE.....	1
INTRODUCTION	1
1.1 Background.....	1
1.2 Statement of the Problem.....	5
1.3 Rationale of the study	9
1.4 Study Objectives	11
1.5 Outline of the Study Chapters.....	11
CHAPTER TWO.....	13
REVIEW OF LITERATURE.....	13
2.1 Review of Literature	13
2.1.1 Introduction.....	13
2.1.2 Maternal migration and under-five mortality.....	14
2.1.3 Migration dynamics in Ghana.....	18
2.1.4 Migration and household socio-economic status.....	26
2.1.5 Migration duration and household socio-economic status.....	30
2.1.6. Household socio-economic status (SES) and under-five mortality	31

2.1.7. Maternal education and child survival	33
2.1.8 Maternal age at birth and under-five mortality	36
2.1.9 Place of residence and under-five mortality	39
2.1.10 Marital status and child mortality	41
2.1.11 Place of delivery and child mortality	43
2.1.12 Sex of child and child mortality	45
2.1.13 Multiple births and under-five mortality.....	48
2.1.14 Birth order and child mortality.....	49
2.1.15 Presence of grandmother and under-five mortality.....	52
2.2 Theoretical Framework.....	55
2.3 Conceptual Framework.....	57
2.4. Hypotheses	60
CHAPTER THREE	61
SOURCE OF DATA AND METHODOLOGY.....	61
3.1 Data Source	61
3.2 Data management.....	65
3.3 Description of variables	66
3.4 Analytical techniques.....	71
3.5 Analytical approach	74
3.6 Limitations of the study	75
CHAPTER FOUR	76
PROFILE OF STUDY AREA AND CHARACTERISTICS OF STUDY POPULATION	76
4.1 Profile of study area	76
4.2 Characteristics of study population.....	81
4.2.1 Distribution of women by migration status.....	82
4.2.2 Distribution of women by survival status of children.....	83

4.2.3 Distribution of women by age at time of birth of child	83
4.2.4 Distribution of women by educational status.....	84
4.2.5 Distribution of women by household socio-economic status	84
4.2.6 Distribution of women by place of delivery of children	85
4.2.7 Distribution of women by birth order of children.....	85
4.2.8 Distribution of women by number of children from single pregnancy.....	85
4.2.9 Distribution of women by presence of grandmother in household	86
CHAPTER FIVE	87
MIGRATION DYNAMICS IN THE KASSENA-NANKANA DISTRICTS	87
5.1 Introduction.....	87
5.2 Levels and trends of migration in the Kasena-Nankana Districts.....	92
5.3 Age-Sex Profile of Migration	93
5.4 Seasonality of Migration.....	96
5.5 Reasons for Migration.....	98
CHAPTER SIX.....	100
LEVELS AND TRENDS IN UNDER-FIVE MORTALITY IN THE KASSENA-NANKANA DISTRICTS	100
6.1 Introduction.....	100
6.2 Mortality levels and trends in the Kassena-Nankana Districts	103
CHAPTER SEVEN	109
MATERNAL MIGRATION AND HOUSEHOLD SOCIO-ECONOMIC STATUS ...	109
7.1 Introduction.....	109
7.2 Poverty prevalence in the Kassena-Nankana Area	109
7.3 Determination of Household Socio-economic Status	111
7.4 Bivariate association between household SES and selected socio-demographic variables	113
7.5 Multivariate analyses of household SES and selected socio-demographic variables	115

CHAPTER EIGHT	123
MATERNAL MIGRATION AND UNDER-FIVE MORTALITY	123
8.1 Introduction	123
8.2 Bivariate results of association between under-five mortality and predictor variables	123
8.3 Multivariate regression analysis of maternal migration and under-five mortality	127
8.3.1 Maternal migration and under-five mortality	129
8.3.2 Household socio-economic status (SES) and under-five mortality	133
8.3.3 Maternal education and under-five mortality	135
8.3.4 Maternal age and under-five mortality	136
8.3.5 Place of delivery of child and under-five mortality	138
8.3.6 Birth order and under-five mortality	139
8.3.7 Multiple births and under-five mortality	140
8.3.8. Presence of grandmother and under-five mortality	141
CHAPTER NINE	143
SUMMARY, CONCLUSION AND RECOMMENDATIONS	143
9.1 Introduction	143
9.2 Summary of findings	144
9.3 Conclusion	148
9.4 Recommendations	150
9.5 Study's contribution	155
REFERENCES	157

LIST OF TABLES

Table 2.1: Volume of net-migration by region, Ghana (1960-2010).24

Table 3.1: Structure of residency table for the generation of individual migration status67

Table 3.2: Study variables and their definitions 70

Table 3.3: Test of proportional hazard condition72

Table 3.4: Table of AIC and BIC values for model selection73

Table 4.1. Background characteristics of study population.....82

Table 5.1: Levels and trends in migration in and out of the study area (2000-2014).....93

Table 7.1. Output of Variance Inflation Factor test..... 113

Table 7.2. Association between SES and some predictor variables 114

Table 7.3. Regression results of the association between migration duration and
Household SES. 116

Table 7.4 Results of Granger Causality Wald test..... 121

Table 8.1. Association between child survival and predictor variables 124

Table 8.2. Regression results of the association between child survival and predictor
variables 128



LIST OF FIGURES

Figure 2.1: Conceptual framework showing the relationship between maternal migration and child survival.....	59
Figure 3.1: Map of the study area showing fieldworker areas (clusters) and major villages.....	62
Figure 4.1: Map showing location of the study area	77
Figure 5.1: Out-migration by age and sex (2000, 2004, 2009 and 2014) for the KNDs..	95
Figure 5.2: In-migration by age and sex (2000, 2005, 2010 and 2014) for the KNDs....	95
Figure 5.3: Seasonal out-migration by sex for 2000 and 2007.....	97
Figure 5.4: Reason for Out-Migration by sex in the KNDs for 2005-2014	98
Figure 6.1: Levels and trends in neonatal, infant and under-five mortality in Upper East Region and Ghana.....	102
Figure 6.2: Levels and trends in neonatal, infant and under-five mortality rates in the KNDs, 2000-2014.....	104



ABSTRACT

The levels of under-five mortality are disproportionately high in the developing world compared with those in the developed world. Several factors are responsible for this, and even though efforts have been made to address the problem, these needless deaths still occur. Sadly, children under age five tend to bear the brunt of these high death rates. This study seeks to examine the effect of maternal migration on under-five mortality in the Kassena-Nankana Municipality and Kassena-Nankana West District of northern Ghana. The study area is predominantly rural and agriculture is the mainstay of the people. Poverty is pervasive due to the generally low agricultural outputs and limited economic opportunities. As a result, seasonal migration has been one of the main livelihood strategies, where the people move to other places in the country in search of jobs. The study thus seeks to compare under-five mortality levels between children of migrant mothers and non-migrant mothers in the study area.

Data from the Navrongo Health and Demographic Surveillance System (HDSS) in northern Ghana were used for the study. The HDSS has been operating since 1993 and uses fieldworkers who visit households periodically to collect health and demographic data. Specific data that are collected include pregnancies, births, deaths, in- and out-migrations, household characteristics and assets, educational status of all individuals age six years and over, marital status and vaccination status of all children who are at most 3 years.

The outcome (dependent) variable in the analysis was the survival status of the children (dead or alive). The main independent variable for the study was migration status of the mother, which was categorised into two main groups of migrants (return migrants) and non-migrants. The return migrants were further categorised into three

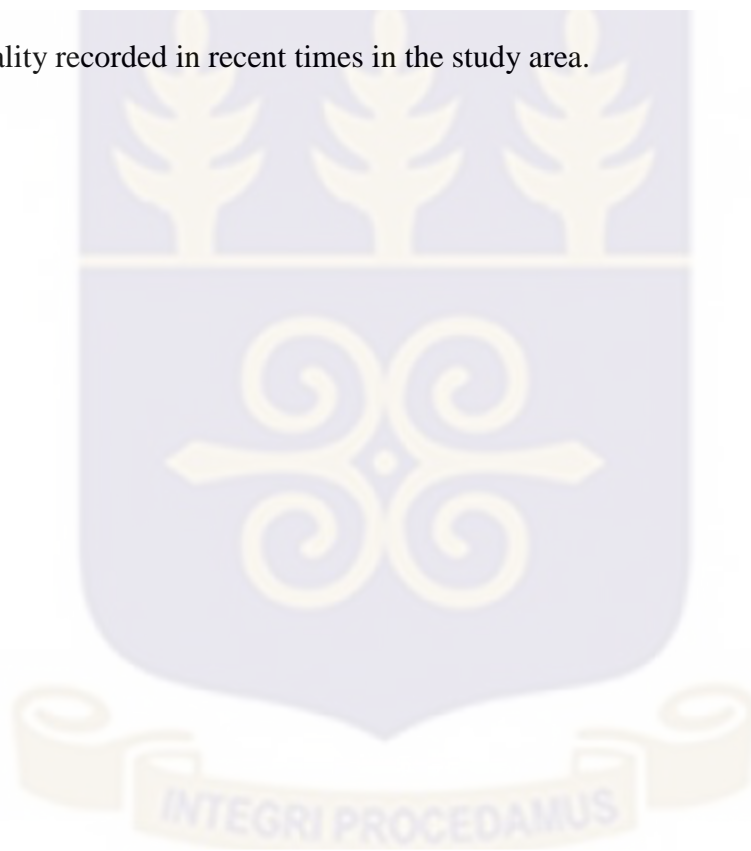
groups according to their duration of stay before returning to place of origin (study area). Other independent variables were age of mother at time of birth of child, educational status of the mother, household socioeconomic status, birth order of children, place of delivery of children, number of children born from a single pregnancy (multiple or single birth) and presence or absence of grandmother in the household.

In all, 20,990 children who were born between 2000 and 2014 were used for the analysis. Out of this number, 1,854 (8.8%) died before attaining age five years. Proportional Hazard Model, with a Weibull distribution, was used to examine the effect of the independent variables on the survival outcomes of the children.

The results showed decline in neonatal, infant and under-five mortality in the study area over the years. However, neonatal mortality increased between 2013 and 2014, while infant mortality also increased marginally within the same period. The results also revealed that households of female return migrants (irrespective of duration) have a higher socioeconomic status than households of non-migrant mothers. With regards to the association between maternal migration and under-five mortality, the results showed that children of women who have ever migrated and returned have a better survival chance than children of non-migrant mothers. In terms of migration duration before return, survival benefits was highest for children whose mothers had been away for one year and more.

Other factors that were found to impact on under-five mortality in the study area include maternal education, maternal age at birth of child, place of delivery of child, birth order of child, number of birth from one pregnancy and the presence of grandmother.

The study concludes with some recommendations aimed to improve child health and survival, as well as the general well-being of the people. Specifically, it recommended that so long as migration continues to play a part of the livelihood strategy of rural people, due to the unending challenges in these areas, policies should be put in place to improve migrants' wellbeing at place of destination to enable them improve themselves and their origin households while at the same time contribute to the growth of the economy in the destination areas and the country at large. It also recommended that the health system should be strengthened to reverse the increases in neonatal and infant mortality recorded in recent times in the study area.



CHAPTER ONE

INTRODUCTION

1.1 Background

It has been estimated that, globally about 11 million children die annually before reaching their fifth birthday, and sub-Saharan Africa accounts for over one-third of these deaths (Hill et al, 1999; UN, 2013). Even though there has been substantial decline in child mortality over the years, the levels still remain high, particularly in sub-Saharan Africa where the health-care system is stressed with myriads of challenges including access, finance, logistics and personnel, among others (Kaseje, 2006). For instance, in 1990 under-five mortality rate was estimated to be 197 deaths per 1,000 children and this reduced to 92 deaths per 1,000 children in 2013, which is more than 15 times the average for the developed countries (UN, 2013). Additionally, about 50 percent of these deaths are attributed to infectious diseases such as malaria, diarrhoea, acute respiratory infection and malnutrition, all of which are preventable and treatable with some basic and low cost interventions (UN, 2013).

There have been renewed global efforts at implementing interventions that seek to reduce these needless deaths. One major global initiative was the United Nations Millennium Development Goals (MDGs), particularly goal four which sought to reduce child mortality by 67 percent by 2015. The MDG Initiative increased awareness and helped mobilise resources, both financial and technical, in developing countries to help address the high burden of diseases and deaths. Even though this initiative yielded some positive results, only a few countries in Africa were able to achieve the MDG 4 target at the end of 2015 (United Nations & Economic Commission for Africa, 2015). At the end of 2015, most countries of the developing world were still reeling in poverty and deprivation, with mortality levels still high. As a result, there is the need for some

renewed efforts such as those of the Sustainable Development Goals (SDGs), to make any meaningful impact at achieving further and sustained reductions in child mortality.

Among several factors, the role of mothers in achieving reductions in under-five mortality cannot be over emphasized. Mothers are the main caregivers of children and their major concern has always been the wellbeing and survival of their children. As a result, they make every effort to mobilise the needed resources using every available means to achieve this objective. Women's contributions in the upkeep of their households have been more dominant in most rural settings of the developing world, where poverty, deprivation, ignorance and limited opportunities are pervasive. In such settings, one possible means by which women acquire resources and contribute to household needs is migration, where they move to other places outside their usual place of residence to work and earn some income due to lack of such opportunities in their rural place of residence (International Organization for Migration, 2014). Even though migration is motivated by several factors (Nabila, 1975; Anarfi et al, 2003; Awumbila and Ardayfio-Schandorf, 2008), the most dominant reason for most migrations is economic (Thadani and Todaro, 1984).

Migration patterns in the past had been dominated by males where husbands moved leaving their partners behind to take care of the family. However, the pattern is becoming more feminized lately as evidence reveals more females moving independently in search of better economic opportunities either locally or abroad (Adepoju, 2004). This has come about due to changes in gender roles within households and families. Faced with increasing unemployment and declining food productions, resulting in higher cost of living, men are unable to adequately provide for the upkeep of the family and so women have to be actively involved in the quest to contribute to household income and wellbeing.

In Ghana and elsewhere, decline in agricultural output, which is the main source of household incomes at rural places of origin, compels people to embark on migration to supplement household incomes. Declining job opportunities for men in the job markets have brought to the fore the importance of remittances from female migrants to their household members and this has led to increased number of female migrants who go to the south to work as head porters (known as *Kayayei*) or domestic workers, among others (Awumbila et al, 2008). In fact, many studies have reported that females have come to dominate the migration process that used to be male-dominated, leading to what is now known as feminisation of migration (Adepoju, 2004). It is thus important to investigate the contribution of women's migration to household incomes and well-being, and ultimately how this impacts on child survival at the place of origin.

As more women participate in the migration process for economic reasons due to limited economic opportunities in their places of origin, it is believed that benefits associated with such movements could improve the general wellbeing of their respective households. In addition to the economic benefits associated with migration, other benefits that have been identified to be associated with maternal migration are knowledge acquisition at the points of destination, which are mostly urban settings (Hildebrandt and McKenzie, 2005). The knowledge acquired includes better child healthcare, environmental cleanliness, personal hygiene and general modern best practices. Given that literature has demonstrated how maternal education and household wealth impact on under-five mortality (Doctor, 2004; Osei-Kwakye et al, 2010; Kanmiki et al, 2014), it is conceived that with migration leading to increases in household incomes as well as acquisition of knowledge in various forms, children of women who have ever migrated and returned (in-migrants or return migrants) will have lower

mortality than children of mothers who have always stayed at the place of origin (non-migrants).

Opportunities exist to substantially address the problem of high mortality rates, but these are contingent upon the identification, understanding and the adoption of appropriate measures at addressing key social, economic and cultural factors that affect child mortality. This, in addition to the intervention by the mainstream health delivery sector, will go a long way to reduce the high mortality levels experienced in these deprived areas. However, few studies have assessed the socio-economic benefits of female migration, with particular reference to child survival (Behn et al, 1982; Brockerhoff, 1990; Bocquire et al, 2011; Ettarh & Kimani, 2012; Aigbe et al, 2012). The absence of many such studies is even more obvious at the place of origin. Meanwhile, understanding this relationship, in addition to other factors, will provide the necessary guidelines for the implementation of appropriate interventions to reduce child mortality in most parts of the country and elsewhere. This will also contribute to our understanding of the pathways through which maternal migration affects the well-being of their households and eventually under-five mortality.

This study, therefore, seeks to use longitudinal data from the Navrongo Health and Demographic Surveillance System (NHDSS) in Ghana to examine the effects of maternal migration on under-five mortality in the Kassena Nankana East and West districts in northern Ghana (place of origin). It has to be highlighted that the analysis is being conducted with the study population being children who are born in the study area (Kassena-Nankana districts), where their mothers are categorised into two groups of migrants (return migrants) and non-migrants. In addition to the main independent variable, other socio-demographic variables will be included as confounding variables to

ascertain the independent effect of maternal migration on under-five mortality in the study area.

1.2 Statement of the Problem

Loss of lives is one of the major problems facing most developing countries in the world. Most of these deaths are preventable and can thus be reduced if factors responsible for them are identified. It has been pointed out that infant and under five-mortality rates are a measure of the level of a country's development and well-being (Alderman and Berhman, 2004). Therefore, high levels of under-five mortality that are experienced in less developed countries place them at very low levels of socio-economic status (SES). Children need not only survive, but grow in good health, as a country's future human resources depend on them. As a result, the high rates of child mortality experienced in developing countries will invariably affect their future prospects. This is because while more children die, relative to their counterparts in the developed world, some of those who survive are afflicted with one form of disability or the other and so are unable to contribute meaningfully to household income and national development as a whole (Graham et al, 2014).

Another problem is that the magnitude of under-five mortality rate is obscured by the national average, as there are significant differences in the rates among regions and population sub-groups. For instance, according to the 2014 Ghana Demographic and Health Survey (DHS), while Greater Accra Region (National capital) had under-five mortality rate of 47 deaths per 1,000 live births, Upper East and Upper West regions had rates of 72 and 92 deaths per 1,000 live births respectively. Overall, rural areas in Ghana reported a higher under-five mortality rate of 75 deaths per 1,000 live births, while the

urban areas had a rate of 64 deaths per 1,000 live births (Ghana Statistical Service, 2015).

High rates of under-five mortality have several implications for the general populace and women in particular. High levels of child mortality lead to high levels of fertility as women or couples continue to bear many more children in order to be assured of some of them surviving (i.e., security against high levels of child deaths). High fertility also leads to high infant deaths, particularly for higher order and closed-spaced births (World Bank, 2010). This vicious spiral will continue to operate (high mortality, high fertility and high mortality) unless some measures are put in place to reverse the trend. High fertility rates also have their downsides in respect of maternal mortality as frequent births put women at high risks of maternal deaths, particularly at higher order births (Chen et al. 1974; DaVanzo et al. 2004). In addition, high rates of under-five mortality also tend to put financial stress on couples and families at large, as funerals have to be organised with their associated expenditure, and more importantly loss of man-hours, which will all affect household incomes and well-being.

High levels of under-five mortality result in low life expectancy, and as a major indicator of level of development, improvements in child survival and increase in life expectancy will place such countries at higher levels of development. Apart from reducing burden on household income, improvements in child survival will also lessen the burden on government expenditure in the health sector.

With an estimated Millennium Development Goal (MDG) target rate of 43 deaths per 1,000 live births in 2015, it was rightly predicted that it was unlikely Ghana will achieve this target (Lozano et al, 2011). Ghana's inability to achieve the set target means that factors responsible for the high levels of child mortality still persist. This is even

more pervasive in rural areas where limited economic and social infrastructure hinders people's ability to live a better life, thus leading to higher levels of mortality.

High levels of child mortality, particularly in rural areas, are exacerbated by high levels of poverty, and the Kassena-Nankana districts, where this study was conducted, is no exception. Early childhood malnutrition, which is a high risk of mortality, is reported to be attributed to poverty and limited economic resources (Begin et al, 1999). Agriculture is the main livelihood activity of the people, and over the years outputs have been on the decline due to climatic change and land degradation. Flooding, drought and occasional bushfires have been main factors of low agricultural yields. This has been compounded by increases in population and the lack of modern and scientific means of cultivation. To overcome challenges associated with extreme poverty, the people resort to migration in search of alternative source of income, particularly during the dry season when there is less agricultural activity.

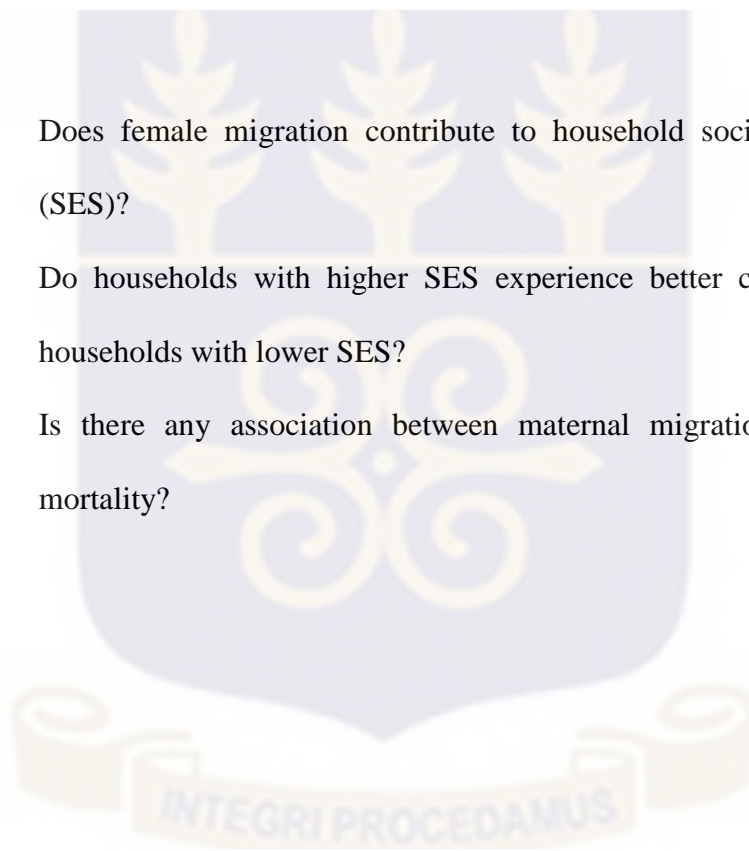
While the positive consequences of migration is envisaged, it is without problems. The key negative effects of migration are challenges migrants face at place of destination, which include initial lack of jobs, lack of decent accommodation and abuse of all kinds (Wickramage, 2016). Migration, including female migration could result in labour shortages at point of origin and this could lead to low agricultural outputs at place of origin, thereby exacerbating the already precarious poverty situations in these areas.

Another major consequence of migration, particularly female migration are the effects of the absence mothers on children left behind. Several studies have found such negative impacts on children left behind to include school dropout, negative health outcomes, child abuse, and truancy or child delinquency, among others (Cortes, 2010; Jampaklay, 2006; Hildebrandt and McKenzie, 2005). While return migrants are expected to come home with money and/or goods, some rather come home with problems, such as

illnesses (Welaga et al, 2009). In such cases the return migrant turn to burden on the family.

Even though these negative outcomes on children left behind have been reported, the dominance of females in the migration process in recent times has been highlighted and their contribution to household income, and for that matter household socioeconomic status (SES) and child survival have also been reported. However, the positive contributions of female return migrants at rural place of origin has rarely been empirically ascertained. As a result, this study is set out to answer the following questions:

- i. Does female migration contribute to household socio-economic status (SES)?
- ii. Do households with higher SES experience better child survival than households with lower SES?
- iii. Is there any association between maternal migration and under-five mortality?



1.3 Rationale of the study

Under-five mortality rates in Ghana are still high, and even higher among disadvantaged populations. This gives an indication that there are still certain factors (clinical, social, economic and demographic) that militate against our efforts at reducing these rates to acceptable levels. Government has recognised this problem and has tasked the various sectors and agencies to redouble their efforts to achieve a substantial reduction in mortality in general and under-five mortality in particular (WHO, 2013). Therefore, the significance of this study cannot be over-emphasised as it seeks to contribute to our understanding of factors contributing to the high under-five mortality in the Kassena-Nankana districts, which are among the most deprived districts in Ghana. Specifically, the study will enable us understand the contribution of maternal migration to under-five mortality in the study area, where poverty and deprivation is endemic.

Many demographic studies have examined the relationship between non-demographic factors and the three components of population change independently or in combination. Only a few of these studies have examined the relationship between and/or among the three components of population change in Ghana (Kwankye, 1994; Brockerhoff, 1990). Even though migration has been found to contribute positively to household income and thus improves household SES and child survival (Ettarh & Kimani, 2012; Hildebrandt & McKenzie, 2005), few studies have examined the link between maternal migration and under-five mortality, thus creating a gap in our understanding of this important relationship.

Even though the relationship between migration and SES on one hand and SES and child survival on the other have been widely studied, with most of them pointing to survival advantage of children from higher SES households, most of the methods used are not appropriate. Specifically, most of these studies used cross-sectional data which

are not suitable for the investigation of such relationships. For instance, Borjas (1989) showed that the use of cross-sectional data provide unreliable estimates of parameters that determine migrants' earnings over time. The importance of this study is reflected in its utilization of longitudinal data that include maternal migration, to examine this complex web of relationship. In particular, longitudinal data for about fifteen years is used to examine the relationship between mother's migration and their effect on under-five mortality in a rural setting in northern Ghana.

Unlike most studies that tend to examine migrants at point of destination, this study focuses on the benefits of migration at the place of origin, which is largely rural and deprived where the brunt of child mortality is felt. Understanding the contribution of female return migrants to child survival could be a major policy pathway through which child mortality could be reduced. Also, many migration studies have generally viewed female migration with considerable pessimism (Hugo, 2006; Dungumaro, 2013; Kavar, 2004). Some of these perceived negative outcomes are abuse, rape and lack of sleeping places, among others. This study takes a different look at female migration by examining the positive aspects of it and the possible contribution it makes to the improvement of the socio-economic wellbeing of their households, including those of their children.

This study is useful as it will broaden our knowledge on factors responsible for under-five mortality in the study area with particular reference to the positive contributions of female migration in addressing the problem. The findings of this study will therefore be a route through which our quest to reducing the high levels of child mortality across all segments of the population in the study area may be realised. This is because the study is among the few that utilise longitudinal data spanning one and a half decade to examine these important relationships. An important factor is that findings from this study could inform policy on the appropriate interventions that could benefit

not only the people of the study area, but also people of other settings with similar social, economic, cultural and demographic characteristics. The methodology adopted in this analysis could also be informative and beneficial to scholars and researchers who seek to undertake similar analysis using longitudinal data.

1.4 Study Objectives

The main objective of this study is to examine the impact of maternal migration on under-five mortality in the Kassena-Nankana districts of northern Ghana.

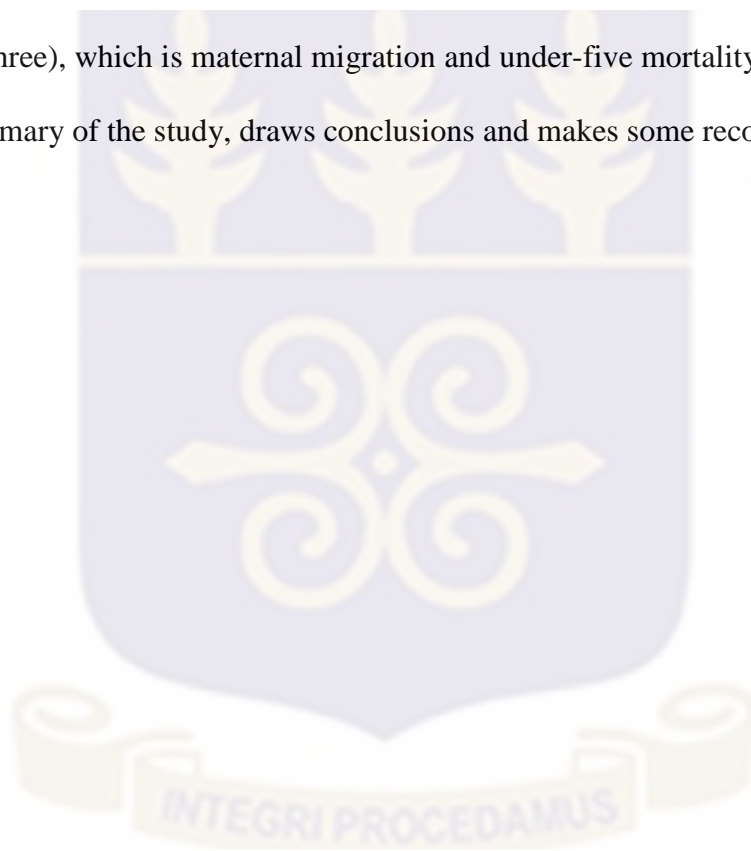
The specific objectives include the following:

- i. To examine the level and trends of under-five mortality in the Kassena-Nankana districts in northern Ghana from 2000 to 2014.
- ii. To examine the migration dynamics in the Kassena-Nankana districts.
- iii. To analyse the relationship between maternal migration and household SES.
- iv. To investigate the relationship between maternal migration and under-five mortality in the Kassena-Nankana districts.

1.5 Outline of the Study Chapters

The study is organised into nine chapters. The first is the introductory chapter which provides the background to the study. It also states the research problem and questions as well as outlines the research objectives. The chapter finally provides the rationale for the research work. The second chapter provides a review of the literature on child mortality and its determinants, with particular reference to maternal migration. In addition, the chapter outlines the theoretical focus and the conceptual framework underlying the study.

Chapter three discusses the methodological approaches employed in the study. These include source of data and methods of data analysis. Chapter four provides a description of the study area and characteristics of the study population. Chapter five examines the migration dynamics in the Kassena-Nankana districts over the period of the study. Chapter six discusses objective one of the study, which is the levels and trends in under-five mortality in the study area over the period. Chapter seven is devoted to the examination of objective two, which seeks to examine the relationship between maternal migration and household SES. Chapter eight discusses the main theme of the thesis (objective three), which is maternal migration and under-five mortality. The final chapter gives a summary of the study, draws conclusions and makes some recommendations.



CHAPTER TWO

REVIEW OF LITERATURE

2.1 Review of Literature

2.1.1 Introduction

Though there has been global decline in under-five mortality over the past three decades, this decline has been highly skewed in favour of the developed countries, with sub-Saharan Africa bearing the brunt of these deaths (You et al, 2014; Rahman et al, 2010; WHO, 2006). Several factors have been found to contribute to these deaths and the disparity in mortality levels among different population sub-groups, socio-economic status and regions (Bradshaw et al, 2003; Dejene and Girma 2013, Mekonnen 2011, Mekonnen et al. 2013). These factors can be categorised into two main groups, namely clinical (or biological) and non-clinical factors. Clinical factors, also referred to as proximate determinants, are those biological factors that directly affect child health and sometimes death. These include factors such as sex of the child, vaccination status of child, place of delivery, birth order and spacing, number of children per pregnancy and breastfeeding practices, among others.

Non-clinical factors, on the other hand, are those factors that influence child survival indirectly and include social, economic, cultural, political, religious and geographical factors. While a plethora of knowledge exists regarding child mortality differential among countries and regions as well as population sub-groups, their direction of influence and relative magnitude are asymmetrical across these population sub-groups (Minujin & Delamonica, 2003). In another vein, while studies have found similarities in the determinants of mortality outcomes, others have found contrasting results and outcomes.

An important factor that has been found to be associated with better survival is the socio-economic status (SES) of the individual or household. Higher SES is associated with better nutrition and better healthcare, all of which lead to better health and survival. However, in resource constraint settings, such as those of rural areas, poverty is so rife that adequate nutrition and better healthcare almost always become difficult to come by. This is so due to lack of economic opportunities in those areas. One means which individuals and households adapt to assuage these hardships is to migrate to other places where better economic opportunities exist. Incomes and savings made are sent home to supplement household incomes which tend to improve their livelihoods and survival chances. This literature attempts a review of studies on the effect of maternal migration and other factors on under-five mortality. Several socio-economic, demographic and cultural factors are found to also affect child survival, either individually or in most cases jointly. Therefore, the literature review also examines the roles these other factors have played to affect child mortality by reviewing relevant studies conducted in other settings in this regard.

2.1.2 Maternal migration and under-five mortality

The underlying causes of migration are copious, since several factors account for the process, particularly rural-urban types of migration. However, it has been established that economic motives drive most migration ventures. For instance, according to Thadani and Todaro (1984), the most recognised stimulus for migration is the economic factors. It has been noted earlier that inequalities in economic and social opportunities account for the migration of rural people to the urban areas in search of better economic opportunities to improve upon their livelihood at the place of destination and also for family members back home while away and upon their return (Awumbila et al, 2014).

Another important dimension of the benefit of female migration is that it improves migrants' knowledge in childcare practices, which also tend to improve child survival (Hildebrandt and McKenzie, 2005). This comes about when migrants adapt to urban ways of life. As migrants come into contact with the urban environment, they are exposed to new ideas and social interactions, which could result in change in behavior, attitude and life style (Caldwell, 1969; Amankwaa et al., 2002; Hildebrandt and McKenzie, 2005). For instance, in an urban environment, women would learn to adhere to better personal hygiene, use of clean and safe drinking water, living in a clean environment or surroundings and seeking care promptly when ill. Brockerhoff (1990) has noted that such exposure and change in behavior are necessary for the improvement of child health and survival. As a result of these benefits associated with migration, it is envisaged that children of women who have migrated and returned will have a better health outcomes and survival compared with children of non-migrant mothers.

For instance, Collinson (2008) used data from the Agincourt Health and Demographic Surveillance System to examine the relationship between temporary maternal migration and child mortality. The results from the study revealed that children of migrant mothers had a slight survival advantage over children of non-migrant mothers. However, when other confounding factors such as mother's education and marital status were introduced, the child survival benefits associated with mothers' migration disappeared. This suggests that mother's education and marital status tend to overshadow or erode the benefits associated with maternal migration in respect of child mortality.

Using 2006 Haiti DHS data, Smith-Greenaway and Thomas (2014) found that children of mothers who moved "laterally" (rural-rural or urban-urban) had a higher survival advantage compared to their non-migrant counterparts. On the other hand,

children whose mothers moved "non-laterally" (rural-urban or urban-rural) had a lower survival chance than children whose mothers are non-migrants.

In another study in Mexico, Hildebrandt and McKenzie (2005) found that children of rural migrant households had a higher survival probability than children of rural non-migrant households. Specifically, children born in migrants' households are estimated to be 4.5 percent less likely to die than children in non-migrant households. However, after controlling for some confounding variables, the beneficial effect reduced to 3.7 percent. This means that other factors, apart from maternal migration, also play important roles in contributing to child survival.

While migration has been found to lead to economic gains, for individuals, households and communities at large, some studies have also established some negative consequences of migration. Proponents of the negative impact of migration in places of origin argue that migration contributes to declining agricultural outputs in these areas due to inadequate farm labour, since it is mostly the able-bodied and energetic members of the population who migrate (Iruonagbe, 2009; Mba et al, 2016). In rural farming communities, with the departure of the young members, farming activities are left in the hands of older and weak members and this eventually leads to low agricultural outputs (Lewis, 2004; Quisumbing and McNiven, 2007; Iruonagbe, 2009). This sometimes tend to worsen the already debilitating food shortages associated with these rural farming communities.

Apart from agricultural output, non-agricultural activities are also affected following the departure of skilled labour such as teachers and nurses, among others. Communal works of all kinds are also affected, with the absence of the young and energetic ones. In the medium to long term, some migrants would return with problems

that do not only impact negatively on their immediate family or household members, but the community at large. For instance, migrants may return with some health problems such as HIV and AIDS or some other communicable diseases (Welaga et al, 2009). In this case, the family bears the brunt of caring for the sick return migrant, whilst the community faces the risk of the spread of the disease.

Specific to women, the negative impact of migration is multi-dimensional. Even though women move with the intention of improving their economic wellbeing, they sometimes encounter certain unanticipated precarious situations at place of destination (UNFPA, 2006; Wickramage, 2017). These include lack of decent accommodation, joblessness, unhygienic living conditions, exposure to abuse of all forms. In the midst of these challenges, some may get into risky behaviours for survival such as, multiple sexual partners and prostitution, alcoholism and robbery, sometimes due to peer influence (Anarfi, 1993). This sometimes results in the acquisition of certain diseases and if they are unable to continue stay, they return home and the consequences are as enumerated earlier.

Another problem arises when women migrate and leave their children in the care of other family member(s). The consequence of this on the general wellbeing of children left behind is well documented (McKenzie, 2006; Coronel and Unterreiner, 2005). Generally, the absence of the mother leads to less attention being paid to the child, and this could put the child at high risk of injuries and fatalities. Poor feeding regimes, inadequate healthcare, abuse, absenteeism or dropout from school and drug abuse are some of the factors that can negatively affect children left behind. While migration is perceived to improve individual wellbeing and household socio-economic status, these negative outcomes could erode the benefits associated with migration. For instance, in a study in Mexico, Donato et al (2003) found that maternal migration was associated with

increased child mortality. The study found that migration of both parents was rather beneficial to child survival.

While the foregoing factors are acknowledged to have some dire consequences on the migrants and their households and communities, benefits associated with migration are also well documented, as enumerated in the previous section. And as Lucas (2015, p. 17) notes, “Almost everywhere, migrants are the big winners in the migration processes”.

The link between household wealth and child wellbeing has been well documented (Awumbila et al, 2015; Hilderbrandt and Mckenzie, 2005). Similarly, the relationship between migration and household income has also been established. However, there are few studies that have examined the association between migration, particularly female migration, and child survival in migrants’ sending areas (Hildebrandt and McKenzie, 2005). It must be noted that this relationship is not a direct one as enumerated above. Migration has been found to improve household socio-economic status, which in turn has been found to impact positively on child survival, which is the main theme of this thesis.

2.1.3 Migration dynamics in Ghana

Migration in Ghana dates back to pre-colonial era and was mostly for trading purposes, particularly during the period of the Trans-Saharan Trade (Anarfi et al, 2003). These trading activities involved sales of goods such as kola, salt, animals, and cloths, among others. This resulted in the movement of people from place to place. This was also the time of the slave trade that saw the capture, sale and movement of people from the northern to southern territories of Ghana. However, internal migration, particularly north-south movement, gained momentum during the colonial period, when a deliberate

policy by the colonial government made the northern part of the country a labour reservoir for the recruitment of labour for the mines and cocoa farms in southern Ghana (Songsore and Denkabe, 1995; Songsore, 2003; Anarfi et al, 2003). This coupled with improved transportation system and relative peace (due to minimisation of tribal wars) resulted in massive movements across the country, particularly from the north to the south (Akokpari, 2000 as cited in Adaawen and Owusu, 2013).

The migration process that was experienced during the colonial era prevailed even after independence. This was due to the establishment of networks in the destination areas, mostly the cocoa growing and mining areas that attracted yet more migrants from the northern territories. These migrations had been dominated by male adults who moved to the mining and cocoa growing areas in the south to work, particularly during the dry season (Nabila, 1974, 1985; Songsore, 2003; Lobnibe, 2008; Kwankye et al, 2009). However, over time younger people, including more females have also been part of the migration process (Adepujo, 2004; Kwankye et al, 2009). For instance, according to the Fifth Round of the Ghana Living Standards Survey (GLSS 5) and the 2000 Ghana Population Census, internal migrants accounted for over 50 percent of the population, and over half of these migrants were females (Ackah and Medvedev, 2010; Litchfield and Waddington, 2003).

According to literature, the motivation for such movements includes poverty, bad socio-cultural practices (such as early marriages, female genital mutilation and widowhood rites), ethnic and domestic conflicts, among others (Nabila, 1975; Anarfi and Kwankye, 2005; Awumbila and Ardayfio-Schandorf, 2008). With regard to poverty, women tend to bear the higher brunt of the suffering associated with it as they are faced with the problem of properly caring for their children, particularly in polygynous situations. This comes about when women have to compete with one another for the

limited resources in such households to adequately cater for their respective children. To overcome hunger and deprivation, women, just as their male counterparts resort to migration to other parts of the country, particularly Kumasi and Accra in search of jobs. In the Upper East Region, where the study area is located, these types of movements are highly seasonal, where migrants move during the off-farming season and return during the farming season.

Some theoretical models that have been used to explain migration in general can be applied to migration in Ghana, and in particular to north-south movement in Ghana. For instance, according to the "push-pull" factors by Ravenstein (1889) and Lee (1966), unfavourable conditions at one place (origin) tend to drive away ("push") people to places with favourable conditions that serve as "pull" factors. During the 1970s and early 1980s, Ghana experienced serious economic hardships due to some factors, among which is mismanagement of the country, political instability, unfavourable external conditions, unfavourable weather conditions leading to poor agricultural outputs, among others. With respect to weather variability and food insecurity, a number of studies have pointed to a link between these conditions and migration (Marchiori et al, 2011; Findley and Diallo, 1993). In Ghana, these conditions led to people looking for alternative sources of livelihood, for which migration became the main option as people move from all parts of the country to another (Anarfi et al, 2003).

Another factor that has triggered the north-south migration since independence is the relatively limited natural resources in the northern part of Ghana compared to the south. As a result, the north has not been as attractive as southern Ghana and has thus been "pushing" people away to take advantage of the perceived better economic opportunities in the south for the improvement of their socio-economic status. The limited natural resources coupled with the differential developmental agenda of the

colonial government in favour of southern Ghana further exacerbated the development gap between the two regions. This phenomenon of developmental pattern continued even after independence and this has led to migration of people from northern to southern Ghana in search of jobs (Kwankye et al, 2009). This situation has prevailed up to date as depicted in the net migration rates by region from the 1960 to 2010 Census reports, where regions of the north have consistently recorded negative net migration rates throughout the period, except in 1984 for Northern Region (Table 2.1).

While acknowledging the role played by the economic models of migration in terms of their contributions to migration theorisation, it is important to consider the effects of systems and structures that tend to have some major influence on individual decision and ability to move. In this vein, historical-structural models can better describe some of the migration dynamics we have observed in the past and present. In the context of international migration, historical structural model interprets migration as one of the several manifestations of capitalism that results in unequal terms of trade between developed and developing countries (Massey et al, 1998). Developing countries produce raw materials for the industrialised developed nations. This leads to some dependence of the developing countries on the developed countries for manufactured goods. As this dependency continues and the unequal terms of trade persist in favour of the developed countries, higher returns in the developed countries lead to migration from the developing countries to the developed countries to take advantage of the higher levels of incomes in these countries.

Limiting this phenomenon to internal migration, colonial governments had interest in places where they could get raw materials to feed their industries back home. This saw the selective developments of some parts of the country to the neglect of other places that lack natural resources. As these areas got developed with better opportunities,

people migrated from deprived areas to the more developed areas. For instance, as noted elsewhere in this thesis, there were even deliberate policies by colonial government to recruit labour from northern Ghana to the mining and cocoa growing areas in southern Ghana. This opened up the way for many more people to migrate, particularly from northern to southern Ghana.

Another important historical structural factor of migration is social-cultural and economic development of the country. As the country gets developed, some social and economic changes occur, which make people to migrate elsewhere to seek better opportunities. For instance, as more people become educated they tend to move out of their rural areas to more developed areas where their skills can earn them better incomes than at their home places of origin. As Cadwell (1969) noted, people move to urban places to look for work because they have completed some level of education. Development also leads to better transport services and better road networks that facilitates movements of people. Technological advancement in telecommunication enables people to easily communicate and seek information on possible places of destination where opportunities are greatest. This tends to facilitate movement of people from one place to the other.

Network theory is another important dimension of migration. As more people engage in the migration processes, migration network becomes central in the migration process. First generation migrants facilitate the migration of non-migrants who are relatives, kin members or friends. The former provides the latter with relevant information pertaining to possible places of destinations, where better opportunities in terms of jobs exist. These first time migrants also get assistance from their kin members upon arrival at places of destinations. When migrants return home, non-migrants at home are motivated by the change of wellbeing of these return migrants and also motivated to migrate. Sometimes, return migrants motivate non-migrant relatives and friends at home

to also move. In fact, they sometimes take them along when they are going back to their places of destination, mostly in urban areas. All these reduce cost of migration, which Lee (1966) term as intervening obstacles. Chain migration become perpetuated and more people become part of the migration process.

Political development also has influenced the nature and direction of migration in Africa and Ghana in particular. For instance political instability could lead to movement of people from one location to another, sometimes across national boarder(s). A case in point is the political upheaval in Liberia and Cote d'Ivoire that displaced thousands of people, with many of them moving across some countries in the West Africa sub-region and beyond. In Ghana, conflicts of all forms, such as those that happened in Bawku, Yendi and many other places have resulted in the migration of people from those areas. Another important political development is government policies that tend to be unfavourable to some people and sometimes results in the migration of people to places of relatively better opportunities, perceived or real. For instance, the structural adjustment programme (SAP) implemented by the government of Ghana in the early 1980s affected quite a lot of people. Workers were retrenched, subsidies on agricultural inputs were withdrawn, which made agricultural activities unattractive (Pickbourne, 2011). These and others made people to migrate to other places in search of alternative and better sources of livelihood. Added to this is the 1993 drought and bushfires that resulted in food shortages and caused severe hunger in the country. This was compounded by the deportation of over one million Ghanaians from Nigeria. These led to the movement of people across all parts of the country in search of alternative source of livelihood (Anarfi et al, 2003).

Table 2.1: Volume of net-migration by region, Ghana (1960-2010).

REGION	1960 Number	1970 Number	1984 Number	2000 Number	2010 Number (rate/1000)
Upper East (UE)	++	-148,707***	-20,762	-201,532	-267,692 (-257.22)
Upper West (UW)	++	++	-3,083	-191,653	-209,414 (-302.50)
Northern Region	-157,055**	-33,719	+10,716	-139,216	-332,597 (-135.54)
Brong Ahafo	+84,919	+117,291	+52,192	+163,749	117,884 (51.50)
Volta Region	-94,422	-169,089	+97,192	-403,404	-535,671 (-258.60)
Ashanti Region	+90,821	+72,402	-28,327	+197,059	+240,020 (50.59)
Central Region (CR)	++	-131,286	-77,874	-274,579	-238,015 (-110.10)
Eastern Region	-18,519	-99,645	-78,136	-224,386	-332,086 (-127.19)
Western Region	-1,566*	+123,916	+46,687	+350,792	282,119 (120.22)
Greater Accra	+90,101	+272,809	+153,154	+901,780	1,275,452 (324.97)

Source: From Kwankye et al (2009) and extract from Ghana's 2010 population census report (GSS, 2013).

Notes: *including Central Region (CR); **including UE and UW Regions; ***including UW Region

++ Those regions were non-existent at the time

Female migration in Ghana, as in many countries of the developing world, is a recent phenomenon (Pickbourne, 2011). In Ghana, it is believed that women's participation in migration became prominent during periods of economic reformation, such as the Structural Adjustment Programme/Economic Recovery Programme

(SAP/ERP) in the early 1980s (Pickbourne, 2011). This was when subsidies on agricultural inputs were withdrawn making farmers in the country, particularly northern Ghana unable to achieve their usual agricultural yields. At the same time, the country was hit by a severe drought also leading to poor harvest. Added to this was the repatriation of Ghanaians from Nigeria in 1983. All these resulted in food shortages and high food prices (Pickbourne, 2011). The withdrawal of subsidies on agricultural inputs, in particular led to reductions in farm sizes, including commercial farming where women used to work for wages. This resulted in limited job opportunities for women in the agricultural sector (Pickbourne, 2011). Limited job opportunities, food shortages and high food prices during this time precipitated increased female migration from north to southern Ghana in search of jobs to supplement the incomes at home in order to sustain household livelihood.

Migration of females since then has been dominant in the migration dynamics of the country. Majority of these women, who are mostly young uneducated girls and school dropouts migrate in order to fulfill their economic and social needs rather than joining a husband or other family members, as has been the case in the past. Some of these girls are found in the cities of Accra and Kumasi working as domestic house helps, chop/beer bar attendants and most particularly as head porters known as *Kayayei* (Awumbila et al, 2008 & 2014). Even though, the benefits or otherwise associated with female migration are mixed, there is little literature on the phenomenon at place of origin. However, the phenomenon has persisted with more women still migrating to the south in search of jobs (existent or non-existent), giving an indication that the benefits associated with their movements outweigh any losses. In this study, an attempt is made to ascertain the benefits or otherwise of female migration in the KNDs of northern Ghana, with particular reference to under-five mortality.

2.1.4 Migration and household socio-economic status

Classical theory of migration suggests that migration is an individual decision which is based on the expected income maximisation, which is also based on the wage differentials between rural place of origin and urban place of destination (Harris-Todaro, 1970). This position has been challenged with the explanation that the decision to migrate is not always the sole decision of the individual potential migrant, but a household decision. The New Economics of Labour Migration (NELM) theory (Lucas and Stark, 1985; Katz and Stark, 1986; Stark, 1991) provides a systematic explanation on the role of labour migration in household strategies. This theory posits that under an imperfect market situation in rural place of origin, coupled with uncertainty in their incomes from agricultural activities, households adopt strategies to diversify their income sources, maximize earnings and minimize losses under those circumstances. One important strategy usually adopted by households is the migration of some of its members in search of alternative sources of income to supplement that of those generated at home (Rosewarne, 2012). With this arrangement, migrants are expected to remit and also return home with some resources, either in monetary or material form.

Despite the argument raised by the NELM theory, the benefits of migration to households at the place of origin have been mixed, with literature available to support each position (Collinson et al, 2009). For instance, while Rhodes (1977) and Krane (1973) have argued that return migrants show no significant improvement in living standard, other scholars have on the contrary contended that rural urban migration leads to economic development (Bryceson, 2009).

Several forms of migration exist in contemporary developing countries, with the common one being rural-urban type of migration. It is well documented that this type of migration has been associated with improved wellbeing of the individual migrant and

their households at place of origin (Goldscheider, 1984; Itzigsohn, 2001; Collinson et al, 2009). However, there is paucity of studies on the impact of migration on household socio-economic status in developing countries, particularly those that focus on gender (Black et al, 2004). This has resulted in limited understanding of the contribution of female migration to household income and socio-economic status at the place of origin.

Migration has since been seen as an alternative livelihood strategy globally that tends to assuage poverty levels for most individuals in the sending households (Stark and Bloom 1985; Lucas 1997; Quisumbing and McNiven, 2007). While long term migrants remit their households back home (Adepoju, 1974; Gubert, 2002), short term (circular) migrants return home with their monetary savings or purchase materials for use at home or both (Nabila, 1975). Migration is thus a means of enhancing the socio-economic status of individuals not only at point of destination (urban area) but also at point of origin (rural area).

There is general consensus that migration and its associated remittances alleviate poverty at the rural places of origin and improve household living standard (Anarfi and Awusabu-Asare, 2000 cited in Anarfi et al, 2003). Studies have also shown that migration reduces income inequality and leads to general improvement in household wealth both at places of destination and origin (Ravallion et al. 2007; Opare, 2003; Yaro, 2008; Murrugarra et al, 2011). Specifically, there are studies that have revealed that households of migrants have a higher socio-economic status than households of non-migrant (Taylor and Mora, 2006; Schmook and Radel, 2008; Wouterse and Tailor, 2008). For instance, using panel data from 912 households in the Kagera Region of Tanzania to investigate the impact of migration on poverty and wealth, Beegle et al (2011) revealed that migration out of the region was associated with substantial increases in consumption and decline in poverty in origin households. This could result in the

improvement in child survival status of children of these migrant households, a relationship that is the main objective of this study.

In their study on migration and socio-economic change in rural South Africa, Collinson et al (2009), using longitudinal data from the Agincourt Health and Demographic Surveillance System (HDSS), found a positive relationship between female migration and household SES. Specifically, the study revealed that having one female temporary migrant increases household SES by three percent compared with household without a migrant. Similarly, households with more than one temporary migrant were also associated with the same positive effect. The study, however, revealed that male temporary migrants contribute more to household SES at place of origin than female migrants. Similar results were found by Collinson (2008) using the Agincourt Health and Demographic Surveillance System (HDSS). The results specifically showed that for poorest households in rural South Africa, government grants and female temporary migration are the key factors that improve household SES.

Using panel data from a rural sending area in Bangladesh, Rahman et al (1996) found that poverty was about 30 percent lower for households with at least a migrant member. On the other hand, poverty was much higher (about 60 percent) for households without a migrant. In his study on labour and migration in rural Vietnam, Narciso (2015) uncovered significant difference between households of migrants and non-migrant households, with the former being wealthier than the latter in respect of food expenditure quintiles. He further observed that migrant households have better access to credit facilities than non-migrant households. This could be as a result of the ability of the former to fulfill the payments due to their higher SES compared to the latter.

Using data from the third and fourth rounds of the Ghana Living Standards Survey (GLSS 3 and 4), Litchfield and Waddington (2003) found that migrant

households have significantly higher standard of living than non-migrant households, by way of consumption expenditure. The study, however, showed no presence of significant difference between migrant and non-migrant households in terms of non-monetary welfare indicators.

In his study in Ghana, Obeng-Odoom (2010) found evidence that rural-urban migration is beneficial to both migrants and families in rural place of origin. Some of the perceived benefits, according to the findings, include remittances, knowledge transfer and political consciousness. In an earlier study by Boakye-Yiadom (2008), the results showed that migration enhanced household welfare considerably, even though some losses were experienced.

In another study in four regions in Ghana to establish whether households of migrants are better off than households of non-migrants, Awumbila et al (2015) found that higher percentage of households with migrants reported some improvement in their financial situation over the five years prior to the study compared to households without migrants. Corresponding smaller percentage of households with migrants reported a lot or somewhat deterioration in their financial situation. A higher proportion of internal migrant households reported improvement in their financial situation than households with international migrants. This, according to the authors was contrary to the popularly held view that international migration contributes more to household wellbeing than internal migration (Awumbila et al, 2015).

What is missing in most of these studies is the gender differentials in migration benefits to households' socio-economic status. It is believed that with more women participating in the migration process in recent times, their contribution to household and family welfare both at places of destination and origin cannot be overruled.

2.1.5 Migration duration and household socio-economic status

Migration contributes to household socio-economic status (SES), particularly in rural deprived settings where poverty is rife due to limited economic opportunities in these areas. The interest is whether varied migration durations affect household SES differently. While migration duration is a consequence as well as a cause of several factors (Dustmann, 2001; Stark et al., 1997), its direction and magnitude are not very clear, particularly with respect to household SES. What is clear, however, is that migration in general, and the duration in particular affects labour supply in sending areas negatively, and this can reduce household incomes, particularly from agricultural outputs (Gibson et al, 2013). On the other hand, remittances to households back home can make for the loss of income due to the absence of the migrants. If remittances are higher than losses due to the migrant absence, it is likely that the migrant will stay much longer. The question to ask is whether this benefit always prevails.

Several studies have examined the relationship between migration duration and its impact on remittances and household SES and have found no straightforward or conclusive relationship between the two. For instance, it has been pointed out that short-term migration may contribute negatively to household income since within the short period the migrant is unable to earn enough to remit to pay for the cost of movement or save enough and take home (Gibson et al, 2013). Another scenario is that long-term migrants are likely to earn higher and more incomes and so are able to remit or save more to take home. However, it is also possible that commitments of long-term migrants to their kinfolks at home could wane over time and this could lead to little or no remittances being sent home (Demurger, 2015).

In their study on the North-South Migration Remittances in Ghana, Adaawen and Owusu (2013) found that migration of the youth from the north to south, and the

associated remittances sent home, play an important role in improving the wellbeing of their households. More importantly, their study also established that the duration of stay at place of destination influences the amount of money remitted, with longer stay associated with higher amounts of remittance.

Another effect of migration, particularly female migration that has been examined, is the care given to children left behind. Several studies have given varied outcomes of migrations in respect of children left behind. Often times there is oversimplification of migration benefits against possible negative effects this migration might cause (Kandel and Kao, 2001). This complexity arises because under such circumstances while the mother or caregiver is away, the child is in the place of origin. However, the current study examines migration status of mothers at place of origin where these mothers have in-migrated or are return migrants who have delivered in the study area. In this case, the women and their children are studied together at the place of origin and so will not encounter so much of the problem of "children left behind."

2.1.6. Household socio-economic status (SES) and under-five mortality

Higher SES is found to be associated with better livelihood in terms of better nutrition, housing, education, healthcare that eventually lead to higher survival in general and child survival in particular (Rustein, 1984; United Nations, 1985; Hobcraft et al, 1984; Bicego & Boerma, 1993; Sullivan et al, 1994; Muhuri 1996; Filmer and Pritchett, 2001; Doctor, 2004; Mustafa and Odimegwu, 2008; Nattey and Klipstein-Grobusch, 2013).

Evidence of the effects of socio-economic status on child mortality dates back to the twentieth century in some European countries. For instance, the decline in mortality in England and Wales during this time was attributed to rising standards of living

(Mckeown et al, 1975). Earlier, during the period of the demographic transition, rapid declines in mortality were also attributed to availability of food, improved hygiene and sanitation, which could be considered as proxy for measuring improvement in socio-economic status. A study on the pattern of mortality decline by socio-economic status by Haines (1995) also in England and Wales found that child mortality decline was more rapid in the higher socio-economic groups.

Socio-economic status and its association with child mortality in the developing world has been studied, with similar results as those observed in the developed world. For instance, Nattey et al (2013), studying the relationship between household socio-economic characteristics and under-five mortality in Tanzania showed that children in the least poor households have a 58 percent reduced risk of dying compared to children in the poorest households. After adjusting for maternal age and education, the risk marginally reduced to 52 percent in favour of the least poor households.

In a pooled cross-sectional data for analysis on risk factors for under-five mortality in Nigeria, Ezeh et al (2015) found positive relationship between household socio-economic status and child survival. The results showed that even after adjusting for possible confounders, children from poor households were about one and a half times more likely to die compared with their counterparts in rich households.

Hill et al (2000) in their examination of trends and determinants of childhood mortality in Kenya observed a negative relationship between household socio-economic status and child mortality. Both unadjusted and adjusted results showed that household wealth was strongly and monotonically associated with child mortality. Children from least poor households had about 45 percent lower mortality than children from the poorest households. Similarly, children from less poor, poor and poorer households had

about 28 and 22 percent lower mortality respectively compared with children from the poorest households.

Contrary to the child survival benefits associated with household socio-economic status, some studies have found no statistically significant difference between the two. For instance, Kanmiki et al (2014), in their study in northern Ghana found no statistically significant difference between different socio-economic groups in respect of under-five mortality. With regard to the Upper East Region of Ghana, the absence of mortality differentials by household SES could be explained by the almost uniform geographical distribution of health facilities, which includes the Community-based Health Planning and Service (CHPS) compounds. This tends to eliminate travel cost in seeking health care that has been one of the major burdens on poor households.

2.1.7. Maternal education and child survival

Of the several determinants of child mortality, maternal education has been reported in many studies to be the dominant socio-economic factor that affects infant and child mortality (Adhikari and Sawangdee, 2011; Kayode et al, 2012; Kanmiki et al, 2014) and thus has received extensive discussion in the literature. This is because education leads to many positive life-changing opportunities that impact positively on child survival through several pathways (Aslam & Kingdon, 2012; Frost et al, 2005; Buor 2003). In the first place, knowledge of all forms, and in particular for child care, is acquired through education, formal or informal. Even though empirical evidence abounds from several studies that have shown the inverse relationship between mothers' education and child mortality, there are other studies that have found a positive relationship between maternal education and child mortality, while other studies have recorded no relationship at all (Osei-Kwakye et al, 2010).

Several studies in Ghana that have examined the relationship between mothers' education and child survival found consistent decline in child mortality with increases in mothers' education (Tawiah, 1979, 1989; Osei-Kwakye et al, 2010; Kanmiki et al, 2014). The benefit of maternal education to child survival has been widely discussed (Cleland & Ginneken, 1988). Education broadens the individual's knowledge and increases the skill and ability of the woman to deal with issues pertaining to child health, leading to better child health outcomes (Caldwell, 1979; Murthi et al, 1995). Literate mothers are able to access information through various means, including both electronic and print media. They are also able to explain themselves better to health personnel for better treatment of their children when they are sick. Similarly, education also empowers the women, both economically and socially, to demand better health services for their children from medical and health personnel. Feeding habits, use of preventive care, adherence to therapy and other behaviours that enhance child survival are known to correlate with higher socio-economic status, particularly education (Adler et al, 1994; Goldman and Smith, 2002).

In their study, titled "Socio-economic and demographic determinants of under-five mortality in rural northern Ghana", Kanmiki et al (2014) found that mother's education significantly predicted child mortality. In particular, they found that children whose mothers had primary or junior high school education were 45 percent less likely to die compared to children whose mothers had no education. Comparing children whose mothers had no formal education with those whose mothers had secondary and higher levels of education, the latter were 76 percent less likely to die than the former.

In a study in Tanzania by Nattey et al (2013), their results also showed a negative relationship between maternal education and child mortality. In particular, it was found that children whose mothers had secondary school education or higher had 70 percent

reduced risk of dying compared to those whose mothers had no education. Comparing those children whose mothers had primary education with those whose mothers had no education, the former had a 34 percent reduced mortality risk.

Using data from the Nigeria Health and Demographic Survey (NDHS), maternal education was revealed to be associated with child survival (Kayode et al, 2012). At the unadjusted level, children whose mothers had primary education were 17 percent less likely to die compared to children whose mothers had no education. Children whose mothers had secondary education or higher were 42 percent less likely to die compared to children whose mothers had no formal education. However, the significant difference disappeared after controlling for available confounders such as maternal age, place of residence, SES and birth order among others. This implies that other factors are more influential than maternal education when they act together to determine child survival. For instance, there are cases where higher educated women employ the services of housemaids, who do not have experience in childcare to take care of their children. There are even instances where some these maids abuse children entrusted in their care. All these could lead to higher mortality among children whose mothers have higher education. The health and survival benefits associated with exclusive breastfeeding could be compromised when educated mothers do not adhere to this due to their busy schedules.

Using DHS data of Rwanda from 1990 to 2010 for their analysis, Musafili et al (2014) reported that higher mothers' education was associated with reduced child mortality. Specifically, children whose mothers had no education had a significantly higher child mortality compared to children whose mothers had some education. The significant difference remained even after adjusting for potential confounders.

On the contrary, some studies have found a positive relationship between maternal education and child mortality. For instance, a counter-intuitive result was recorded by Adetunji (1995) who used the 1986-1987 DHS data for the Ondo State in Nigeria. The study found that children whose mothers had secondary education had a higher mortality than children of mothers without education. However, he suggested that the reason for this could be due to shorter duration of breastfeeding associated with the more educated women. Other reason could also be that those educated mothers entrust the care of their children to housemaids who are unable to take proper care of the children, leading to high risk of illnesses and deaths.

In a similar counter-intuitive result in a study of determinants of child mortality in the Builsa District of northern Ghana, the results showed no statistically significant effect of maternal education on child mortality, for both unadjusted and adjusted models (Osei-Kwakye et al, 2010). In that study, about 70 percent of the women selected had no formal education and this could probably explain the non-significant relationship between maternal education and child mortality.

2.1.8 Maternal age at birth and under-five mortality

Maternal age has been found to significantly affect child mortality. This has been confirmed by several studies that found that mortality levels among children are significantly higher for younger and older mothers compared to women in the middle ages of childbirth. This phenomenon depicts a U-shape relationship between mothers' age at child's birth and the risk of child deaths (Doctor, 2011; Manda, 1999; Mturi and Curtis, 1995). One plausible reason accounting for the relatively higher risk of deaths among children of young or teenage mothers is the fact that these young mothers are inexperienced in handling pregnancies as well as childcare. Another reason for the high mortality among children of young mothers could be biological in view of the fact that

the reproductive systems of such mothers are not well developed (gynecological immaturity). Some teenagers could also conceal their pregnancies for some reasons and so may not have the benefit of early antenatal care or never at all. They are also more likely to be attended to by non-health professionals during delivery (Nigusie et al, 2004; Reynolds et al, 2006).

Studies have shown that teenage mothers have the propensity to give birth to pre-term babies with low weights, who also have relatively high risk of death (Ventura et al, 1994; Paneth, 1995). With regard to the higher mortality associated with children of older mothers, it is found that older women face biological risks of poor birth outcomes such as shorter pregnancy duration (Reichman & Pagnini, 1997), leading to low birth weight that has very low survival chances. Older women have also been reported to have a higher probability of having still births as well as give birth to children with congenital deformities who are less likely to survive childhood (Fretts & Usher, 1997).

In their study in Nigeria, Kayode et al (2012) established a U-shape characteristic of the relationship between maternal age at birth and child mortality. Children of younger and older mothers had a significantly higher levels of mortality than children of mothers in the middle ages of reproduction. The results specifically showed that the odds of under-five mortality among children of mothers within ages 21-25 years was reduced by 17 percent, while those age 26-30 years was reduced by 20 percent compared with children whose mothers were 20 years or less. On the other hand, children of mothers in the age group 31-35 had their odds reduced by 14 percent compared with children whose mothers were of age 20 years and below. The significant difference was present even after adjusting for possible confounders.

Using the Zimbabwe Demographic and Health Survey (DHS) data for their analysis, Kembo and Ginneken (2009) reported that the relationship between maternal age and under-five mortality was U-shaped during the 1985-1994 and 1995-1999 periods. In the 1994 survey, children born to mothers aged less than 20 years reported 43 percent higher mortality relative to children whose mothers were aged 30-39 years. Similarly, in the 1999 survey, the former experienced 21 percent higher mortality compared to the latter. Similar results were observed when comparison was made between children born to mothers aged 30-39 years and those aged 40-49 years, where the latter had 79 percent higher mortality compared to the former in the 1994 survey. The results of the 1999 survey, however, indicated that children born to mothers aged 30-39 years had 61 percent higher mortality than those children born to mothers aged 40-49 years.

The U-shape phenomenon is not only peculiar to children of developing countries, but also found in the developed world. For instance, in his study in the United States of America in 2013, Mathews et al (2015) reported that infants born to mothers under 20 years and those of age 40-54 years were more likely to die compared with children of mothers of other ages. In particular, the study showed that children born to mothers less than 20 years had mortality rate of 12 per 1,000 live births, while those born to mothers of age 30-34 years had a rate of 4.9 per 1,000 live births.

A counter-intuitive result was found in a study of determinants of under-five mortality in the Builsa District of northern Ghana, where there were no significant differences among the various age groups in respect of effect of maternal age at birth on child mortality (Osei-Kwakye et al, 2010).

Contrary to the U-shape relationship between maternal age and child mortality as discussed earlier, Sjursten (2011), using data from Angola for his thesis, rather found a hyperbolic shaped relationship. This means that children of mothers at the extreme age groups (younger and older) were associated with lower mortality compared to children of mothers in the middle age group. He argued that lower mortality for older women could be explained by their experience in childcare. He however, admitted that the lower child mortality associated with young mothers was difficult to explain since younger women have less or no experience in childcare. Similarly, Kembo and Ginneken (2009) in their study on determinants of infants and child mortality in Zimbabwe did not find the expected U-shaped relationship between maternal age and child mortality.

2.1.9 Place of residence and under-five mortality

Place of residence, be it rural or urban, has certain characteristics that are found to influence child mortality. For instance, a study by Behm & Vallin (1982) found that mortality was lower in urban areas than in rural areas. However, they explained that the higher survival probabilities in the urban areas are not a direct result of place of residence, but the influence of socio-economic factors, which include higher incomes, access to health care, proper nutrition and knowledge of good life style, among others.

In their study of risk and predictive factors for under-five mortality in Nigeria, Kayode et al, (2012) concluded that place of residence was associated with child mortality. Using health and demographic survey data, the results showed that residing in rural areas increases the odds of under-five mortality by 53 percent. After adjusting for important confounders, the same level of rural disadvantage prevailed. In a recent study in Nigeria, Ezeh et al (2015), using pooled cross-sectional data for their analysis found that children who reside in rural areas had a risk of 1.3 times more likely to die compared with children in urban areas. This is after controlling for possible confounders.

Similar results were found in a study in Cambodia with a rural disadvantage in under-five mortality (Hong and Hor, 2013). Using DHS data, the results of the study showed that children born in rural Cambodia were 2.7 times more likely to die compared with children in the urban areas. However, the significant difference disappeared in the adjusted model. This means that when other factors, such as mothers' education and age, household socio-economic status, among others come into play, the influence of place of residence in determining child mortality disappears.

While several studies have established that being born and living in rural settings is associated with comparatively higher mortality, some results have either found no significant difference, or on the contrary, have reported rural survival advantage in under-five mortality. For instance, Kanmiki et al (2014) in their study on under-five mortality in the Upper East Region of northern Ghana did not find any statistically significant difference between rural and urban areas of residence. Urban survival advantage is attributed to several factors, notable among them is the availability of health facilities, which provide both maternal and child health care. As a result, the authors of this study attributed the lack of difference in mortality between rural and urban resident children to the fact that the Upper East has a fairly well distribution of health facilities (CHPS Compounds) in most communities. This makes geographical access to health facilities for care quite easy so the rural-urban disparity in health facilities in favour of urban areas disappears, along with survival advantage for urban resident children.

Using data from the Brazilian censuses of 1970, 1980 and 1991 for the city of Sao Paulo, Sastry (2002) established a survival advantage for rural resident children compared with their urban counterparts. After adjusting for some important variables, the estimates showed that the rural under-five mortality was 83 percent of urban under-five mortality in 1970, 75 percent in 1980 and 89 percent in 1991. He explained that there

had been larger deleterious effects and smaller beneficial effects of risk factors associated with child mortality in urban areas. He explained that the urban disadvantage was as a result of rapid growth of urban population, particularly between 1970 and 1980, that contributed to poor living conditions in those areas, including Sao Paulo.

2.1.10 Marital status and child mortality

It has been established that apart from the purely bio-medical or direct factors, social factors also play an important role in the determination of child survival. One such social factor found to be associated with child survival is the marital status of the mother. This is because the presence of husband plays several roles in child survival. Unmarried mothers usually have unplanned pregnancy and so are unable to adhere to rules of ensuring that the pregnancy is well taken care of and the baby properly cared for. Such mothers are also unable to afford the financial commitments associated with pregnancy and proper child care. For instance, it has been established that unmarried pregnant women are less likely to seek antenatal services due to financial difficulties and lack of social support from spouse, parents or guardians (Chaibva, 2007).

Several studies have examined this relationship and have consistently shown that children whose mothers are currently married have a higher survival probability than those whose mothers are not in marriage (Dawson, 1991; Angel & Worobey, 1988). For instance, in their study on the determinants of under-five mortality in the Upper East Region of northern Ghana, Kanmiki et al (2014) recorded a survival advantage for children whose mothers were married. Specifically, children whose mothers were married were 27 percent less likely to die compared with those whose mothers were not in marriage. Using Ethiopia Demographic and Health Survey data, Seyoum (2012) established similar results of survival disadvantage for children of mothers who are

unmarried. They specifically found that children of unmarried mothers had 51.3 percent higher risk of dying than children of currently married women.

Using data from 11 demographic and health surveys in Africa, Clark and Hamplova (2013), reported survival advantage for children whose mothers are currently married in six of the countries. In those countries, the study specifically revealed that children whose mothers were never married were significantly more likely to die before age five compared with children whose mothers were married. According to the detailed results, the odds ratio in Nigeria was 1.36, while that in Zimbabwe was 2.61. It further indicated that in nine of the countries, children born to previously married mothers had a significantly higher risk of dying before age five compared with children whose mothers were never married, with odds ratios ranging from 1.29 in Zambia to 1.75 in Kenya. As expected, children born to unmarried mothers have a higher risk of dying compared with children of married women. The study thus recommended that policies aimed at supporting single mothers should be in place to reduce under-five mortality in Africa.

In an earlier study, Clark and Hamplova (2011) observed similar findings, where marital status was associated with child mortality. Using DHS data from five countries, they found that children whose mothers were unmarried were between 42 percent (for Kenya) and 77 percent (for Ethiopia) more likely to die before age five compared with children whose mothers were currently married. For Malawi, the results showed that children of unmarried mothers were 67 percent more likely to die before attaining age five. Similarly, in Tanzania and Zimbabwe children of unmarried mothers were respectively 49 percent and 65 percent more likely to die before age five compared with children whose mothers were married. There is clear evidence that having a single parent (mother) could have dire consequences on child survival. The study concludes that even

though results showed generally that there is beneficial effect of two parents, there are variations in the negative impact between and among countries.

In Burkina Faso, Thiombiano et al (2013) used 2006 and 2007 data from the Migration and Urbanization Integration Survey in Burkina Faso to examine the effects of parental union dissolution on child mortality. The study established an association between maternal marital status and child mortality, with some interesting findings. Specifically, the results showed that children whose mothers have divorced for less than two years were 43 percent more likely to die before age five compared with those whose mothers are currently married. Interestingly, children whose mothers have divorced for two years or more did not have any differential mortality risks compared to children whose mothers are currently married. The non-significant effect of two or more years after maternal divorce on child mortality could be explained by the gradual successful adjustment by the woman of the situation of living without a partner.

In their study in Cambodia, Hong and Hor (2013) using DHS data for 2000, 2005 and 2010, however found no statistically significant difference in mortality between children of women who were currently married and those who were not, both in the adjusted and unadjusted models. In the review so far, there seems to appear that there is little or no survival advantage for children whose mothers are unmarried. This follows the usual expectation that care received by a child from both parents from time of conception through to birth and up to age five is more beneficial compared with children with "absentee" fathers.

2.1.11 Place of delivery and child mortality

It has been shown that mortality risks are highest at the time of delivery and so requires professional care to avert any mishap. It is estimated that about 25 percent of all

neonatal deaths occur within twenty-four hours of birth and 75 percent within the first seven days of life (WHO, 2006). Delivery at a health facility thus gives the mother the opportunity to be attended to by a health professional who is in a better position to recognize and deal with any complications that may endanger the life of the baby or the mother or both (Filippi et al, 2006). Besides, the environment at the health facility is devoid of pathogens that cause infections and may affect the baby, which could eventually lead to death.

Several studies have provided evidence to the effect that babies who are born in health facilities have lower risk of dying than those born outside a health facility (Doctor, 2011; Worku, 2009). In his analysis of the Kenya 2008 DHS data, Wambugu (2012) found survival advantage for children who were born in either a private or public owned health facility. After adjusting for some important confounders, the results showed that children who were delivered in a public health facility had about 51 percent reduced risk of experiencing under-five mortality compared with children born at home. Similarly, children delivered at a private health facility had about 40 percent reduced risk of dying before age five.

In their studies in Malaysia, Panis and Lillard (1994) reported that institutional delivery was associated with enhanced child survival. Similarly, Maitra (2004) in a study in India revealed higher survival advantage for children who are born in health facilities compared with children born outside health facilities. Using the 2007 Bangladesh Demographic and Health Survey data, Pal (2015) reported statistically significant beneficial effect of hospital delivery on child mortality. Specifically, the results showed that delivering at a health facility lowers child mortality by 32.4 percent, after controlling for various confounders.

While delivery at a health facility has been shown to improve child survival, some studies found no statistically significant difference in child survival between those born in health facilities and those born outside health facilities. A case in point is a study on the effects of neighbourhood contexts on under-five mortality in Nigeria which showed no statistically significant difference in under-five mortality between those children born in health facilities and others born outside health facilities (Adedini & Odimegwu, 2014). The results were observed for both adjusted and unadjusted models in the analysis.

In their study on under-five mortality among mothers employed in agriculture in India, Singh and Tripathi (2014) used data from the National Family Household Survey-3 and established that place of delivery did not present itself as a significant determinant of under-five mortality. In an earlier study which examined maternal factors and their contribution to under-five mortality, no statistically significant effect was reported about place of delivery on under-five mortality except for birth order two (Singh and Tripathi, 2013).

2.1.12 Sex of child and child mortality

There is evidence in the biological literature that suggests that survival at infancy favours female born babies (Waldron, 1976; Da Vanzo et al, 2004). However, as they grow the biological advantage associated with this higher female survival disappears with time. Specifically, this difference prevails throughout childhood where under-five survival continues to favour female children. After the childhood period, however, the mortality difference between the male and female children stabilizes (Bhuiyat & Streatfield, 1991).

Several studies have established that female children have higher survival chances compared with male children. For instance, according to the 2010 Population and Housing Census in Ghana, under-five mortality rate for male children was higher than female children in both rural and urban areas. According to the report, child mortality for males and females in rural areas was 98 and 92 per 1,000 live births respectively, while urban areas recorded mortality rates of 82 per 1,000 live births for males and 76 per 1,000 live births for females (GSS, 2013). This means that in both rural and urban areas, mortality was relatively higher for males than females.

In a study in Nigeria, Kayode et al (2012) concluded that male children had a higher survival probability than female children. Specifically, being born a female reduced the odds of under-five mortality by 13 percent compared to being born a male. However, after adjusting for possible confounders, the female survival advantage disappeared.

In their analysis of the Kenya Demographic and Health Survey (KDHS) data, Mustafa and Odimegwu (2008) reported that female children had a higher survival advantage than male children in both rural and urban areas. In the unadjusted model, the risk of mortality for female children in the rural setting declined by 37 percent. With regard to the urban area, the risk of mortality for female children declined by 25 percent. However, in the adjusted model, the female advantage in the rural setting disappeared, while in the urban area the female advantage still persisted with significance.

Whilst mortality generally favours female children than their male counterparts, there are studies that did not find any significant differences between males and females. For instance, Becher et al (2004) in their study using DSS data in Burkina Faso did not find any significant difference in mortality between male and female children, both at

infant and childhood levels. Similarly, in their study in Cambodia, Hong and Hor (2013), recorded no significant difference in mortality between male and female children, both in the adjusted and unadjusted models.

In some other studies the opposite has been observed where mortality is lower for male children. It has been noted that China and India are the only countries where male infant mortality rates are lower than those of the female (United Nations, 2011). This has been attributed to gender discrimination against female children (son preference). In their study to explain sex differentials in India between 1992 and 1996, Kuntla et al (2014) observed that female child mortality continues to be higher than that of males in the majority of the states. The only states that had reversal of the female survival disadvantage were Kerala and Tamil Nadu. The pattern reflected in the 2011 census of India.

Son preference has been attributed to several factors. The main reason is that, unlike daughters, sons provide assistance on farms and businesses (Bardhan, 1988). They also provide care to parents at old age, whereas females are married away from their parents. Another factor is the fact that male children provide continuation for the family. Male children are also involved in the funerals of their parents. Inheritance of family property can only fall in the hands of male children, particularly in northern India where patriarchal system dominates. It is even believed that a family without a male child will adopt one from their male kin's family instead of allowing a daughter inheriting their wealth (Das Gupta et al, 2003). These situations have created the adverse survival conditions for females, including female infanticide (Hull, 1990).

2.1.13 Multiple births and under-five mortality

The number of babies born from one pregnancy has an effect on the survival of each child. It has been established that single births are associated with lower risk of childhood mortality as compared to multiple births (Health Canada, 2004). This is so because two or more babies have to compete for space and nutrients in the womb and when these are inadequate, chances are that they will be born either preterm or underweight or both (Health Canada, 2004), conditions which are associated with high risk of death. For instance, studies have shown that multiple births account for one in five preterm and one in four low birth weights and are also at a higher risk of long term disability as well as dying at infancy (Dube et al, 2013).

Kembo and van Ginneken (2009) in their study in Zimbabwe on determinants of infant and child mortality reported that mortality risk among multiple births was about 2.1 times greater than single births in the unadjusted model. The adjusted model produced similar results in favour of singleton children. A similar study in Bangladesh showed that multiple births were 6.5 times as likely to die compared with those born singleton. After controlling for possible confounders, the associated risk reduced to 6 times (Hong, 2006). These results have so far shown that the number of children born out of a single pregnancy is a major determinant of infant mortality.

In their study on the effects of multiple births on infant mortality in Nigeria, Uthman et al (2008) found that children born multiple have a lower survival probability compared with those born singleton. They reported in the unadjusted model that multiple births were about twice more likely to die compared with those born singleton. After adjusting for child, maternal and household characteristics, the survival advantage for singleton children remained the same with a statistically significant difference.

Using Demographic Surveillance System (DSS) data in Burkina Faso to examine risk factors associated with infant and child mortality in Burkina Faso, Becher et al (2004) also established that twin born children were about four times more likely to die within six months of life than those born singleton. The study revealed that children born single continue to have survival advantage beyond six months up to 59 months (<5 years).

Using DHS data from Cambodia to examine factors associated with the decline of under-five mortality in that country, Hong and Hor (2013) found that the number of children born out of a single pregnancy was an important determinant. In the unadjusted model, the results specifically showed that children born as twins were about 3.3 times more likely to die before reaching their fifth birthday compared to those born singleton. In the adjusted model, the survival difference reduced, where twin children were about twice more likely to die before age 5 years compared to those born single.

Contrary to the above findings, which tend to be the norm, Ogada (2014) analyzing Demographic and Health Survey (DHS) data of Kenya, Tanzania and Rwanda for his Masters thesis, established that children born singleton have lower survival chances than multiple born children. Specifically, the results at the bivariate level revealed that multiple births had 0.22 odds of reduced mortality compared with those children born singleton. The survival advantage of multiple births was still predicted even at the multivariate level, when adjustment was made for maternal and household confounders.

2.1.14 Birth order and child mortality

The placement, ordinal position or the chronological order of the child in relation to one or more siblings is referred to as the birth order. This position or order plays an

important role in the survival probability of the child, even though the direction is a priori ambiguous (Kaldewei, 2010). However, there have been several studies that have examined this relationship and have pointed to a U-shape effect of birth order and the survival probability of infants and children (Titaley et al, 2008; Uddin and Hossain, 2008).

According to the U-shape hypothesis, the probability of dying decreases after the first child, reaches a minimum at a certain birth order and rises thereafter. This phenomenon is explained by the fact that first order children are mostly born to young mothers who lack the needed experience in infant and child care. It is also the case that the biological systems of these young mothers are not well developed and this affects them during pregnancy and delivery and subsequently impacts negatively on the survival of the child. First born children also lack care and protection from older siblings and are, therefore, prone to several domestic risks and so have a higher risk of injuries, disabilities and death.

As more children are born, the risk of death decreases as children will have older siblings who may assist parents in childcare. Specifically, middle order children have the advantage of being taken care of not only by their parents but also by older siblings, thus protecting them against domestic dangers such as tampering with electrical gadgets, putting unhygienic objects in their mouths, touching hot objects, among others. The other advantage is that the mother would have had some experience from the first order/earlier births that impact positively on the second and/or subsequent births, thereby enhancing their (2-4 birth order children) survival chances. However, as more and more children are born, resources for the house get diluted as resource per person in the household is reducing. This leads to nutritional shortages for higher order siblings, resulting in higher probability of dying.

Contrary to the above assertion, the intra-household resource competition hypothesis (mainly referred to as resource dilution hypothesis) rather posits that first born (early order) children have a relatively higher survival chance compared to higher order siblings as the former have the opportunity to capture important resources such as food, health care, among others (Blake, 1981; Vos et al, 2004). With smaller household sizes, unit share of the household resources is higher. However, as subsequent and more children are born, resources are shared among more members and this dilutes the amount of care for members, including higher order children (Blake, 1981). According to Hertwig et al (2002), these resources include materials, cognitive, and interpersonal resources. As a first child, parents, extended family members and the community are happy and willing to contribute for the upkeep of the child compared to subsequent children that are born.

The hygiene hypothesis is also used to explain the relationship between birth order and child survival. It posits that at higher number of siblings, and with contaminated environment, diseases transmission is higher (from one child to the other). Under such conditions, any communicable diseases that are introduced into the household affects the younger ones since they are more susceptible to disease infections (Strachan, 1989; Holman et al., 2003). Very young children, when not watched have the tendency of putting objects in their mouths, which could have contaminants (poisonous) and thus may cause illnesses and death. This, coupled with the resource dilution hypothesis, will subject the younger child to higher probability of dying compared to the older ones.

Antai (2011), in a study in Nigeria using 2003 DHS data, showed the usual U-shaped relationship between birth order and under-five mortality. It was revealed in that study that children of first birth order had 27 percent increased risk of dying before age

five compared with children of birth order 2-4. Children of birth order five and higher had 58 percent increased risk of dying before age five compared to children of birth order 2-4. After controlling for socio-demographic confounders in their model, similar results were obtained as before.

In a recent study in Nigeria on ethnic differentials in under-five mortality, Adedini et al (2015) reported that children of birth order five and higher have almost twice the risk of dying before attaining their fifth birthday compared with first order children. However, there was no statistically significant difference in mortality risk between children of first order and 2-4 order births. The review of the literature on the relationship between birth order and under-five mortality has documented mixed findings. However, it is realized that the U-shape hypothesis seems to dominate in most of the studies.

2.1.15 Presence of grandmother and under-five mortality

Family support to mothers is an important factor that facilitates improvement in childcare, leading to proper growth and survival. The importance of this kinship support emanates from the extended period of childhood dependency as well as the short inter-birth interval for which mothers have to care for several children simultaneously (Sear and Mace, 2008). Specific support to mothers includes direct childcare, household chores, emotional support, informational support and financial support, among others (Sharma and Kanani, 2006). In most African societies and elsewhere, older women (grandmothers) have experience in childcare and hence have substantial say on decisions regarding childcare at the household level (Aubel et al, 2001; Gupta et al, 2015).

The influence of grandmothers on child development has been studied and found to be beneficial in terms of improved child health and survival. This comes from the grandmother hypothesis which states that the long post-reproductive life span for females

evolves as a resource in support of their children for the care of their grandchildren (Lahdenpera et al, 2004; Sear and Mace, 2008). This, it is believed has a beneficial impact on the child. On the contrary, the presence of grandmother could affect child health and survival negatively as her presence could be a drain on household resources that could otherwise be used for child care. This comes about if the grandmother is unemployed, failing in health, very old or weak and frail. Some grandmothers are also reported to have conservative ideas regarding childcare that could be detrimental to child health and survival and so their influence could lead to the child's ill-health and deaths.

Despite these important revelations, few studies have examined the impact of the presence and influence of the grandmother on child survival, probably due to lack of the appropriate data. The two groups of grandmothers, maternal and paternal grandmothers, have been found to contribute differently in the care, wellbeing and survival of their grandchildren (Sear and Mace, 2008). In most rural settings in Africa, the grandmother who assists in childcare is mostly paternal, since most if not all marriages take place in the man's house where the mother of the husband (paternal grandmother) also resides, with the mother of the married woman residing elsewhere. It is only under certain circumstances that the husband's mother-in-law is found staying with the couple. Given the perceived benefits of the presence of the grandmother in the household, results from several studies on the effect of the grandmother on child survival have been mixed.

In a review of 17 articles on the impact of paternal grandmothers' support on child survival, Sear and Mace (2008) found that paternal grandmothers improve child survival in 53 percent of the studies. The detrimental effect of paternal grandmother on child survival was revealed in 12 percent of the cases, while 35 percent showed no effect. In these reviews, maternal grandmothers appeared to contribute better to child survival than paternal grandmothers.

In an earlier study on the effects of kinship on child mortality in rural Gambia, Sear et al (2002) concluded that the presence of the maternal grandmother had a positive effect on the survival probability of children. Another factor that contributed to significantly higher child survival was the presence of senior sister. It was revealed in the study that paternal grandmother had no significant effect on child survival. In a similar study in Malawi, Sear (2008) reported a detrimental effect of maternal grandmother to child survival. However, contrary to the results in the Gambian study, there was some evidence (though weak) that the paternal grandmother rather had some positive or beneficial effect on child survival.

In their study on a review and a preliminary test of the grandmother hypothesis in historical China, Jamison et al (2002) found that the presence of the mother-in-law was associated with higher child mortality. Similar results were recorded in a study by Voland and Beise (2005) in Germany, where paternal grandmothers were referred to as "the devil in the house". From these findings, it is believed that the impact of the presence of the grandmother on child survival varies from place to place and thus may be dependent on other factors.

From the literature review, it has emerged that some gaps exist in the literature in the examination of the effect of maternal migration and under-five mortality at place of origin. In the first place, most of the studies have examined this relationship at the place of destination and have mostly found poor child health outcomes for migrants. This current study seeks to rather examine this relationship at the place of origin, which is an important contribution in filling the knowledge gap in this relationship. Secondly, many of the studies on the impact of migration on household income and wellbeing fail to highlight the independent contribution of females in this endeavour. Thirdly, majority of studies have relied on cross-sectional data to examine the impact of maternal migration

on child survival. The use of longitudinal data for about 15 years has rarely been used to study this relationship. This will allow for the examination of trends in the contribution of maternal migration on household incomes and child mortality over time. Availability of many important variables makes this study unique as the findings will broaden our understanding of the key factors that contribute to under-five mortality in a rural setting like the Kassena-Nankana East and West districts of northern Ghana.

2.2 Theoretical Framework

The main theoretical model for the analysis is the Grossman's Health Production Function (Grossman, 1972). According to the model, the health status of a child (H_i) at any point in time is given as:

$H_i = h(M_i, T_i, K_i, B_i, \lambda_i)$, where

H_i = Health status of child i

M_i = Medical and nutritional input into child's health

T_i = Time spent on child care by parents

K_i = Parental health knowledge

B_i = Biological endowment of child

λ_i = Random health shocks such as disease outbreaks, strikes, etc.

According to the model, parents invest in their children for future benefits. An important component of investment in children is their health. This makes child health both an investment and consumption good. However, resources are required to meet the investment (M , T and B in the model) required to achieve the needed health. One means by which households acquire resources, thereby increasing households' income, is migration (Collinson et al, 2009). This is even more critical in poor rural settings where

economic opportunities are limited. Several studies have found a positive relationship between household income and health at both macro (Pritchett and Summers, 1996) and micro levels (Strauss and Thomas, 1998). Households with higher incomes are able to feed well as well as have better health, all of which impact positively on child survival.

Apart from the monetary channel through which migration can impact on child health, there is also the health benefit of migration through non-monetary channels. This comes about through health knowledge acquired through migration. It has been established that mother's health knowledge rather than their level of education has been a crucial factor in child health and survival (Glewwe, 1999). Migrants acquire knowledge through several channels. As migrants move to places of better opportunities (mostly urban areas), they learn about basic hygiene, better lifestyle behaviour, contraceptive use, sanitation and proper diet. For instance, a study by Menjivar (2002) revealed that Guatemala immigrants in the USA share information on health issues among themselves through networks. Hildebrandt and McKenzie (2005) also reported that being in a migrant's household increases health knowledge by 0.65 standard deviations.

In this study, the model is modified by introducing more variables that affect under-five mortality in addition to maternal migration. In its modified form, the model is given as: $S_i = f(M_m, M_e, M_a, B_o, P_d, M_b, H_e, G_p)$, where

S_i = Survival status of child i

M_m = Mother's migration status

M_e = Educational status of mother

M_a = Mother's age at birth of child

B_o = Birth order

P_d = Place of delivery

M_b = Multiple births

H_e = Household SES

G_p = Grandmother present

2.3 Conceptual Framework

The survival or otherwise of a child depends on several factors which act exclusively or in combination. These factors, which can be grouped into demographic, social, economic, environmental, biological and chance factors, affect child survival through several channels. While some of these factors affect child survival directly, others are indirect. Models have been designed to explain the link between child mortality and the factors enumerated above. For instance, frameworks by Mosley and Chen (1984) as well as by Venkatacharya and Tesfay (1986) have provided useful insights into these relationships.

Figure 2.1 shows the analytical framework for this study. It is a construct showing the relationship between child mortality and factors that affect it, both directly and indirectly. For this study, available variables that directly affect child mortality (proximate determinants) include birth order, place of delivery of child, and number of children born per pregnancy. The proximate determinants (variables) are in turn affected by distal determinants to affect child mortality. These include migration status of mother, which is categorised into non-migrants and return migrants. The return migrants are further categorised into duration of absence before returning. Other proximate determinants are household socio-economic status, mother's age and education level of mother. Another variable of interest is the presence or absence of the grandmother in the household.

From the diagram, the main independent variable is the migration status, which influences household SES as well as determines acquisition of knowledge of various forms. All these also influence certain decisions that can impact on child health outcomes. For instance, as shown in the diagram, socio-economic status as well as knowledge in childcare could be a determining factor in respect of where a child should

be born. As was discussed in the literature review and shown in diagram, the place of delivery impacts on child survival. Other factors that have the tendency to influence the place of delivery of a child include maternal age and education and place of residence, among others.

The decision to migrate and actually migrating is affected by several factors and so is characterized by some degree of selectivity (Harris and Todaro, 1970). As shown in Figure 2.1, these include maternal age and education, household SES and the presence or absence of grandmother. For instance, young adults (ages 15-34 years) are more likely to migrate compared to individuals in the other age groups. Similarly, people can also move out to attend school and/or return after school. Conversely, uneducated people are more sedentary and thus are less likely to migrate. As Lee (1966) points out, there exist some intervening obstacles to migration and one of such is cost of movement. This means that poverty or lack of resources may restrict an individual from migrating because of lack of money for transportation.

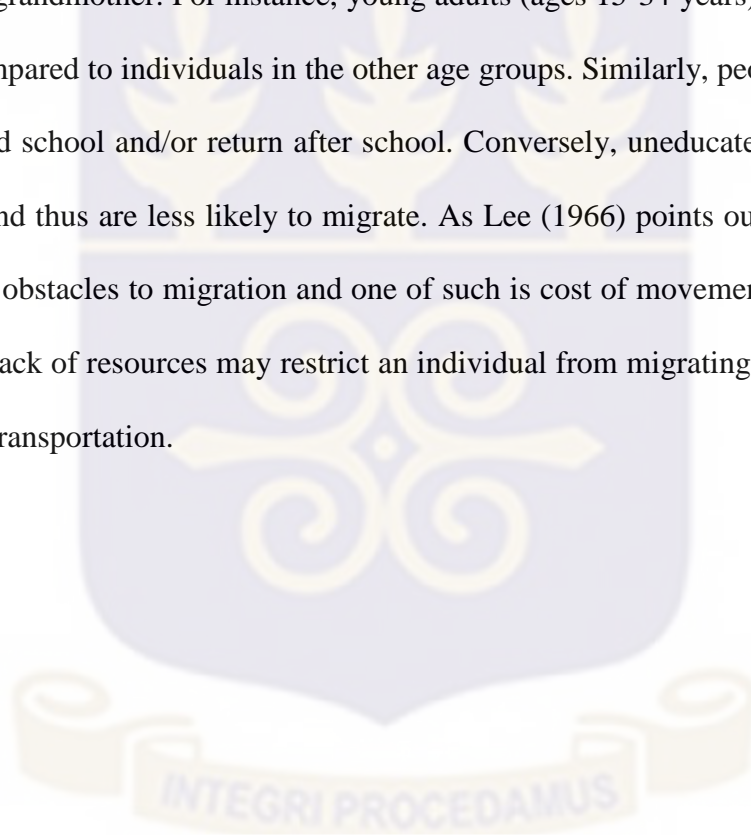
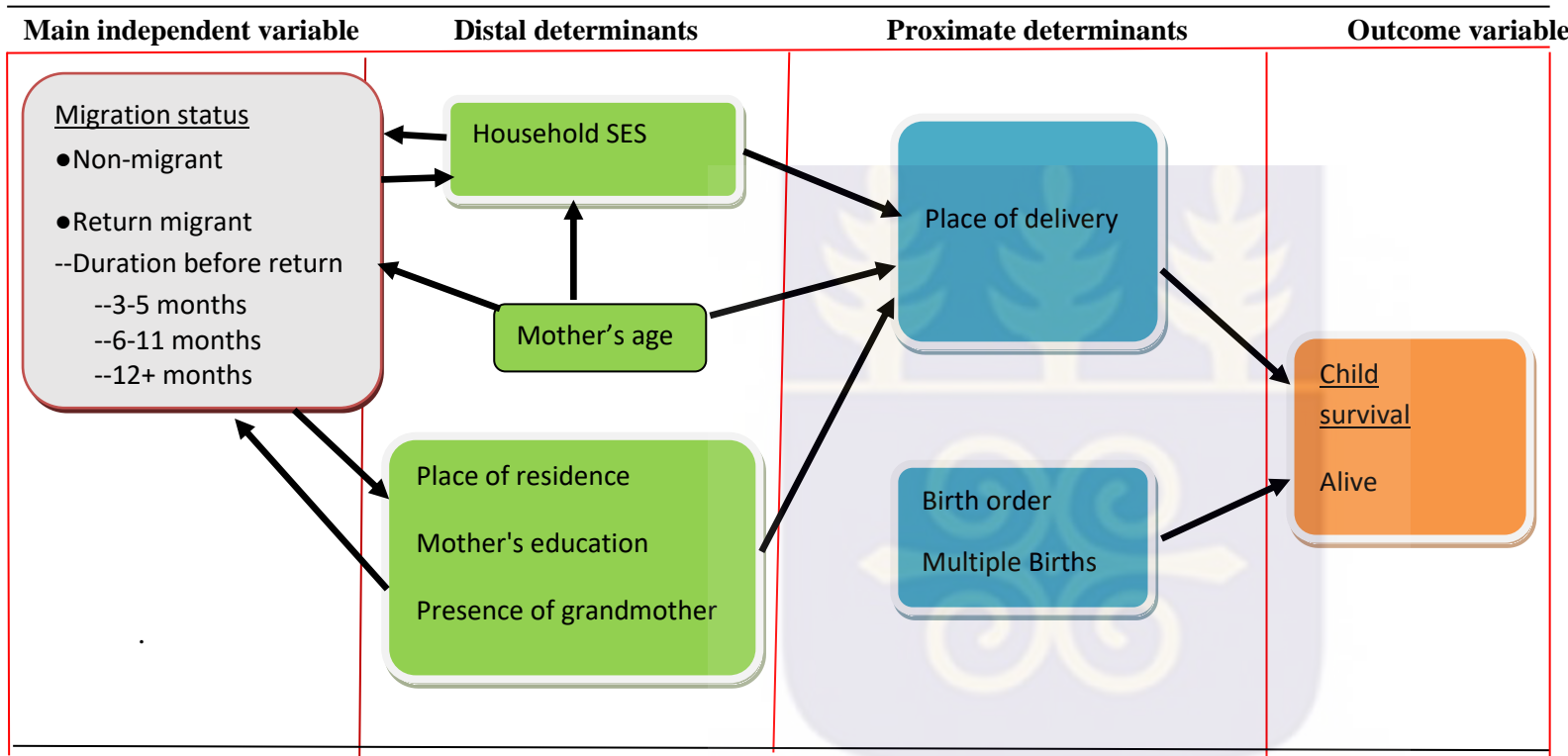


Figure 2.1: Conceptual framework showing the relationship between maternal migration and child survival.



Source: Author's construct, 2016

2.4. Hypotheses

- I. Households with at least a female return migrant have a relatively higher socio-economic status than households without a female return migrant.
- II. Children of migrant mothers have a higher survival chance than children of non-migrant mothers.
- III. Children than children from households with lower SES.



CHAPTER THREE

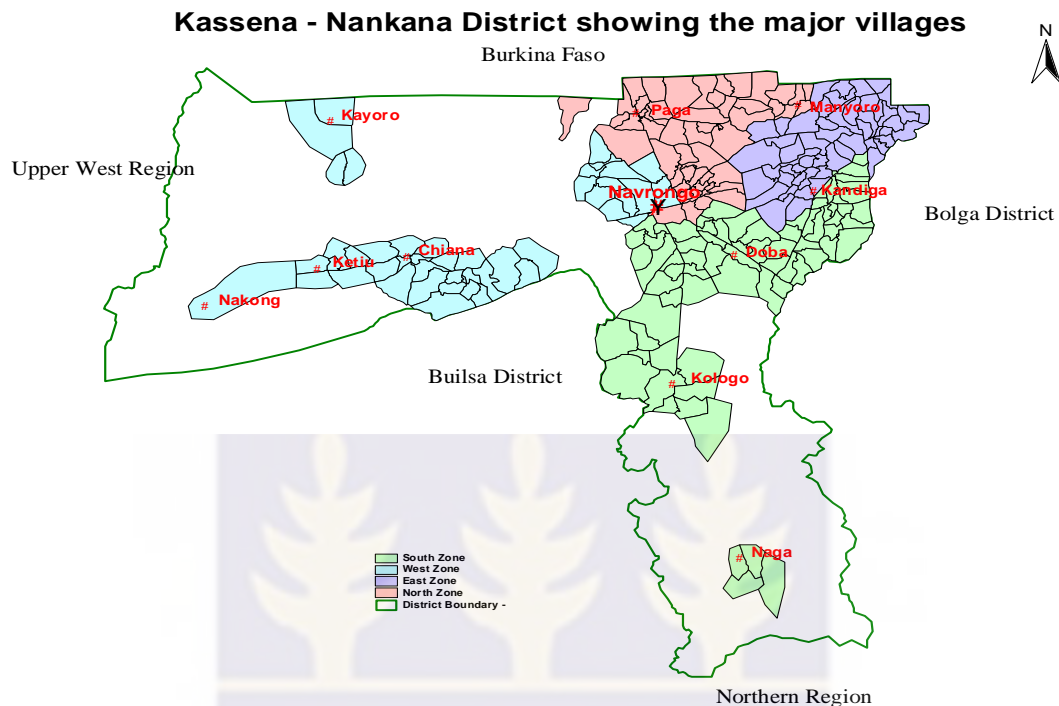
SOURCE OF DATA AND METHODOLOGY

3.1 Data Source

This study uses data from the Navrongo Health and Demographic Surveillance System (HDSS) of the Navrongo Health Research Centre (NHRC). The HDSS was set up in 1992 with the main objective of monitoring the demographic dynamics of the study area to provide the platform to facilitate research activities of the NHRC. Specifically, the HDSS was set up to provide sampling frame for the conduct of various clinical, biological, demographic and social science research in the study area. Another objective of the system was to provide the means for the evaluation of the outcome of all research activities that take place in the HDSS site. In addition, the HDSS was mandated to periodically examine the demographic characteristics of the population of the study area (Oduro et al, 2012).

The operations of the HDSS involve assigning a number of clusters (as shown in Figure 3.1) to fieldworkers who make periodic visits to houses and households to collect and update information on their demographic and socio-economic characteristics. Household head or any qualified adult member of the household provides information during these visits. Where the latter is absent or unable to provide particular information, a revisit is made to meet the household head for that information. It is usually not out of place for more than one individual in the household to provide the necessary information. However, whenever some sensitive information about an individual is required, some confidentially is provided by interviewing that individual exclusively and in private.

Figure 3.1: Map of the study area showing fieldworker areas (clusters) and major villages



For the NHDSS, data that are collected routinely include pregnancies and their outcomes (live births, still births, miscarriages and abortions), deaths, in- and out-migrations, childhood vaccination and verbal autopsies (VA) on all deaths. Annually, information is collected on educational status, marriages, religion and national health insurance. Household socio-economic information is updated every other year, where information including type of dwelling facility, household assets, among others is collected. It has to be noted that, initial data collection was done at the compound level, where most of these compounds contained several households and sometimes made up of different families, particularly in the urban areas. However, in 2004 the system was reconfigured and data collection had since been done at the household level. This was done by reassigning all individuals in a compound to their respective households. In addition, information on household characteristics was also collected and has since been updated periodically.

During the routine visits, respondents provide information on the presence or absence of a household member. In cases where an individual is reported to have died, an indication of death is made against that individual's name in the register and a death form is filled, providing detailed information such as date and place of death, among others. On the other hand, if the individual is reported to have migrated and has been away for at least 90 days, an indication of migration is made in the register against the individual's name, and an out-migration form is filled, providing detailed information about the migration such as date of migration, place of destination and reason for migration. An individual who is reported to have been away for less than 90 days at the time of a visit is considered a temporary migrant.

In most developing countries, data on mortality in general and infant and child mortality in particular are obtained from retrospective cross-sectional surveys. These are beset with recall problems due to the long period between event occurrence and registration, thus leading to age heaping (Klerman, 1993) and under reporting. As a result, some of the events, particularly neonatal deaths are missed. These problems are considerably reduced in the HDSS due to the regular visits to households. It has to be mentioned that another important system that has facilitated the timely recording and registration of early deaths in the Navrongo HDSS is the registration and monitoring of pregnancies until they terminate. Hitherto, quite a number of neonatal deaths and their related births were missed because those events were not reported because the people did not think that it was worth reporting those events when those children had died and were not present.

Besides registration and monitoring of pregnancies to improve on timely and better coverage of births and early deaths, another important aspect of the HDSS is the Community Key Informants (CKI) system. Under this system, selected individuals in the

various communities are given some rudimentary training to enable them record some vital events that occur in their respective areas. They are tasked to record any pregnancy, birth or child (under-five) death that occur in their respective communities and make such events available to supervisors who visit them every two weeks. These events are chosen because of the fact that some respondents do not report them during the fieldworkers' visits, particularly when there is pregnancy loss through miscarriage or abortion, as well as early child deaths (neonatal deaths). However, the presence of the CKIs in the communities ensures that the loss of such events are minimised. This also ensures that events are timely captured, so that rates generated from these data can be as accurate and reliable as possible.

To make sure that data are of high quality, certain checks are put in place to achieve this objective. The major method in achieving this is strict supervision, which includes unannounced visits to fieldworkers to check on their work as well as the conduct of interviews in compounds and households where fieldworkers have already visited for verification. Another important quality control check is done by selecting five percent of the households for a quality control supervisor to independently conduct the interviews in some of those households fieldworkers have visited. The work by the supervisors is then compared with that of the fieldworkers to see if there are any discrepancies between the two. Where there are discrepancies, they are either resolved in the office, if possible or sent back to the field by a third party for resolution.

In terms of in-migration, which is the main event for this analysis, this comes about when an individual moves into a location in the DSA and stays for at least 90 days. An in-migrant is identified during a fieldworker's routine visit to a household when it is reported that a previously non-resident person has moved into the household and has stayed for 90 days or more. The name and some bio-information of the individual are

written in the register, and an in-migration form is filled. In addition, an in-migration form is filled, providing detailed information such as date of migration, reason for migration and place of origin. There are also return migrants who were previously in the study area and had been registered into the HDSS, but moved out of the study area for a period before returning. Mothers who fall into this group of migrants are the main subjects of this analysis. Return migrant women will be compared with their non-migrant counterparts in terms of under-five mortality in the study area.

3.2 Data management

The HDSS uses the Household Registration System (HRS2), which is structured, designed and programmed through the relational database package, which uses Visual Foxpro. The HRS is designed to function as a template for the generation of computer programs that facilitate the collection, management and analysis of demographic surveillance data (Oduro et al, 2012). Apart from its core functions, another important aspect of the HRS2 framework is that it allows for the construction of additional modules for project-specific data. The system also has the flexibility of tracking new types of information, multiple relationships and a concept of social groups, which has multiple families in one location. Another important flexibility is that data can be transferred to any other computer programme for analysis. However, for this study, STATA is used for the analysis.

During data entry, information on each of the registered events (births, migrations, deaths and so on) is entered on separate tables in the database. During analysis, these different tables are linked to each other by the unique identification numbers (IDs) of each individual, which are assigned to them during registration at baseline, at birth or in-migration.

3.3 Description of variables

For this analysis, the outcome variable (dependent variable) is under-five mortality and this information is obtained during the routine visits by the fieldworkers to the households. A death is recorded only when the individual is a registered member of the HDSS. The age at death information is obtained by the difference between the deceased date of birth and date of death. For this study, all children who were born in the study area between 1st January 2000 and 31st December 2014 were included. All children who were born outside the DSA and brought in (in-migrant children) were excluded from the analysis.

The primary explanatory variable for this analysis is migration status of the mother, and this is generated from the residency database (table) where individuals' migration and residency histories are captured. An example (sample) of the structure of the residency table where individual migration and residency status is generated is shown in Table 3.1. From the table, the first individual with ID CAL005004 is a migrant as she was enumerated (ENU) in 1995, migrated out (EXT) in April 1999 and came back (ENT) in September 1999 and has since not gone anywhere. Similarly, the second individual with ID NGH021033 is also a migrant who was born (BIR) in the DSA in 1984, migrated out twice and finally came back in December 2015 and has since been in the DSA. For the migrants, their duration away from home before returning is calculated by subtracting the date of outmigration from date of return.

Table 3.1: Structure of residency table for the generation of individual migration status

Individual ID	Birth date	Sex	Start event	Event Date	End event	Event Date	
			RETURN MIGRANTS				
CAL005004	15Jun67	M	ENU	27-Nov-95	EXT	12-Apr-99	
CAL005004	15Jun67	M	ENT	15-Sep-99	.	.	
NGH021033	15-Jul-84	F	BIR	15-Jul-84	EXT	15-Sep-08	
NGH021033	15-Jul-84	F	ENT	15-May-11	EXT	15-Jun-15	
NGH021033	15-Jul-84	F	ENT	15-Dec-15	.	.	
			NON-MIGRANTS				
CAL024015	21-Nov-94	F	BIR	21-Nov-94	.	.	
NGB112005	15-Dec-95	F	BIR	15-Dec-95	.	.	
CAL004006	15Jun-50	F	ENU	27-Nov-95	.	.	
SGR054004	15Jun-28	F	ENU	1-Jan-89	.	.	
WGD063001	15Jun-54	M	ENU	1-Jan-89	.	.	
			DEATHS				
EDE043301	02 Dec-89	M	BIR	02 Dec-89	EXT	10Mar-93	
EDE043301	02 Dec-89	M	ENT	15Dec-04	DTH	01Nov-13	
EDE049005	15Jun-79	M	ENU	01 Jan 89	EXT	15 Jun 94	
EDE049005	15Jun-79	M	ENT	15 Sep 02	EXT	07 Mar 03	
EDE049005	15Jun-79	M	ENT	07 Dec 03	DTH	15 Oct 04	
EDD056601	27Aug -90	M	BIR	27Aug-90	DTH	15 Sep 95	
EDD057003	15Jun-19	F	ENU	01Jan-89	DTH	15Apr 99	
EDE003017	15Jun-48	M	ENT	15May-03	DTH	15Nov-11	
			CENSORED				
NCB029021	21 Jan-93	M	BIR	21Jan-93	EXT	15May-95	
NCB029021	21 Jan-93	M	ENT	15May-99	EXT	10Apr-11	
EFG032011	15 Jun 82	F	ENU	01Jan-89	EXT	15Apr-95	
EFG032011	15 Jun 82	F	ENT	15Apr-08	EXT	15Jul-08	
CAA068027	15Jun-72	M	ENT	15May-05	EXT	13Dec-07	
CAA068027	15Jun-72	M	ENT	15Dec-08	EXT	15Jun-09	

Source: Generated from the HDSS database

Sample of individuals who are considered non-migrants are also shown in the table. They are those who have never moved out of the DSA since they became members of the HDSS by birth or by enumeration, as shown in the table. For instance, individuals with IDs CAL024015 and NGB112005 were born in the DSA and have never moved out before. On the other hand, individuals with IDs CAL004006, SGR054004 and WGD063001 became members of the HDSS by enumeration and have since not moved out of the DSA

Apart from the migration information that is found in the residency table, there are other events of interest that are also generated from the residency table. These include individuals who die or are censored. As shown in Table 3, it is noticed that individual with ID EDE043301 was born on 2nd December 1989, moved out in March 1993, came back in December 2004 and did not move until he died in November 2013. On the other hand, individual with ID EDE049005 was enumerated in January 1989. He moved out on two occasions, came back in December 2003 and died in October 2004. Individuals with IDs EDD056601, EDD057003 and EDE003017 became members of the HDSS at different times through birth (BIR), enumeration (ENU) and in-migration (ENT) respectively. They never moved anywhere until they died at different times as shown in the table. With regard to censoring, individuals with IDs NCB029021, EFG032011 and CAA068027 became members of the HDSS at different times through birth, enumeration and in-migration. Each of them moved out, came back and moved out again and never returned since they last migrated out in April 2011, July 2008 and June 2009 respectively.

The migration status variable is categorised into two main groups of return migrants and non-migrants. A migrant is someone who was registered into the HDSS, migrated out for a period and came back. Specific to this analysis, mothers of all children born in the DSA between 1st January 2000 and 31st December 2014 were categorised into return migrants (simply referred to as migrants) and non-migrants. The migrants are further categorised into different groups of migration duration. These are those who have

been away for 3-5 months, 6-11 months and 12 months or more before returning. Migration duration is the main independent variable of this study, while child survival effect of migration duration is the main objective of this study.

Other independent variables are household socio-economic status, mothers' education, mothers' age at birth of child, birth order, place of birth, multiple births and presence of grandmother. For the socio-economic status, the Principal Component Analysis (PCA) method was used to categorise individual households into five groups of very poor to the least poor (Dunteman, 1989; Filmer and Pritchett, 1998, 1999). Household living assets such as television, wireless set, refrigerator, telephone, source of fuel wood, lighting type, type of roofing material, type of floor material, toilet facility type, source of drinking water, land ownership, vehicles, motorbikes and livestock were included in the PCA. However, for the determination of the association between maternal migration and household SES, two categories of household socio-economic status were generated. The two categories were “poor” and “rich” households.

Mother's education as generated from the education database has four categories, which include women who have never been to school, those who attained up to primary school, those who got up to middle or junior high school, and those who got to senior secondary school and beyond. Mother's age at time of birth of child was generated by finding the difference between the date of birth of the child and that of the mother. These were then categorised into the usual seven age groups.

Birth order is determined by the order in which the children of a particular woman are born in terms of their ages. For each woman in the sample, the children were ordered by their date of birth, with oldest child coming first, followed by the second and so on. For this analysis, there were three categories in this variable and these were first order births, second to fourth order births as another category and then five and higher order births as the third category. Place of birth information is obtained during the registration of the child at birth and the variable was categorised into three main groups. Those

children who were born in health facilities (hospitals, clinics, health centres and CHPS compounds) and those who were born at their own homes formed another category. A third category were those born in places other than their own home and outside health facilities. Multiple births were categorised into two groups and comprised those children who were born singleton and those who were born two or more from a single pregnancy.

In the HDSS, every individual is linked to his or her mother, provided the mother is a registered member of the HDSS. As a result, every man whose mother is also registered in the same household can be identified with the mother. In view of this, it was possible to determine the presence or otherwise of a paternal grandmother in the household. Table 3.2 shows a summary description of the variables used in this analysis.

Table 3.2: Study variables and their definitions

No.	Variable	Categories and definitions
Child related characteristics		
1	<i>Child survival status</i>	Whether child was alive or died before age 5 years 0=Alive; 1= Dead
Birth-related characteristics		
2	<i>Place of birth</i>	Where the child was born: 1=Health facility; 2=Own home 3=Other
3	<i>Multiple births</i>	Number of live children from one pregnancy: 1=Singleton; 2= two or more
4	<i>Birth order</i>	Birth order of child in relation to other siblings 1st order; 2nd-4th order; 5+ order
Maternal Characteristics		
5	<i>Mother's migration duration</i>	How long the mother stayed out of the DSA before coming back: Three categories are generated: 3-5 months; 6-11 months; 12+ months.
6	<i>Mother's age at child's birth (years)</i>	Age of mother (in years) at time of birth of child 1=<20; 2=20-24; 3=25-29; 4=30-34; 5=35-39; 6=40-44; 7=45+
7	<i>Maternal education</i>	Highest education attained by mother at time of birth of child: 1=No education; 2=Primary; 3=JHS/Middle; 4=SHS+
Household characteristics		
8	<i>Household wealth index (quintiles)</i>	Composite index of household assets: 1=Poorest; 2=Poorer; 3=Poor; 4=Less poor; 5=Least poor
9	<i>Presence of grandmother in household</i>	Whether there was paternal grandmother in household; 1=Yes; 2=No

Source: Generated from HDSS database

3.4 Analytical techniques

Two regression analyses were done to address objectives three and four of this study. The first regression technique was used to address objective three, which was intended to examine the relationship between maternal migration and household SES. As mentioned earlier, another variable was generated from the household wealth index (SES), which had two main categories (instead of five) of “rich” and “poor” households. This new variable that measures the poverty level is the outcome variable, while maternal migration status is the main independent variable. Because the outcome variable is dichotomous (“rich” or “poor” household), simple logistic regression method was used to examine the relationship between maternal migration and household SES level. Other important variables such as maternal education, maternal age and place of residence were used as control (confounding) variables to assess the net effect of maternal migration on household SES level.

The second part of the analysis used the proportional hazard (survival analysis) technique to address objective four of this study. Survival and hazard functions are the major concepts in event history or survival analysis. Survival function describes the probability of survival up to a certain time and is denoted as $S(t) = \Pr(T > t)$, where $S(t)$ is survival up to time t , \Pr is the probability and T is time of death.

This function describes the case of a death occurring, per unit time (T), given that the individual has survived up to a specified time (t).

Several techniques or models abound for the analysis of the relationship of a set of predictors and survival time. These techniques are broadly categorised as parametric, semi-parametric and non-parametric models. However, the commonly used models for survival analysis are the parametric and semi-parametric models. For this study, a preliminary non-parametric Cox proportional hazard model (Cox, 1972) was initially

used to assess the relationship between under-five mortality and each of the covariates. The initial attempt to use the Cox model was due to its flexibility based on the fact that the baseline hazard function in this model is usually unspecified. However, upon testing for the proportional hazard assumption that underlies the use of this method, the condition was violated. Table 3.3 shows the output of the test for the proportional hazard condition. The result of the test shows a chi-square value of 0.000, which means that we rejected the null hypothesis that the hazards are proportional for this model, hence, it was inappropriate to use this model for this analysis.

Table 3.3: Test of proportional hazard condition

	chi2	df	Prob>chi2
global test	101.56	26	0.0000

Source: Generated from the proportional hazard test

Due to the failure of the Cox proportional hazard model to meet the necessary condition for this analysis, alternative survival analysis models were considered. Other hazard models that were considered for this analysis were the Exponential, Gompertz and Weibull, which are all fully parametric hazard functions. To choose the one that best fit this data, the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) tests were done. From the results of the test, the Weibull distribution (Weibull, 1951) was found to have the best fit, since both the AIC and BIC values for Weibull were the least compared with the other two. This is shown in Table 3.4 where the Weibull had an AIC value of 44,681.68 as against values of 45,407.77 and 53,518.04 for the Gompertz and Exponential respectively. Similarly, the Weibull had the smallest BIC value of 44,931.94 as against values of 45,658.03 for the Gompertz and 53,759.37 for the Exponential.

Table 3.4: Table of AIC and BIC values for model selection

Model	Obs	11 (null)	11 (model)	Df	AIC	BIC
Gompertz	56,267	-23,957.09	-22,675.89	28	45,407.77	45,658.03
Exponential	56,267	-27,686.25	-26,732.02	28	53,518.04	53,759.37
Weibull	56,267	-23,466.04	-233312.84	28	44,681.68	44,931.94

Source: Generated from the AIC and BIC tests

For the Weibull distribution, the hazard function at time t is given as

$$h(t|X_j) = h_0(t)\exp(X_j\beta_x),$$

where $h_0(t)$ denotes the baseline hazard function, X_j is a vector of covariates and β_x is a vector of regression coefficients which are estimated from the data.

Equivalently, the baseline hazard function can be represented as

$$h_0(t) = pt^{p-1},$$

where p is some ancillary shape parameter that is estimated from the data (Cleves et al, 2004).

The Weibull shape parameter (p) has values less than one, equal to one and greater than one. When p is less than one, it means hazard is decreasing with time, denoting infant or under-five mortality. When p is equal to 1, hazard is constant and the model takes the form of the Exponential distribution. The value of $p > 1$ indicates an increasing hazard with time, denoting adult mortality, where the rates of death (hazard) increases with time. The output from Weibull distribution shows hazard ratios (exponentiated coefficients) and standard errors. It also shows other parameters such as the z-scores significant levels ($P < |z|$) and the confidence intervals (CI). In addition, values of p , $\ln(p)$ and $1/p$ are also

displayed in the output. The value of p determines whether the accelerated failure time (AFT) hazard for the data is increasing, constant or decreasing (Weibull, 1951).

3.5 Analytical approach

Several types of analyses were done which include the description of the level and trends of under-five mortality as well as examination of various aspects of the relationship between under-five mortality and each of the covariates separately and in combinations. The analyses started with the description of levels and trends of under-five mortality over the period of the analysis. Also, levels and trends of migration in general and female migration in particular were described. In-migration, out-migration and net migration rates by age and sex over the period were also presented.

The second part of the analysis involved the generation of frequencies by way of univariate descriptive statistics to describe the number and distribution of the study population according to the various socio-demographic characteristics. The third presentation of the data was done using the Chi-Square statistical test to ascertain the association between the dependent variable and each of the independent variables.

At the final stage of the analysis, two multivariate regression analyses were done. The first was a regression analysis of the association between household SES and the independent variable (maternal migration). Both unadjusted and adjusted models were run to see the gross and net effects of maternal migration on household SES respectively. The second multivariate regression analysis was done to examine the effect of maternal migration on under-five mortality, first without controlling for confounding effects of other variables. A second model was run that included other variables as confounders to see the net effect of the main independent variable on under-five mortality. For both

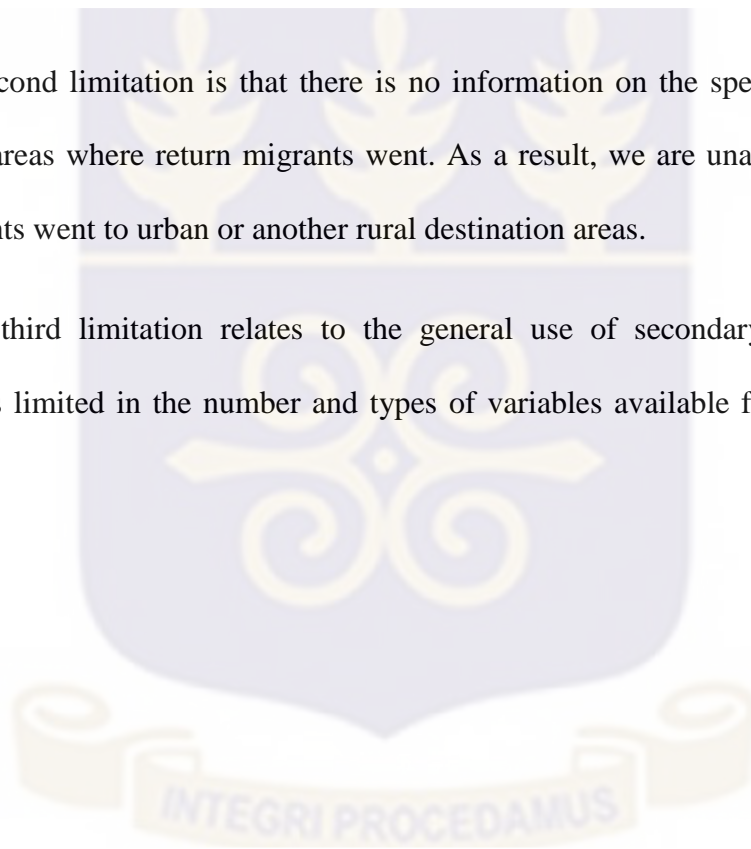
bivariate and multivariate regressions, a p-value of at most 5 percent (≤ 0.05) was used to indicate statistical significance.

3.6 Limitations of the study

The study has some limitations that are worth enumerating. First, classifying women who were enumerated in 1989 and have since not moved out of the study area as non-migrants could be misleading. This is because there is no information on their previous migration status before enumeration.

A second limitation is that there is no information on the specific location(s) at destination areas where return migrants went. As a result, we are unable to tell whether those migrants went to urban or another rural destination areas.

The third limitation relates to the general use of secondary data, where the researcher is limited in the number and types of variables available for analysis (Israel, 1993).



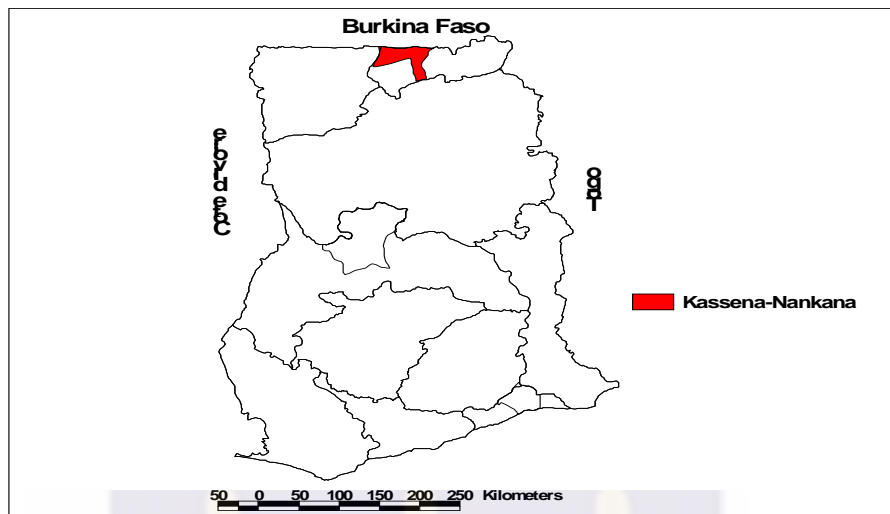
CHAPTER FOUR

PROFILE OF STUDY AREA AND CHARACTERISTICS OF STUDY

POPULATION

4.1 Profile of study area

The study area is the Kassena-Nankana Municipality (KNM) and Kassena-Nankana West District (KNW), which are two of the 13 municipalities and districts located in the Upper East Region of northern Ghana. The two used to be one until it was divided into two by Legislative Instrument (LI) 1895 in 2008 (Ghana Statistical Service, 2014). While the Kasena-Nankana District was upgraded by LI 2106 into a municipality, the KNW was established as a district on its own. The major towns in the study area are Navrongo and Paga, the former being the capital of KNM and the latter the capital of KNW District. Navrongo, which is the largest town in the study area is about 30 kilometres from the regional capital, Bolgatanga and about 850 kilometres north of the national capital (Accra). The entire study area covers 1,675 square kilometres and shares boundaries with Bongo District and Bolgatanga Municipality to the east, Builsa District to the west, West Mamprusi to the south and Burkina Faso to the north. The area lies approximately between latitudes $10^{\circ} 30'$ and $11^{\circ} 00'$ north of the Equator and longitudes $1^{\circ} 00'$ and $1^{\circ} 30'$ west of the Greenwich Meridian. The land is relatively flat at an altitude of between 200 and 400 metres above sea level. Figure 4.1 shows the location of the study area in Ghana.

Figure 4.1: Map showing location of the study area

Located in the Guinea Savannah belt, the ecology of the study area is typically Sahelian (hot and dry). There are two main seasons in the area, the wet and dry seasons, the wet starting from April to October and the dry from November to March. Total annual rainfall is estimated at about 940mm, the highest occurring in August (approximately 260mm). Excessive rains during the peak season sometimes cause flooding leading to crop losses and loss of human lives. The area also experiences high temperatures, with mean monthly temperature ranging from 22.8⁰C to 34.4⁰C. The highest temperature usually occurs in the months of March and April, with excessive heat and dryness during this time precipitating the outbreak of cerebro spinal meningitis (CSM), sometimes with fatal consequences. On the positive side, the high temperatures experienced in the area have made it possible for the generation of electricity through the installation of solar plant in the study area, one of its kind in the country.

The area is largely rural, with just about 18 percent of the people living in urban areas (Navrongo and Paga). The population consists of two main ethnic groups from which the area derives its name: the Kassena and the Nankana groups, which form about 49 percent and 46 percent of the population respectively. The main minority ethnic group

is the Builsa, who form about three percent of the population. The rest of the population is made up of other ethnic groups from other parts of the country and neighbouring Burkina Faso. Due to the presence of the Tono Irrigation Project, a faculty of the University for Development Studies (UDS) and other institutions, the study area tends to attract many more people of other ethnic groups (temporary migrants) from other parts of the country. Despite the linguistic distinction, the population is homogenous in many respects, with a common culture. The main religion in the district is traditional, with Christianity gradually becoming more prominent. Being largely rural and a traditional society, social behaviour is guided by strong traditional beliefs and as a result male dominance is strong, constraining the autonomy of women (Adongo et al, 1997). This has persisted up till the present time, with some modification over the past few years due largely to education (particularly of women), modernity and technology.

The population of the district as at June 2014 was 161,429, with females constituting about 52.3 percent of the population. About 12 percent of the population is less than 5 years, while those aged 60+ years constitute about 10 percent. The area is considered one of the deprived areas in Ghana, even though there have been improvements in some socio-demographic indicators over the past two decades (Oduro et al, 2012), courtesy data from the Navrongo Health and Demographic Surveillance System. For instance in 1995, infant and under-five mortality rates were 129 and 147 per 1000 live births respectively. Since then the rates have been declining consistently and as at June 2014 the infant and under-five mortality rates stood at about 21.1 and 40.6 per 1000 live births, a reduction of about 84 and 72 percent respectively. Fertility rates have also been declining as well. For instance, total fertility rate (TFR) has declined from about 5.0 in 1995 to about 3.7 in mid-2014, a reduction of more than one child per woman within the period.

In terms of the economy, subsistence agriculture is the mainstay of the people, which is complemented by some retail trading. About 90 percent of households are engaged in subsistence agriculture, which depends largely on rainfall, and thus limits food cultivation to a single growing season. Major crops grown during the rainy season include millet, guinea-corn, maize, rice, beans, potatoes, sorghum and groundnuts. However, there is an irrigation dam and a few dugout wells that supply water for dry season farming, with the major crop grown during the dry season being tomatoes, pepper, onions, okro and melons. Most of the people also undertake animal rearing, which include fowls, sheep, goats and cattle. These animals are mostly sold to meet other household needs such as paying for healthcare, school fees and purchasing of cloths. The animals are also used for cultural purposes, including rituals and for paying bride prices. The districts occasionally experience severe drought and flooding resulting in poor harvest and food shortages. This situation usually culminates in seasonal out-migration of the people, particularly young men and women from the area to other parts of the country as well as neighboring Burkina Faso in search of jobs during the off-farm season. The Tono Dam provides major opportunity for fish farming and the major fish types caught include tilapia and mudfish (GSS, 2013).

Tourism is another activity that tends to boost the economy of the study area and has also made the place popular as it boasts of some of Ghana's most renowned tourist attractions. Notable among these attractions are the Paga crocodile ponds and the Pikworo Slave Camps. Others include the unique Catholic Cathedral edifices built in the 1920s and the Pottery Project and the village architecture. Sharing border with Burkina Faso also attracts tourists to the border town of Paga. Another tourist attraction is the Tono Irrigation Dam that provides water for all-year farming in the area. These tourist attractions contribute to the economic development of the area as people are employed to

work in these places. Trading is also boosted, particularly in local crafts and other goods, as some visitors purchase these items when they visit.

Access to education in the study area is still hampered by limited educational infrastructure, even though there have been marked improvements in the provision and expansion of educational facilities in the area. Currently, there are about 121 primary schools (77 in 2006), 88 junior high secondary (35 in 2006) and 10 senior high secondary schools (six in 2006) in the study area (KNM Education Directorate Report, 2016; KNW Education Directorate Report, 2015/2016). In addition, there is one training college, three vocational institutions, a community nursing training school and a faculty of a university (University for Development Studies). Despite improvement in the provision and availability of educational infrastructure in the area, educational attainment is still low even though there has been a substantial increase in enrollment over the past few years. For instance, in the year 2000 the proportion of the population six years and above, who had ever attended school was just 48 percent, with 55 percent and 41 percent of them being males and females respectively. The situation has improved over the years. As at 2014, the proportion of individuals who are six years and above who have ever attended school was 69 percent for males and 54 percent for females (61 percent overall).

In terms of access to healthcare delivery, the study area has two hospitals, with one located in each of the two district capitals. There are also 14 health centres located in some selected communities. There is also a health centre that is managed by the Catholic mission, which has an orphanage that takes care of children who have lost a parent or two. The mission also rescues children who are alleged to be spirits and are sometimes killed (Denham et al, 2010). There are some other clinics that are owned by private individuals. The area also has 49 functioning Community Health Planning and Service (CHPS) compounds across the entire area. These static health facilities are complemented

by community-based health officers (CHOs) who do periodic visits to houses to deliver door-to-door services in most parts of the study area. In terms of illnesses, the main cause of morbidity and mortality that has persisted over some years include malaria, gastroenteritis (diarrhea) and acute respiratory infections (Debpuur et al, 2011).

Located in the meningitis belt, there are also periodic outbreaks of cerebro-spinal meningitis (CSM) that cause widespread morbidities and deaths (Dukić et al., 2012; Molesworth et al., 2002). As a result, there are annual and periodic vaccinations of the people against the disease (Hodgson et al., 2001; Woods et al., 2000). The Navrongo Health Research Centre has contributed immensely to the health needs of the population through its research activities that have informed national health policies for which the residents of the area have been key beneficiaries.

4.2 Characteristics of study population

This section examines the characteristics of the study population. In all, a total of 20,990 women are part of the analysis. Their socio-demographic characteristics are shown in Table 4.1. Variables under consideration for this analysis are survival status of children before age five years (alive or dead), migration status and duration of migration of mothers (main independent variable), maternal age at birth of child, educational status of mothers, household socio-economic status, place of birth of child, birth order of child, multiple births and presence of grandmother in the household.

Table 4.1. Background characteristics of study population

Variable	Number	Percent	Variable	Number	Percent
Mothers migration duration			Maternal Education		
Non-migrants	2,108	10.0	No education	11,975	57.1
Less than 6 months	3,973	18.9	Primary	5,342	25.5
Between 6-11 months	2,937	14.1	JHS/Middle	2,487	11.8
At least 12 months	11,972	57.0	SHS+	1,186	5.6
Child Survival			Multiple births		
Alive	19,136	91.2	No	20,528	97.8
Dead	1,854	8.8	Yes	462	2.2
Household SES			Mothers Age at birth		
Poorest	4,665	22.2	15-19	2,247	10.7
Very poor	3,993	19.0	20-24	4,730	22.5
Poor	6,415	30.6	25-29	4,995	23.8
Less poor	2,354	11.2	30-34	4,021	19.2
Least poor	3,563	17.0	35-39	2,802	13.4
			40-44	1,562	7.4
			45+	633	3.0
Place of birth			Birth order		
Health facility	9,575	45.6	1	4,902	23.4
Own Home	5,850	27.9	2-4	7,936	37.8
Other	5,565	26.5	5+	8,152	38.8
Grandmother presence					
No	11,725	55.9			
Yes	9,265	44.1			

Source: Generated from the HDSS database

4.2.1 Distribution of women by migration status

Migration, for whatever reason(s) is a complex phenomenon. The complexity includes the decision to migrate, who migrates, where and when to migrate and when to return to place of origin. Factors that determine the above include age, education, marital status, sex, conditions at place of destination (accommodation, prospect of getting a job and relatively higher wages), distance to destination, and cost of transport. Similarly, migrants' duration of stay at place of destination depends on several factors including those enumerated above (Constant and Massey, 2003; Massey and Akresh, 2006; Waldorf, 1995).

In this study, mothers' migration status and duration of stay at place of destination before returning to place of origin is the main independent variable. About 90 percent of the mothers have ever migrated out of the DSA for at least three months but have returned

and are currently residing in the DSA. In terms of migration duration, about 19 percent of the women have experienced migration for a duration of between three and less than six months before returning. Those who moved out for six months but less than one year constitute 14 percent, while those who returned after being away for at least one year form about 57 percent of the women included in this analysis. Mortality in general and under-five mortality in particular is affected by many factors exclusively or in combination, and so apart from migration duration, other demographic, social and economic factors (variables) were included in the analysis as confounders. This will allow us to examine how these variables on their own and in combination with other variables affect under-five mortality in the study area.

4.2.2 Distribution of women by survival status of children

The outcome of interest (dependent variable) for this study is the survival status of the children (dead or alive before age five years). Out of the total number of women, 1,854 (8.8%) of the women had their children die before celebrating their fifth birthday.

4.2.3 Distribution of women by age at time of birth of child

As discussed in previous chapters, the age at which a mother delivers a child has important implication for the child's health and survival. The distribution of the study population (women) by age at the time of birth of child is shown in Table 4.1. The highest proportion of 23.8 percent of the women gave birth to their children while aged between 25-29 years. The smallest group are those in the age group 45 years and over, who constitute only 3 percent. About 11 percent of the births occurred among women within the age group 15-19 years.

4.2.4 Distribution of women by educational status

Educational status of the mother is one important factor that has been shown to impact on child health and survival. Higher educational status of the mother is shown to be associated with lower mortality of the child. It is observed that more than half (57.1 percent) of the women in this analysis have never attended school. About 25.5 percent of the women have education up to primary school, while 11.8 percent have junior or middle school education. For secondary school and beyond, only 5.6 percent of the women have attained this level. In terms of benefits associated with maternal education, this distribution will suggest that majority of the children will be disadvantaged given that majority of their mothers are uneducated.

4.2.5 Distribution of women by household socio-economic status

An important determinant of health and wellbeing is the socio-economic status of the individual in particular and the household in general. Human survival is positively linked to the ability to afford basic necessities of life including better nutrition, healthcare, appropriate lifestyle, clean water and environment, among others. In this analysis, the households are categorised into five groups from the poorest through to the least poor (richest). From the table, 4,665 of the women (22.2 percent) are found in the poorest households. Women from the poorer households make up 19.0 percent of the total study population, while 30.6 percent of them lived in the poor households. About 2,354 (11.2 percent) of the women are in the less poor households. The least poor households contained 3,563 (17 percent) of the study population.

4.2.6 Distribution of women by place of delivery of children

Even though several advantages are associated with delivery at a health facility, a number of childbirth occur outside health facilities. This is pervasive in rural settings where several factors, including access, ignorance, cultural beliefs and practices, among others play a major role in determining where a child is born. The distribution of women by place of birth shows that 45.6 percent of the women delivered their children in a health facility, with almost 28 percent delivering at their respective homes. About 26.5 percent of the women delivered their children at places other than a health facility or their own homes. These other places of delivery include traditional healers' homes, TBA homes, market places and on way to certain destinations.

4.2.7 Distribution of women by birth order of children

As noted elsewhere, the placement of a child in the sibling arrangement (birth order) has been found to impact on the child's overall development and survival. For this analysis, 23.4 percent of the children of the women are first order births, while those who are between second and fourth order births constitute 37.8 percent. Those in the birth order of five and more form 38.8 percent. This provides us the opportunity to examine the relationship between birth order and under-five mortality so as to be able to understand the differences in mortality between and among these groups.

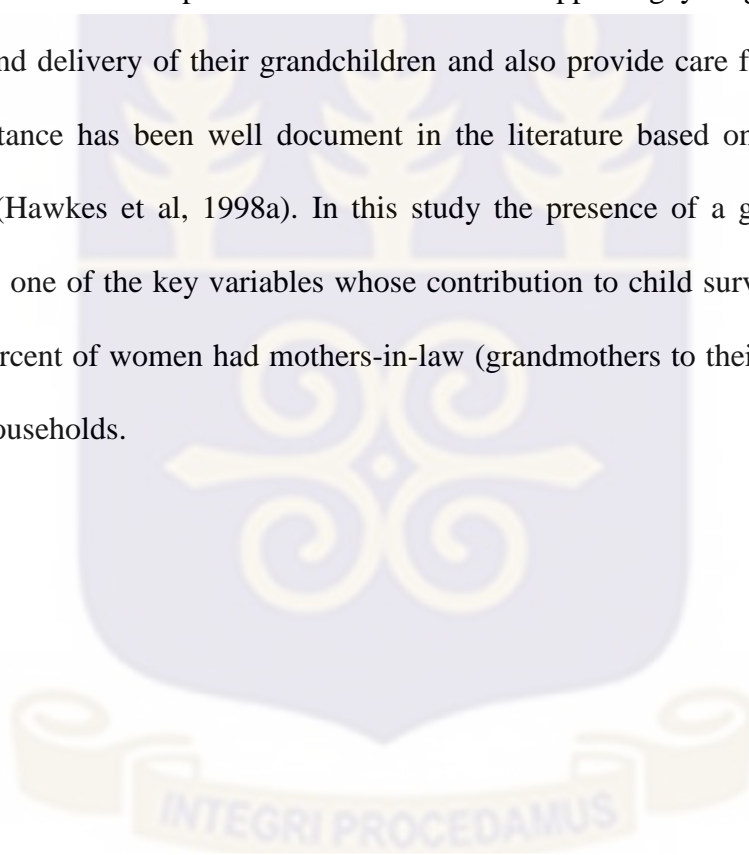
4.2.8 Distribution of women by number of children from single pregnancy

Babies are a special gift and bring joy to families. However, with multiple births the joy associated with newborn babies is sometimes reduced or even cut short, due to the various risks the babies and their mother face (Blickstein, 2002) as well as challenges mothers and family members face in caring for such children. Among the study

population, about 2.2 percent of them had their children born as multiple births (2 or more babies from a single pregnancy). The global average multiple birth rate is about 3 percent and so the rate from the KNDs is not very different from the global rates of multiple births.

4.2.9 Distribution of women by presence of grandmother in household

In traditional societies, grandmothers play several and important roles in the family and household in particular. These include supporting younger women during pregnancy and delivery of their grandchildren and also provide care for them thereafter. Their importance has been well document in the literature based on the Grandmother Hypothesis (Hawkes et al, 1998a). In this study the presence of a grandmother in the household is one of the key variables whose contribution to child survival was assessed. About 60 percent of women had mothers-in-law (grandmothers to their children) in their respective households.



CHAPTER FIVE

MIGRATION DYNAMICS IN THE KASSENA-NANKANA DISTRICTS

5.1 Introduction.

Literature on the migration dynamics specific to the Kassena-Nankana districts is rather scanty or unavailable. However, as noted earlier, migration in the country and the northern part of Ghana, including the Kassena-Nankana districts, dates back to pre-colonial era and is triggered by several factors (Anarfi and Kwankye, 2005; Awumbila and Ardayfio-Schandorf, 2008). Apart from tribal movements that culminated into today's tribal diversity in the Upper East Region, traders brought their goods for sale and in turn purchased local products. As a result, local community members sometimes moved to take advantage of the trading activities that took place at some locations (Adaawen, 2015). Slave trade and pre-colonial wars in the 19th Century also saw a lot of forced migrations in the northern part of Ghana (Schraven, 2010).

Migration dynamics in northern Ghana took a dramatic turn during the time of colonial rule in about 1902 when the then Northern Territories were annexed by the British to prevent the French and Germans from expanding their activities into the region (Schraven, 2010). This time saw the people of northern Ghana moving down south to work in the mines and cocoa farms. These movements were a deliberate policy of the colonial government to get more labour to work in the gold mines located in southern Ghana. The search for labour in the Northern Territories became necessary as the local mine workers at the time refused to work in the underground mines, due to the hazardous nature of underground mining. In addition, since these local people could earn some livelihood from the cultivation of basic food crops, there was no need to work in these mines (Anarfi et al, 2003:10).

In view of the difficulty in getting labour for the mines, managers of the gold mines started the process of recruiting labour from the Northern Territories and, therefore, reached an agreement with the local chiefs in these territories for that purpose. Following this agreement, by the end of 1906, about 30 men from Navrongo and Wa (north-east and west of Ghana respectively) were recruited by the colonial officials in collaboration with their local chiefs to undertake an exploratory trip in the mining areas (Schraven, 2010). They returned and reported about the working and living conditions of the area and this opened the way for more of their people to migrate to the mining areas of the south. While this initial visit and feedback resulted in the increased migration of people from the north generally, it was realized that those from the north-east "deserted" the mining areas even before they arrived (Lentz 2006:140-141). Many of the labourers had also abandoned the mine work, but did not return home as the agreement for their recruitment stipulated. The main reason for abandoning the mines was the risky nature of the mine work, and the refusal to go back home was due to the better living conditions in the south (Lentz, 2006:140-141). Following this, the colonial officials absolved themselves from labour recruitment from the north to work in the mines. However, mine managers were allowed to do their own recruitment of labourers from the Northern Territories.

Following the curtailment of forced labour recruitment was the beginning of the First World War that set the tone for another recruitment drive of able-bodied men for the British Frontier Force. It is estimated that for the 5,600 soldiers that were recruited from Ghana and British Togo, about 3,900 (70%) were from the Northern Territories (Kasanga & Avis 1988:66). According to Thomas (1975), of the 21 ethnic areas where the conscription was done in the Northern Territories, the Grunshie ethnic group (from Navrongo) contributed 16 percent of the total number of soldiers. Kumedzro (1970) also found that the low population growth in the area, compared to the other districts in the

region between 1948 and 1960 was due to the out-migration of about 26,000 people from the area. This number constituted about 20% of all the people born in the area.

From the narration so far, migration, whether forced or voluntary, had been dominated by males. This was probably due to the types of work available in the destination areas at the time, which were physically demanding and so were more suitable for men. As a result, most of the earlier studies on migration had been limited to males. Sex differences in migration studies have been a recent development, probably over the past two decades, and only a few of these studies have examined these differentials within national boundaries (Reed et al, 2010). In studies where women are mentioned, they are perceived as accompanying their husbands (Nabila, 1974; Brukum, 1976).

However, in recent times, more women have been part of the migration process (Adepoju, 2004). This has been so due to changes in gender roles in most societies. In most developing countries women tend to carry a lot of responsibilities in the family, particularly childcare. Also, in the midst of perennial food shortages, these women have a major role in providing for their family upkeep (UNFPA, 2006). The needs of women have also changed lately, as they have in recent times acquired the taste for certain goods and services. Another factor that has precipitated female migration is the availability of jobs that are suitable for women in destination areas, which were non-existent in the past. These include domestic works, trading, carrying of goods, as well as some white-collar jobs for those who are educated.

With the establishment of networks in destination areas following initial migrations, coupled with improvement in transportation and communication, many more people are expected to participate in the migration process. However, certain factors (push and pull) inform the migration of people. The Kassena-Nankana area is endowed

with both human and natural resources that can be tapped to the benefit of the people. The area abounds in land for agricultural activities, which include cattle rearing. However, most of the agricultural activities depend on rainfall, which lasts for only five or six months between May and October, with an average annual rainfall of 950mm (Ghana Statistical Service, 2014). This limits farming activities to only the farming season. As a result, some of the residents are motivated to migrate to other places outside the districts during the dry season in search of jobs to earn some income to supplement the earning from their farming activities.

Another important resource in the study area is the Tono Irrigation Dam that provides water for all year crop and fish farming. There are also dugouts and ponds located in some parts of the districts that provide water for dry season farming. The Tono Dam and the dugouts allow for the cultivation of tomatoes during the dry season that provides jobs and income to the people and, therefore, serves as a disincentive for them to migrate to other places for jobs. Charcoal production, through the burning of forest wood also provides some livelihood for some of the people, particularly those living at the fringes of the forest reserves. Sharing border with Burkina Faso to the north, the people also engage in some cross-border activities such as trading in animals, cereals, petroleum products, alcohol, among others.

With the existence of these opportunities, it is expected that out-migration in the area will be minimal, since people will have some economic engagement in the area all year round. However, this has not been the case as most of the opportunities enumerated above have dwindled. For instance, following several years of intensive rain-fed farming against the backdrop of increases in population, the fertility of the land has reduced, resulting in low agricultural yields. Inadequate and erratic rainfall, floods and occasional

drought (due to climate change) have also had a toll on agricultural outputs. This has also resulted in dwindling grazing land for the animals. Water for animals has also become scarce. As a result, animal rearing has been affected negatively. Consequently, perennial food shortages have become pervasive and migration has become a major and an important alternative source of livelihood for many inhabitants of the districts.

While the Tono Irrigation Project has been viable over a number of years, this viability has diminished in recent times. One major limitation is inadequate market for tomatoes produced in the area and several factors have accounted for this. In the past few years, market women from Accra who have been the main buyers of tomatoes in the area now travel to Burkina Faso to buy tomatoes there, claiming that tomatoes produced in the Navrongo area are of lower quality and are also easily perishable. As a result, tomatoes produced from the Tono area (and other areas outside the Tono Irrigation Site) easily get rotten due to lack of market. Other problems of the Tono Project include high cost of hiring farm machinery, lack of credit facilities, inadequate water supply, ineffective technical support and lack of entrepreneurial skills (Dinye & Ayitio, 2013). These problems have made tomato farming unattractive leading to its abandonment. These factors, coupled with other push and pull factors, have given impetus for people to migrate outside the area in search of alternative sources of livelihood.

5.2 Levels and trends of migration in the Kasena-Nankana Districts

Migration out and into the study area has been a key feature that has shaped the population structure of the area. The phenomenon has also been a part of the diversification strategy that is aimed at improving the socio-economic status of the people. This section presents the number of people who migrated in and out of the study area within the period under study (2000-2014). The crude rate of in- and out-migration is also presented. The section also presents the age-sex specific migration rates for selected years within the period.

The number of people who migrated in and out of the study area does not follow any regular pattern over the period. However, it is evident that out-migrants have consistently been more than in-migrants except in 2009, 2010 and 2012, where in 2009 more males migrated in than they migrated out. On the other hand, more males and females migrated in than they migrated out in 2010. Similar to 2009, more males migrated in than they migrated out in 2012 (Table 5.1). Throughout the period, more females have migrated than males, for both in- and out-migrations. This shows the dominance of females in the migration process in the study area. For instance, apart from 2003 and 2005, out-migration rates for females were higher than those of males. With regard to in-migration, the rates were higher for men than women between 2001 and 2007. For the rest of the years, female migration rates were higher than those of males. This is consistent with the general notion that migration has become more feminized in recent times, as has been reported by several authors and acknowledged in this paper (Adepoju, 2004).

Table 5.1: Levels and trends in migration in and out of the study area (2000-2014)

Year	Out migration					In-migration				
	Number		Rate/1,000		Diff.	Number		Rate/1,000		Diff.
	Female	Male	Female	Male Rate		Female	Male	Female	Male Rate	
2000	6,386	5,361	87.1	80.3	6.8	5,499	4,996	75.0	74.9	0.1
2001	6,729	6,123	91.7	91.6	0.1	5,678	5,213	77.3	78.0	-0.7
2002	6,477	5,812	87.7	86.5	1.2	5,459	5,159	73.9	76.8	-2.8
2003	6,739	6,237	90.4	92.1	-1.7	5,600	5,269	75.1	77.8	-2.7
2004	7,309	6,282	97.5	92.0	5.5	5,615	5,392	74.9	79.0	-4.1
2005	7,440	6,836	99.4	100.5	-1.1	5,687	5,371	76.0	79.0	-3.0
2006	5,873	4,954	77.0	71.4	5.6	5,460	4,899	71.6	70.6	-1.0
2007	6,656	5,322	86.2	75.4	10.7	5,582	5,109	72.3	72.4	-0.1
2008	6,790	5,708	87.2	80.2	7.0	5,852	5,179	75.2	72.8	2.4
2009	5,686	4,446	71.8	61.2	10.6	5,355	4,618	67.6	63.6	4.0
2010	5,621	4,483	69.7	60.5	9.2	5,887	4,955	73.0	66.9	6.1
2011	6,042	5,026	73.9	67.3	6.6	5,502	4,641	67.3	62.1	5.2
2012	5,519	4,516	66.4	59.4	7.0	5,403	4,712	65.0	62.0	3.0
2013	5,846	4,912	69.5	64.0	5.5	5,312	4,581	63.2	59.7	3.5
2014	6,069	5,236	71.6	67.9	3.7	3,878	3,193	45.8	41.4	4.4
Total	95,182	81,254				81,769	73,287			

Source: Generated from HDSS database

5.3 Age-Sex Profile of Migration

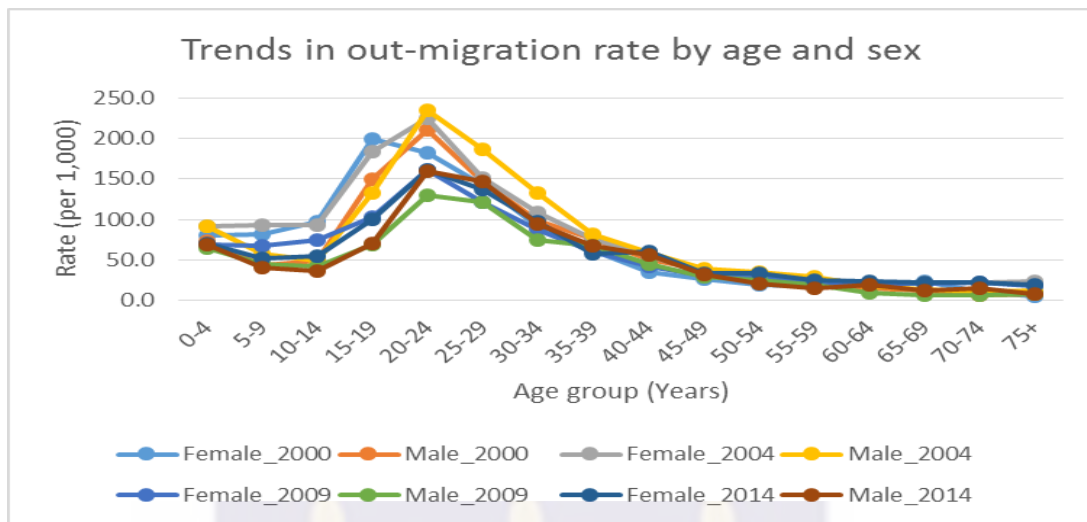
Selectivity, in terms of age, sex and other socio-economic variables has been a common feature in migration analysis. As a result, some regular patterns are found to emerge in migration analyses in respect of these variables, particularly age. For instance, Rogers and Castro (1981) undertook a landmark study in Australia where they examined 500 age profiles of migrants and presented conclusive evidence of regularities in the age pattern of migration. The regularity in the age pattern of migration tends to apply to most populations across the world (Rogers, 1988).

These empirical schedules of age-specific migration rates exhibit patterns in which individuals in their late teens and twenties tend to migrate more. This group is mainly made up of able-bodied people, both educated and uneducated, who move in search of better opportunities outside their usual place of residence. Some of these people

also move for marriage, particularly females. This regular pattern has been observed to peak at a certain age group, with a particular cause-specific migration that determines where the peak will occur (Rogers & Castro, 1981). Beyond the peak age, out migration in particular begins to decline. This is because at older ages people become somehow "immobile" for various reasons. Beyond the prime age, some individuals get themselves established in some economic activity and so do not have any motivation to move. Others also get married and so their capacity to migrate tend to be limited due to marital responsibilities such as caring for children and other household chores (Schachter, 2004).

The migration pattern experienced in the Kassena-Nankana districts is similar to those explained above. For instance, the age-specific out-migration rates show that the young population between ages 15 and 29 years are those with the highest rate of out-migration throughout the period. The peak age of migration occurred at age 20-24 years, except in 2000 where the peak age occurred at 15-19 years for females, as shown in Figure 5.1. It is, however, interesting to note that female migration rates have been consistently higher than those of males for the "active" age group up to 34 years. This, once again, buttresses the claim that migration has become feminized in recent times. It is noticed from Figure 5.1 that migration levels have declined over the period. This decline is prominent in the youthful age group of between 15 and 30 years. It is not clear what factors might have accounted for these declines, but one may suggest limited opportunities at places of destination as the main factor. It may also be the result of increases in educational attendance in the districts over the past few years, which has contributed to the decline in out-migration, particularly at the youthful ages.

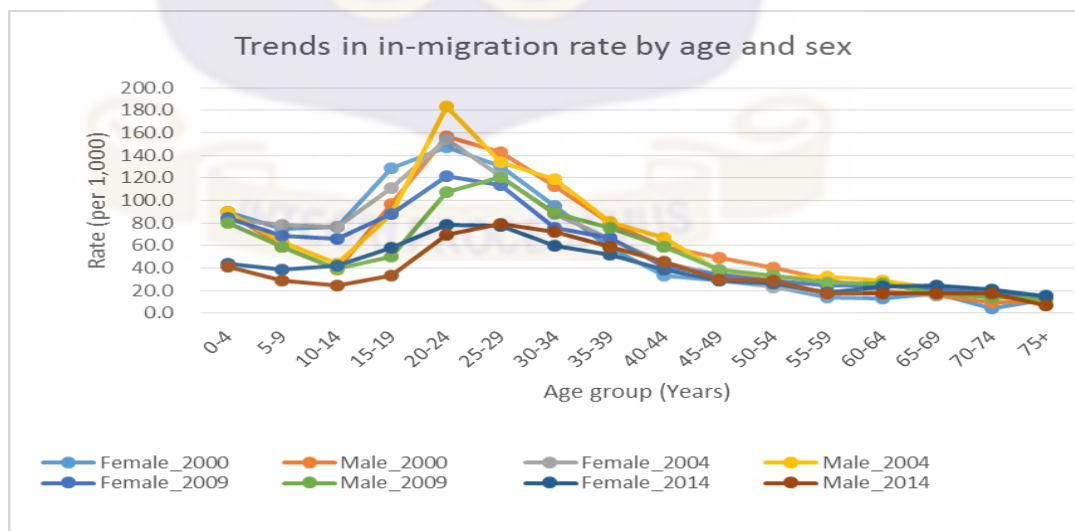
Figure 5.1: Out-migration by age and sex (2000, 2004, 2009 and 2014) for the KNDs.



Source: Constructed using the HDSS database

Similar to out-migration, in-migration (return migration) in the study area also exhibits the pattern observed and explained above. The highest proportions of in-migrants are those between ages 15 and 34 years, with the peak age of in-migration occurring at 20-24 years, except in 2009 and 2014 where male migration peaked at age 25-29 years, as shown in Figure 5.2.

Figure 5.2: In-migration by age and sex (2000, 2005, 2010 and 2014) for the KNDs.



Source: Constructed using the HDSS database

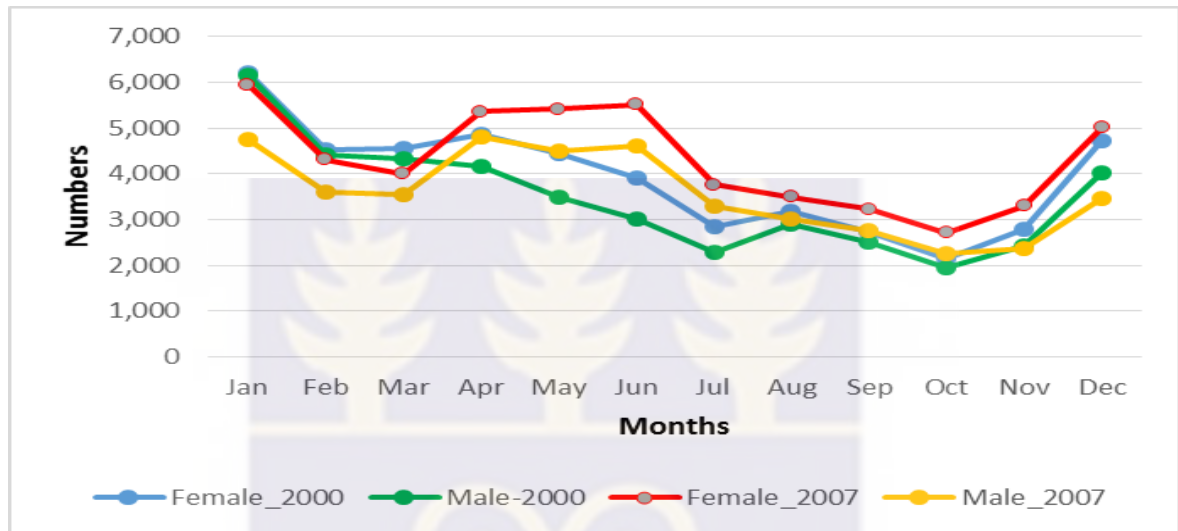
5.4 Seasonality of Migration

The Kassena-Nankana districts are predominantly rural, where majority of the people are engaged in agricultural activities that last for about six months during the rainy season. As a result, migration has tended to be seasonal, where people migrate out after the farming season and return at the beginning of the farming season. Figure 5.3 shows a graph of migration by month for two periods (2000-2006 and 2007-2014). Interestingly, these periods present different migration patterns. As depicted in the graph, out-migration begins to decline from January through to March for the two periods. This period (January-March) coincides with the time when funerals are performed and as a result, out-migration is curtailed while in-migration increases because people return home for such funeral activities. After March, noticeable differences in the migration pattern between the two periods emerge. For the first period (2000-2006), out-migration continues to decline up to July, except for the females where there is a slight increase between March and April and declines thereafter.

On the other hand, out-migration during the second period (2007-2014) exhibits a pattern where after March, out-migration increases up to June and declines thereafter. This difference may be attributed to the late onset of the rains in the second period compared to the first period, due to climate change, which delays the beginning of the farming season. It is believed that unlike the first period (before 2007) where farming activities usually commenced in April following the onset of the rains, the second period has farming activities starting later in the year due to the delays in the rains. In view of these differences, people who come home between January and March for other activities during the first period, stay and continue with their farming activities. However, with respect to the second period, people have to move out again after March and return later (after June) for their farming activities when the rains set in.

This difference in the migration pattern needs further interrogation to understand factors responsible for that and to establish the veracity or otherwise of the relationship between climate change and migration patterns between the two periods as illustrated in Figure 5.3.

Figure 5.3: Seasonal out-migration by sex for 2000 and 2007



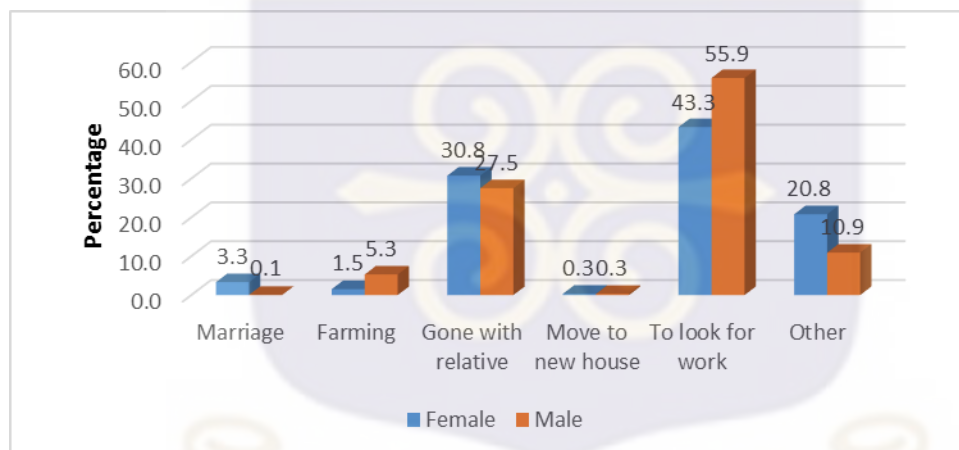
Source: Constructed using the HDSS database

For the two periods, out-migration continues to decline from June up to October when farming activities become intense. Harvesting of food crops usually starts from October when people begin to move out of the area until migration peaks in January. After January, people begin to return and out-migration from the area reduces, leading to declines in total out-migration for reasons enumerated earlier, thus completing the annual migration cycle.

5.5 Reasons for Migration

Various reasons account for the migration of people and several theories have been propounded to explain this (Massey, 1999; as cited in Weeks, 2008). While some people migrate voluntarily for economic and non-economic reasons, others move involuntarily. Most of the theories and studies point to the economic motives for migration (Goldscheider, 1984; Itzigsohn, 2001; Collinson et al, 2009). In the Kassena-Nankana districts, the dominant reason for out-migration is for economic purposes. As indicated in Figure 5.4, over 56 percent of all male migrants move in search of jobs, while about 5 percent move out for purposes of farming. This means that over 60 percent of male migrants move out for economic reasons.

Figure 5.4: Reason for Out-Migration by sex in the KNDs for 2005-2014



Source: Constructed using the HDSS database

With regard to females, 43 percent of out-migrants move in search of jobs while 1.5 percent do so for farming purposes. It is worthy of note that the category of migrants who move with relatives (31% females and 28% males) may actually be following relatives to destination areas to engage in one form of economic venture or the other. These people could also be first time movers who are following to destination areas to become househelps, shop attendants or engage in any job that is available. Given the

pattern of migration that has characterised the Kassena-Nankana districts as discussed, with the dominance of females in the migration process, the following chapters will attempt to examine the effects of these migrations on households SES as well as under-five mortality.



CHAPTER SIX

LEVELS AND TRENDS IN UNDER-FIVE MORTALITY IN THE KASSENANANKANA DISTRICTS

6.1 Introduction

Estimates of under-five mortality give an indication of the standard of living of the people in respect of their health and general wellbeing. This means that trends in under-five mortality of any population may give an indication of the progress made in the standard of living of the people over time. Increasing trends imply the wellbeing of the people is deteriorating, while a decreasing trend over time shows an improvement of the health and general wellbeing of the people. Examining the levels and trends in under-five mortality could serve as a guide to policy makers in the way to implement policies and interventions to sustain the declining trend or curb the increasing trend; whichever the case may be.

The level of global under-five mortality has declined substantially over the past three and a half decades. For instance, the period between 1990 and 2015 reported a global reduction of 53 percent (from 91 to 43 deaths per 1,000 live births) in under-five mortality (World Bank, 2015). This has been possible due to innovative ways of delivering critical health services to the poor, more effective and affordable treatments and sustained governments' commitment at improving the wellbeing of their people in order to achieve or meet the Millennium Development Goals targets (United Nations, 2014). Even though under-five mortality rates still remain high in sub-Saharan Africa, the region has also been a major beneficiary of the recorded global declines, gaining a reduction of 54 percent, from a high rate of 180 deaths per 1,000 live births in 1990 to 83 deaths per 1,000 live births in 2015 (United Nations, 2015). This gives an annual average

rate of reduction of about 2.2 percent. However, the last one and a half decades (1990-2015) has recorded substantially higher annual rate of reduction of about four percent.

In Ghana, some successes have been chalked in respect of reductions in under-five mortality over the past two and a half decades. According to the Ghana Demographic and Health Surveys, under-five mortality has reduced by almost 44 percent; from 108 deaths per 1,000 live births in 1988 to 61 deaths per 1000 live births by 2014 as shown in Figure 6.1 (GSS, 2015). While the country experienced an increase in the rate between 1998 and 2003, from 108 to 111 deaths per 1,000 live births, there was a remarkable decline in the period 2003 to 2014.

In the Upper East Region, where the study area is located, under-five mortality rate has also dropped quite substantially by almost 50 percent between 1998 and 2003 (Figure 6.1). However, unlike the national trend where the decline was remarkable in the period 2003 to 2014, the Upper East Region experienced a remarkable decline between 1998 and 2003, where the rate reduced from 155 to 79 deaths per 1,000 live births, a reduction of 49 percent.

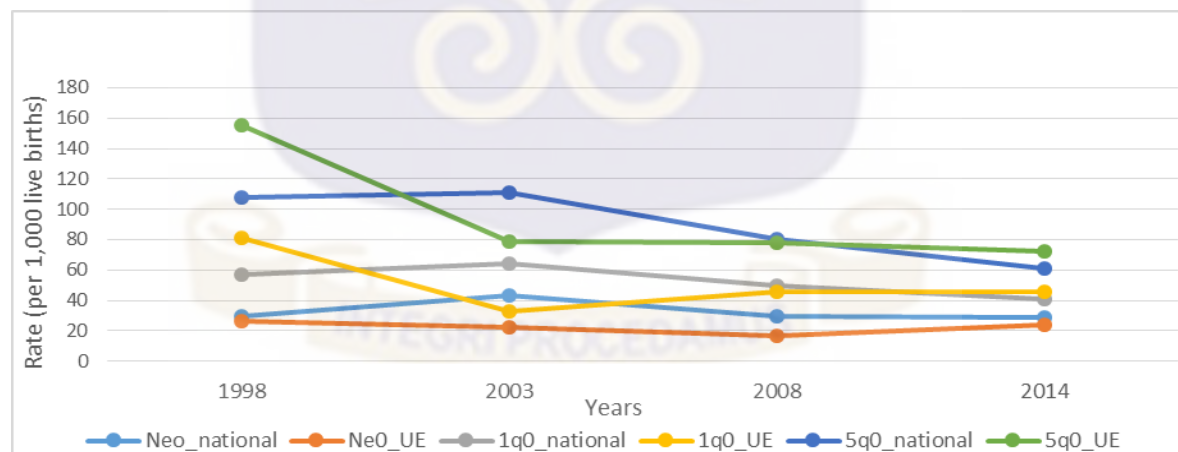
For the country as a whole, several factors have been found to be responsible for the general decline in under-five mortality within the period 1998-2014. These included the free maternal health services, National Health Insurance policy, implementation of the Community-based Health and Planning Services (CHPS) strategy, and the various malaria control interventions (GSS, 2015). These have improved both economic and geographic access to health care services in the country.

For the Upper East Region in particular, the substantial decline in under-five mortality between 1998 and 2003 is mostly attributed to the Accelerated Child Survival and Development (ACSD) programme (UNICEF, 2004). The ACSD Programme started

in 2000 and had groups of health service targets aimed at improving child health in the region. These were done through the improvement or increases in Expanded Programme on Immunization (EPI), vitamin A, deworming, oral rehydration therapy (ORT), the use of insecticide treated nets (ITNs) as well as the effective management of malaria coverage. The target was to increase these interventions by 80 percent at the end of the ACSD study and was envisaged to improve child survival in the region.

However, it is noticed that the trend in the infant and neonatal mortality rates has not been good in the Upper East Region between 2008 and 2014. For instance, infant mortality rate increased from 33 to 46 deaths per 1,000 live births between 2003 and 2008. The rate remained the same between 2008 and 2014. On the other hand, neonatal mortality rate increased from 17 to 24 deaths per 1,000 live births between 2008 and 2014 (Figure 6.1).

Figure 6.1: Levels and trends in neonatal, infant and under-five mortality in Upper East Region and Ghana



Source: Author's construct using data from Ghana Statistical Service Report, 2015.

It is not clear what factors are responsible for the reversal of the decline in these rates. What is, however, clear is the fact that the factors that were responsible for the initial successes have not been sustained. It is worthy of note that if these increasing trends in neonatal and infant mortality rates are not checked and reversed, it could in due

course translate into increases in under-five mortality rate. This means that more efforts are required to reduce neonatal and infant mortality rates to the barest minimum, which will also translate into further reductions in under-five mortality rate. To achieve this means that factors that are responsible for these increases in mortality rates in recent times have to be identified and addressed.

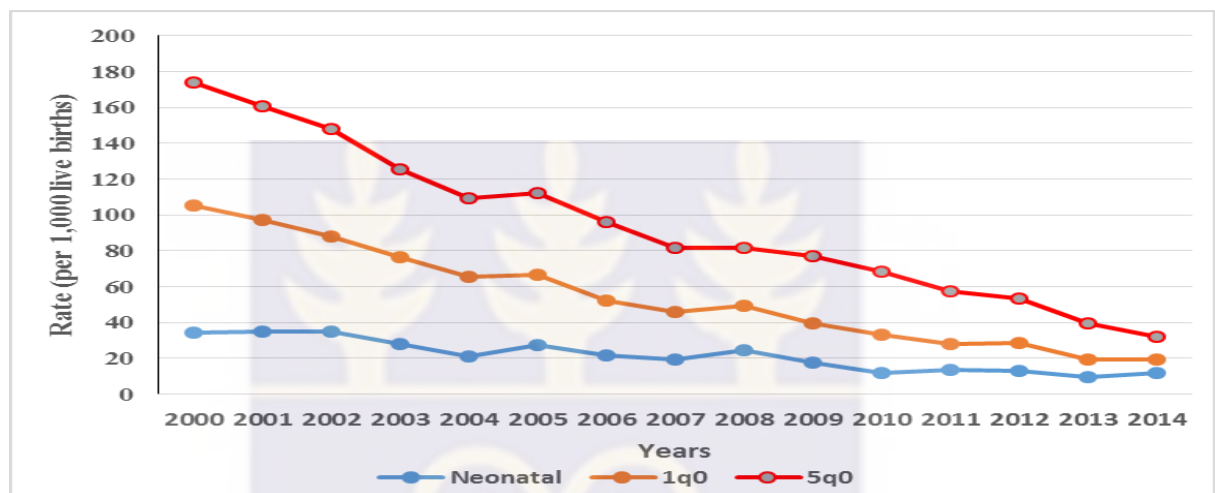
6.2 Mortality levels and trends in the Kassena-Nankana Districts

Since the inception of the Navrongo Health and Demographic Surveillance System (NHDSS) in 1993, data on deaths of all people registered in the area have been collected. This provides the opportunity to examine the levels and trends of mortality within the period. The Kassena-Nankana districts have experienced declines in mortality over the past two decades. Under-five mortality at the early years of the operation of the HDSS was quite high, at a 1996 level of 240 deaths per 1,000 live births. The rate reduced to 191 deaths per 1,000 live births in 1998, which was higher than both the national and regional (Upper East where the KND is located) rates of 180 and 155 deaths per 1,000 live births respectively. The rate further reduced to 174 deaths per 1,000 live births in 2000, giving a percentage reduction of about 28 percent over the period.

For the period of this analysis (2000 to 2014), under-five mortality in the study area in particular has declined substantially, as shown in Figure 6.2. For instance, between 2000 and 2014, under-five mortality rate has reduced by about 82 percent from 174 to about 32 deaths per 1,000 live births. This reduction far exceeds the MDG target of a two-thirds reduction in under-five mortality. This target was also achieved within a shorter period, compared with the MDG period of between 1990 and 2015. Apart from the period between 2004 and 2005 where mortality increased, the decline over the period has been consistent, at least for under-five mortality. It is interesting to note that a long term mortality analysis of Ghana also showed an increase in under-five mortality rate

between the period 1995-1999 and 2000-2005 (Johnson et al, 2005). It is also observed that under-five mortality almost remained the same between 2007 and 2008. These need further interrogation to ascertain the reason(s) for the increase in under-five mortality in 2005 that has been evident from these independent data sources.

Figure 6.2: Levels and trends in neonatal, infant and under-five mortality rates in the KNDs, 2000-2014



Source: Constructed using the HDSS data.

Several factors have contributed to the decline in under-five mortality in the Kassena-Nankana districts over the period under discussion. Firstly, the country has generally experienced mortality decline over the past two and a half decades and factors responsible for this have been discussed. The districts (study area) benefited from the health interventions put in place by the ACSD Project that took place in the Upper East Region, where the study area is located.

However, some specific interventions that benefited the Navrongo area in particular need to be mentioned, as these have contributed immensely to the decline of mortality rates in the area. These interventions were embedded in the research activities of the Navrongo Health Research Centre (NHRC). The NHRC was set up with the main objective of conducting health research to identify the health challenges confronting

residents in the area, and to inform policy on the appropriate intervention to improve upon their lives.

The first project that was carried out in the area was the Vitamin A Supplementation Trial that sought to investigate the impact of Vitamin A on the health and survival of children under five years of age. Under this project, children under the age of five years were divided into two groups, with Vitamin A supplements given to one group of children (intervention group), with the other being a control group. At the end of the study, it was found that under-five mortality reduced by about 19 percent in the intervention group compared with the non-intervention group (Ross, 1995). After the study, the children in the non-intervention group were also given the drug. It is thus, believed that those children would have also derived similar benefits from the study as those in the intervention group.

Meanwhile, during the course of the project, clinical outreach programmes were being organised in the communities to provide healthcare services to the children and their mothers. There was also a referral system where children who were seriously ill were conveyed to the district hospital for further treatment at no cost to the parents. Educational talks were also organised to enlighten mothers on proper healthcare practices, with particular reference on how to deal with basic illnesses such as malaria, diarrhoea and acute respiratory infections (ARI). Even though the project ended in 1992, it had set up a good foundation on which other future projects continued to improve the health status of the people.

In 1993, a study that sought to investigate the effects of bed nets on the survival of children was started. Under this study, all children under five years old were grouped into two, with one group of children (intervention group) being provided with impregnated

bed nets. The result of the trial revealed a 17 percent survival advantage for children who slept under bed nets (Binka et al, 1996). However, at the end of the trial, children in the control group were also given bed nets. Subsequently, the Research Centre started the sales of bed nets to the community members in the districts and beyond. This continued to improve the survival status of the children in the Kassena-Nankana area and beyond.

Another important research project that really transformed the health status of the people in the KNDs was the Community Health and Family Planning (CHFP) Project. The CHFP project, which eventually led to the national health policy known as Community-based Health and Planning Services (CHPS), was aimed at testing various forms of health delivery systems in a rural community in relation to fertility and mortality impact (Debpuur et al, 2002). The project commenced in 1994 where nurses were deployed to stay in selected communities to offer health services to the people. Apart from offering health services in the community health compounds that served as clinics, the nurses also embarked on periodic door-to-door visits to households to provide health and family planning services to the people (Debpuur et al, 2002). At the community health facilities and during their rounds, the nurses provide education to caregivers on how to handle basic health problems such as malaria and diarrhoea. Mothers were also advised to send their sick children to the health facilities early for treatment. It is believed that, all these have contributed in improving the health status of the people resulting in the reductions in under-five mortality over the years.

The major causes of death, particularly under-five deaths, are communicable causes including malaria, diarrhoea and pneumonia (United Nations, 2014). To reduce these deaths, therefore, requires finding ways of dealing with incidences of these illnesses in the population. After the CHFP project, several clinical trials have been conducted in the study area to understand the dynamics in the transmission of these infectious diseases

in the study area. The people of Kassena-Nankana districts have benefited tremendously from these clinical trials that have all aimed at reducing the incidence of these diseases.

Over the years, level of educational attendance and attainment have increased, particularly for females, and as noted in the literature, female education is one of the important determinants of child survival (Musafili et al, 2014). For instance, in 2000, only 41 percent of females of school going age had ever been to school. This improved to about 48 percent in 2005 and to about 50 percent in 2014 (NHDSS, 2015). It is believed that this improvement in educational attendance and attainment, in tandem with the informal education on basic healthcare that was given to these women by the nurses, have all contributed to the positive gains in under-five mortality experienced over the years.

While under-five mortality has generally declined over the period, it is observed that the rates for infants and neonates have increased marginally between 2013 and 2014. For instance, with respect to the study area, infant mortality rate increased slightly from 18.9 in 2013 to 19.2 deaths per 1,000 live births in 2014. On the other hand, neonatal mortality rate increased from 9.2 in 2013 to 11.5 deaths per 1,000 live births in 2014. The increases in these rates mean that factors that have been responsible for previous declines have been eroded. It could also be that other debilitating factors have in recent times plagued the health system, resulting in these increases.

While the mortality levels are high, increases in the rates for neonatal and infants, is even more serious and needs urgent interrogation. Even though the increases are limited to the neonatal and infant mortality stages, continual trends could lead to increases in the rate for the under-five. With the erosion of the health and other benefits gained over the years, which led to reduction in mortality rates, it is of necessity to identify factors

that are responsible for the increases in neonatal and infant mortality rates in the study area.

Several factors have been reported to be responsible for the improvement of child health and survival in the study area over the past few years. These include improved health system (CHPS, NHIS, free maternal health care, etc) and increases in levels of female education. While these factors are important in improving child health and survival, there could be other factors whose presence or absence could undermine all efforts aimed at reducing child deaths in the study area. It has been noted that number of years of schooling per se is not enough to ensure better child health and survival, but also knowledge in proper child health practices is also crucial in this endeavor (Hildebrandt and McKenzie, 2005). This knowledge can be acquired through several means, including moving to other places where opportunity exists to learn new ideas that could have some positive impact on childcare. Another dimension of the problem is that even where there is a better health care system, this might not necessarily lead to improvement in child health and survival. It is important to recognize that proper health care, including adequate medication without proper nutrition, will also not necessarily lead to better child health and survival. With high levels of poverty associated with the study area, it is likely that lack of or inadequacy of basic necessity of life, including proper nutrition, could be a major contributor to increases in some mortality indicators in the study area as observed.

As literature has established, migration has been an important avenue through which rural residents in particular have relied on to improve their lives (Quisumbing and McNiven, 2007; Rosewarne, 2012). It has also been reported that migrant women acquire some knowledge in basic childcare and personal hygiene while at place of destination, particularly urban places. It is thus believed that maternal migration could play a key role in contributing to child survival in the study area.

CHAPTER SEVEN

MATERNAL MIGRATION AND HOUSEHOLD SOCIO-ECONOMIC STATUS

7.1 Introduction

As one of its objectives and hypotheses, this chapter seeks to examine the relationship between maternal migration and household socio-economic status (SES). In particular, an attempt is made to find out if female return migrants are associated with rich households. Even though migration has been viewed as one of the major livelihood strategies in poor rural settings (Adepoju, 2002; Scoones, 2009), its actual impact on household socio-economic wellbeing has been a subject of debate (Awumbila et al, 2015). Studies on the impact of migration on household welfare have revealed mixed results, with conclusive evidence regarding this relationship yet to emerge (Siddiqui, 2012). While some view the relationship as negative, others see migration as having a positive relationship with household welfare.

As mentioned in the previous chapter, migration in the Kassena-Nankana area of the Upper East Region is seasonal. As a result, people migrate during the dry season and return during the farming season, with some of them staying longer. From the perspective of poverty alleviation, this type of circular (seasonal) migration could provide important insights, as these types of movements are more prevalent among poor rural dwellers (Deshingkar and Farrington, 2009; Srivastava et al, 2011). Before an examination of the relationship between the female migration and household socioeconomic, an insight into the poverty situation of the study area is presented herein.

7.2 Poverty prevalence in the Kassena-Nankana Area

Detailed report or information on the poverty situation in the Kassena-Nankana districts is quite scanty. According to the 2010 Ghana Population and Housing Census

and the Ghana Living Standards Survey 6 (GSLLS6), the Upper East Region, where the KNDs are located, is one of the poorest regions in the country. According to the survey, the region is ranked second poorest in the country (next to the Upper West Region), with a poverty head count of about 49.9 percent (Ghana Statistical Service, 2015). However, it is interesting to note that among the 13 districts and municipalities in the Upper East Region, the Kassena-Nankana Municipality and the Kassena-Nankana West District have the lowest poverty incidence and poverty depth (Ghana Statistical Service, 2015).

There is also the Ghana League Table (DLT), which is a tool for the assessment of basic services in all the districts in the country. The districts are ranked according to the availability or absence of some basic services in each district, which is based on an index generated from these services (UNICEF, 2016). According to the DLT, out of the 216 districts in the country in 2014, the Kassena-Nankana Municipality (KNM) ranked 99th but 8th among the 13 districts in the Upper East Region, while the Kassena-Nankana West (KNW) District ranked 125th nationwide but 11th in the region. According to the 2016 rankings, the KNM and KNW placed 101st and 96th nationwide respectively, while at the regional level KNM placed 9th with the KNW placing 8th. General assessment of the above rankings show clearly that, compared to other districts in the region as well as the country, the two districts in the study area are deprived of some basic social services that are vital for the general wellbeing of the people.

While these paint a bleak picture of the KNM and KNW, the situation is even dire for women. In Ghana, different kinship systems and gender roles have varying implications for women's access to resources and critical decision-making in the household, and the KNDs are no exception. In a patrilineal society such as that of the KNDs, women have little autonomy in many family issues (Ngom et al, 2003). For instance, women's access to land for agricultural activities is very limited (Aryeetey &

Bortei-Doku, 2002). The land belongs to the husband or any adult male in the family. Produce from farming activities is usually under the control of the husband. Similarly, some major property such as animals that belong to the woman are mostly under the control of the husband. These tend to exacerbate the already precarious poverty situation and limited resources available for women. Economic and social power are vested in the hands of men and these limit women's autonomy in decision-making pertaining to their health as well as their children, which have implications for child survival. One means by which women overcome some of these barriers is to migrate in search of alternative sources of livelihood, sometimes with the consent of the head of the household, based on the New Economics of Labour Migration (NELM) theory. Under this theory, migration decisions are not individual decisions but household decisions, as the migration of a member benefits the entire household (Stark, 1991; Taylor, 1999). The women migrate and acquire some property, for which they have some amount of control (Pickbourn, 2011). It is expected that these alternative livelihood strategies adopted by these women would go a long way to improve their individual status and those of their households. Ultimately, improvements in the household economic status could impact positively on the wellbeing of household members, including improvements in child health and survival.

7.3 Determination of Household Socio-economic Status

In determining the wellbeing of individuals and households, several methods have been used over several decades. In the 1960s, the use of per capita gross national products (GNP) was used as an indicator of wellbeing of the people. This was found to be inadequate and economists argued for the inclusion of poverty reduction, reduced inequality and decrease in unemployment (Todaro, 1978). The United Nations (1990) also suggested the use of Human Development Index (HDI) as a measure of wellbeing.

The World Bank also started conducting Living Standards Surveys in some developing countries to be used as a measure for socio-economic wellbeing (Filmer and Pritchett, 2001).

The current analysis used a different approach as a measure for household socio-economic status (SES), which is consistent with other approaches (Filmer and Pritchett, 2001; Bawah, 2002; Bawah & Zuberi, 2004). The method uses a combination of household assets such as type of toilet facility, source of drinking water, type of roof, floor type, possession of animals and durable household items to generate an index for measuring socio-economic status (SES). This approach is viewed as very necessary in view of the fact that data on income for the determination of SES are unreliable or unavailable in most developing countries (Bawah, 2002).

In this analysis, information on household characteristics was used to generate an index of household SES. Information on household characteristics as well as ownership of some assets were collected. These included durable assets such as cars, motorbikes, bicycles, television sets, among others. Other assets collected were cattle, goats, sheep, donkeys, pigs and fowls. The Principal Component Analysis (PCA) method was used to categorise households into two main SES groups of poor and rich. The objective here was to examine the relationship between maternal migration and household SES. In particular, the analysis sought to find out whether households of female return migrants had a higher SES than households of female non-migrants. Since migration is selective on certain socio-demographic factors, maternal education, maternal age and place of residence (rural or urban) served as confounders in the logistic regression model. These variables were tested for multi co-linearity using the variance inflation factor (VIF). The results showed a mean VIF value of 1.85, as shown in Table 7.1, indicating that no multi co-linearity exists (VIF value of 10 or more indicates existence of multi co-linearity).

Table 7.1. Output of Variance Inflation Factor test

Variable	VIF	1/VIF	Variable	VIF	1/VIF
Migration duration			Maternal education		
Non-migrant	-	-	No education	-	-
<6 months	1.98	0.504336	Primary	1.47	0.678704
6-11 months	1.71	0.583829	JHS/Middle	1.28	0.778674
12+ months	3.97	0.251784	SHS+	1.21	0.826004
Maternal age			Place of residence		
15-19	-	-	Rural	-	-
20-24	2.27	0.439858	Urban	1.26	0.790703
25-29	2.32	0.431144			
30-34	1.93	0.518137			
35-39	1.49	0.672012			
40+	1.25	0.801471	Mean VIF	1.85	

Source: Generated from VIF output

7.4 Bivariate association between household SES and selected socio-demographic variables

The association between household SES and the predictor variables are shown in Table 7.2. From the table, migration is found to be significantly associated with household SES, as households of return migrants are more likely to be richer (higher SES) than non-migrants' households. For instance, only 23 percent of the non-migrants are found in rich households. However, with respect to migration duration, no particular pattern emerges in relation to household SES. From the results, it is observed that 29 percent of women who have had a migration duration of less than six months are found in rich households. Similarly, about 28 percent of women who had a migration duration between six and 11 months belong to rich households, while close to 29 percent of women with migration duration of 12 months or more are associated with rich households.

Table 7.2. Association between SES and some predictor variables

Variable	Poor		Rich		P-value
	n	%	n	%	
Migration Duration					
Non-migrants	1,623	77.0	485	23.0	<0.001
Less than 6 months	2,818	70.9	1,155	29.1	
Between 6-11 months	2,109	71.8	828	28.2	
At least 12 months	8,523	71.2	3,449	28.8	
Maternal Education					
No education	9,248	77.2	2,727	22.8	<0.001
Primary	3,934	73.6	1,408	26.4	
JHS/Middle	1,464	58.9	1,023	41.1	
SHS+	427	36.0	759	64.0	
Mothers Age					
15-19	1,721	76.6	526	23.4	<0.001
20-24	3,425	72.4	1,305	27.6	
25-29	3,406	68.2	1,589	31.8	
30-34	2,798	69.6	1,223	30.4	
35-39	2,012	71.8	790	27.2	
40+	1,711	78.0	484	22.0	
Place of Residence					
Rural	14,062	75.9	4,468	24.1	<0.001
Urban	1,011	41.1	1,449	58.9	

Source: Generated from the HDSS database

Several factors, in addition to migration status and duration, contribute to household SES, and education has been found to contribute to SES. As expected, higher education is associated with higher SES. This is evident from the bivariate results in the table, as only a small proportion of about 23 percent of the women without education were in rich households. The proportion of those with primary education who were in rich households increased to 26.4 percent. About 41 percent of women with JHS/Middle school education were in rich households, while the percentage of those women with senior high education and higher who were in rich households was as high as 64.

In this analysis, maternal age was examined in relation to household SES and the results, as shown in Table 7.2 show a significant association between the two. For instance, only 23.4 percent of women in the age group 15-19 years were in the rich households. For those in the age group 20-24, the proportion in the rich households was

27.6. About 32 percent of women in the age group 25-29 years were in the rich households, while the proportion of women in the age group 30-34 who were in rich households was 30.4 percent. About 27 percent of those women in the age group 35-39 years reside in rich households, with only 22 percent of women in the age 40 years and over were in the rich households. The pattern exhibited here is an inverted U-shaped, which illustrates the fact that household SES increases with age and peaks at age 25-29 years and declines consistently thereafter.

For place of residence, it is noticed that as low as 24 percent of women in rural areas are found in the rich households. For women who are urban residents, almost 59 percent of them are in rich households. This is expected as several economic opportunities abound in urban areas that lead to better SES. All the associations are statistically significant.

While maternal education, maternal age and place of residence are found to be associated with household SES, they also serve as confounders in the relationship between maternal migration duration and household SES. These are, therefore, used as confounders in the multivariate regression analysis to examine the independent association between maternal migration duration and household SES.

7.5 Multivariate analyses of household SES and selected socio-demographic variables

Two models were presented in the multivariate analyses to try to establish both the gross and net effect of maternal migration on household SES. Model 1 shows the results of the gross effect of maternal migration on household SES, without controlling for relevant confounders. In addition, maternal age, maternal education and place of residence are also modeled to see their effect on household SES. Model 2, on the other

hand, shows the net effect of maternal migration on household SES, while controlling for the effect of the other variables. The selection of these variables as confounders is justified by the fact that they are among the key variables from which migration selectivity arises (Agasty and Patra, 2013). These confounding variables are also important variables that, on their own, contribute to household SES and whose effects on household SES had to be tested, as shown in Model 2 of Table 7.3.

Table 7.3. Regression results of the association between migration duration and Household SES.

Variable	Model 1-Unadjusted		Model 2-Controlled for all variables.	
	Odds Ratio	[95% CI]	Odds Ratio	[95% CI]
Migration duration				
<i>Non-migrants (RC)</i>	-	-	-	-
<i><6 months</i>	1.371***	1.213-1.550	1.197**	1.049-1.366
<i>6-11 months</i>	1.314***	1.154-1.495	1.203**	1.046-1.383
<i>12+ months</i>	1.354***	1.215-1.510	1.164**	1.032-1.313
Mother education				
<i>No education (RC)</i>			-	-
<i>Primary</i>	-	-	1.197***	1.106-1.296
<i>JHS/Middle</i>			1.900***	1.724-2.093
<i>SHS+</i>			3.935***	3.440-4.501
Mothers' Age				
<i>15-19 (RC)</i>			-	-
<i>20-24</i>			1.139**	1.009-1.285
<i>25-29</i>	-	-	1.313***	1.165-1.481
<i>30-34</i>			1.315***	1.158-1.491
<i>35-39</i>			1.352***	1.180-1.550
<i>40+</i>			1.162*	1.000-1.353
Place of residence				
<i>Rural (RC)</i>	-	-	-	-
<i>Urban</i>			3.317***	3.025-3.638

Source: Generated from the HDSS database

p*-value=0.05; *p*-value=0.01; ****p*-value=0.001; RC=Reference Category

As shown in Model 1 (Table 7.3), women with a migration duration of less than six months were 37 percent more likely to be in a rich household compared with non-migrant women. On the other hand, the odds of being in a rich household was 31 percent for women with a migration duration of between six to 11 months compared with non-

migrant women. Women with one year or more migration duration have the highest odds of about 35 percent of being in a rich household compared with non-migrant women.

However, due to a significant selectivity bias that affects the relationship between migration and household socio-economic status, there is the need to account for some of the important factors that are likely to introduce some bias in this relationship. In this analysis, important variables that are used as controlled variables to see the independent effect of maternal migration and households SES includes maternal education and age and place of residence. After controlling for these confounding variables, the results are shown in Model 2 (Table 7.3). It is observed that the effect of maternal migration on household SES still remains significant and the observed pattern remained as before. For instance, when controlled for all the variables, women with migration of duration less than six months were about 20 percent more likely to be in rich households. Those women with migration duration between six and 11 months also had about 20 percent chance of being in a rich household compared with non-migrants. On the other hand, women with migration duration of 12 months or more had 16 percent chance of being in a rich household compared with non-migrants.

This result is consistent with the results of the bivariate analysis, which has revealed that migration contributes to household socio-economic status, even after accounting for the effects of other important factors such as education, age and place of residence. It is, thus, important to examine the net effect of these variables on household SES.

As noted earlier at the bivariate level, the multivariate results also show that maternal education is correlated with household socio-economic status. The higher the education, the higher the SES of the household where the individual resides. The results revealed that, independently, mothers who had education up to primary level have about

20 percent chance of being in a rich household compared with their non-educated counterparts. Regarding women with up to junior high or middle level school, they were about 90 percent more likely to be in a rich household compared with women who had no education. Women who had education up to the SHS level and beyond were about four times more likely to be in rich household compared with women without education, after controlling for the effect of the other socio-demographic variables.

Another important variable that is found to have an independent association with household SES is the age of the woman. For instance, as shown in Model 2 of Table 7.3, females in the age group 20-24 years had about 14 percent probability of being in a rich household compared with women in the age group 15-19 years. On the other hand, women in the age group 25-29 years had 31 percent odds of being in a rich household compared with women in the age group 15-19 years. Similarly, women in the age group 30-34 years had about 32 percent chance of being in a rich household compared with women in the age group 15-19 years. Women who are in the age group 34-39 years were about 35 percent more likely to be in a rich household compared with women in the youngest age group. The results also show that women age 40 years and over are about 16 percent more likely to be in a rich household compared with women in the age group 15-19 years.

For place of residence, the results revealed that women in urban areas were more likely to be in rich households compared with women in rural areas, with odds of 3.3 times in favor of women in urban areas, as shown in Model 2 of Table 7.3.

The importance of migration to household socio-economic status has been evident from the results of this study. Being mainly rural agricultural setting with only one rainy season, which is sometimes associated with poor harvest as a result of several factors,

migration out of the KNDs has been a way of over-coming extreme poverty. With the feminization of migration in the KNDs, more women have dominated the process in the area in recent times. Women migrate, earn some income and either remit or send such incomes home. At the same time, due to their absence from home, they save the little food they had harvested from their farming activities. While at place of destination, they are also motivated by the things they see and desire, so they work hard in order to fulfil these desires. On the other hand, their non-migrant counterparts remain at home, earn little or nothing and at the same time consume what they have harvested from their farming activities. In sum, while migrants earn income and also save what they already have, their non-migrant counterparts earn nothing and at the same time consume the little food they have harvested. It is therefore, obvious that migrants will contribute more to household incomes than non-migrants.

With respect to education, higher education is associated with higher SES. In most rural settings, women with no education are mostly engaged in agricultural activities or some menial jobs, while their educated colleagues may be employed in non-agricultural jobs that may pay better. Apart from that, educated women have more autonomy and are more enterprising, which can propel them to engage in useful ventures from which they can earn more income for themselves and their households. In sum, because of their literacy status, educated women have a better sense of doing business of all types than women with no education.

The effect of maternal age on household SES presents some interesting pattern, at both the bivariate and multivariate levels, which needs further explanation. First, young women in the early stage of their marriage lack some autonomy and resources to embark on some ventures that could contribute to the improvement of their household's SES. Some could also be in polygynous households where the resource dilution hypothesis

comes into play to make such households poor (Downey, 2001). These women are also less energetic and may also lack the necessary wherewithal to embark on any meaningful venture to earn some income. In the KND, women may acquire some farm land after some years in marriage. This means that younger women may not have access to farm lands on which they will farm to earn some income. At the other terminal end of the age spectrum, the women are old and less energetic to embark on any meaningful venture to create resources for their households. Such women also have many more children (and possibly grandchildren) to take care of and so there is little opportunity for such households to move up in the SES ladder. While those women may have access to farm land due to seniority status, they may not have the needed strength to work on the land or provide adequate supervision.

For household location, the result revealed that women in the urban areas in the KNDs have a higher probability of being in rich household. This is expected as studies have established that households in urban areas have a much lower average rate of poverty than those in rural areas. For instance, the Ghana Poverty and Inequality Report of 2016 showed that the average rate of poverty was 10.6 percent and 37.9 percent in urban and rural areas respectively (Cooke et al, 2016). This is so because the urban place is made up of a relatively large educated population, who are in better paid jobs compared with rural areas. Many businesses are found in the urban areas for which residents take advantage of to earn income to enhance their economic status. For instance, in the KNDs, during the tomatoes season, more women in the Navrongo town are engaged in harvesting, carting and selling of tomatoes throughout the season (January-April), and so unlike their rural counterparts, earn more income to support their households.

Although the results have revealed the beneficial impact of maternal migration on household SES, it is important to recognize that there exists a reverse relationship

between migration and household SES. This comes about where migration involves some cost and so it is reasonable to assume that members of better-off households are more likely to embark on migration and thus contribute to further improvement of the SES of their households (Collison et al, 2009). As a result, an attempt was made to test for the existence of reverse causality between migration and household SES that could bias the above results. This was done using the Granger Causality Test (Granger, 1988; 1969). The result reveals that migration significantly causes improvement in household SES, as shown in Row 3 of Table 7.4. Even though the reverse relationship exists, it is not statistically significant. This result thus addresses the problem of selectivity and reverse causality likely to bias the findings.

Table 7.4 Results of Granger Causality Wald test

Equation	Excluded	chi2	df	Prob > chi2
SES	mum_mig	.08346	1	0.773
SES	ALL	.08346	1	0.773
mum_mig	SES	18.787	1	0.000
mum_mig	ALL	18.787	1	0.000

Source: Generated from regression output

In summary, the results of this analysis have highlighted the fact that female migration contributes to improvements in household socio-economic status, thus sustaining the first hypothesis of this study, which states that “Households with female return migrants have a relatively higher socio-economic status than households without a female migrant”. Migration in general has been shown to have a positive contribution to household SES. It is also established that other factors play important roles in the determination of household poverty levels. These include, but not limited to, educational

status, place of residence, job type and age. When some of these socio-demographic variables are used as controls, the associated pattern that emerged at the unadjusted stage of the analysis still prevailed.

To the extent that this relationship has been established, and the fact that studies have found a positive relationship between household socio-economic status and child survival, the next step for this study is to find out how maternal migration impacts on under-five mortality, with household SES as the main intervening variable.



CHAPTER EIGHT

MATERNAL MIGRATION AND UNDER-FIVE MORTALITY

8.1 Introduction

This chapter focused on the main theme of this study, which is maternal migration and under-five mortality in the Kassena-Nankana Districts. The chapter began with a bivariate analysis of the association between maternal migration and the main outcome variable as well as the other independent socio-demographic variables on under-five mortality. This was followed by multivariate analysis method, using survival analysis method with a Weibull distribution, to examine the linkages between the outcome variable and the independent variables. Two models were run, with the first model linking each of the independent variables separately to the dependent variable. For the second model, all the independent variables were included in the regression to control for their effect on the relationship between the main independent (maternal migration) and the outcome variable (under-five mortality).

8.2 Bivariate results of association between under-five mortality and predictor variables

This section examines the bivariate results of the dependent variable with each of the independent variables, using the chi square technique. From the results, it is observed that a significant proportion of 19.4 percent of under-five deaths occurred among children of the non-migrant mothers (Table 8.1). The lowest proportion of 7.3 percent of the under-five deaths was associated with mothers who have the highest migration duration of one year and more. Those children whose mothers had migration duration of between three and five months suffered 8.2 percent deaths, while 8.3 percent of children of mothers with migration duration of between six and 11 months died.

Table 8.1. Association between child survival and predictor variables

Variable	Alive		Dead		P-value
	n	%	n	%	
Migration Duration					
Non-migrants	1,699	80.6	409	19.4	<0.001
Less than 6 months	3,649	91.8	324	8.2	
Between 6-11 months	2,692	91.7	245	8.3	
At least 12 months	11,096	92.7	876	7.3	
Household SES					
Poorest	4,180	89.6	485	10.4	<0.001
Poorer	3,618	90.6	375	9.4	
Poor	5,859	91.3	556	8.7	
Less poor	2,153	91.5	201	8.5	
Least poor	3,326	93.4	237	6.6	
Maternal Education					
No education	10,653	89.0	1,322	11.0	<0.001
Primary	5,016	93.9	326	6.1	
JHS/Middle	2,332	93.8	155	6.2	
SHS+	1,135	95.7	51	4.3	
Mothers Age					
15-19	2,032	90.4	215	9.6	<0.001
20-24	4,339	91.7	391	8.3	
25-29	4,659	93.3	336	6.7	
30-34	3,684	91.6	337	8.4	
35-39	2,503	89.3	299	10.7	
40-44	1,368	87.6	194	12.4	
45+	551	87.1	82	12.9	
Place of birth					
Health facility	9,043	94.4	532	5.6	<0.001
Own Home	5,309	90.8	541	9.2	
Other	4,784	86.0	781	14.0	
Birth order					
1	4,483	91.5	419	8.5	<0.001
2-4	7,370	92.9	566	7.1	
5+	7,283	89.3	869	10.7	
Multiple births					
No	18,727	91.2	1,801	8.8	<0.001
Yes	409	88.5	53	11.5	
Grandmother presence					
No	10,507	89.6	1,218	10.4	<0.001
Yes	8,629	93.1	636	6.9	

Source: Generated from the HDSS database

Household SES had a significant association with child death, with children of mothers in households of higher SES being associated with lower percentage of death. For instance, 10.4 percent of children of women from the poorest households died before age five years, while those women in the poorer households had about 9.4 percent of their children dying before reaching age five years. About 8.7 percent and 8.5 percent of children of women in the poor and less poor households, respectively, died before

celebrating their fifth birthday. The smallest percentage of 6.6 of child death was associated with women in least poor (richest) households.

In terms of maternal education, it is observed generally that children whose mothers had no education experienced the highest proportion of deaths than children of mothers who had some education. This illustrates a significantly negative association between maternal education and child death. As shown in Table 8.1, women without any education had as high as 11 percent of their child dying before reaching their fifth year, while about 6 percent of children whose mothers had primary education died before reaching age five years old. The proportion of child death reduced consistently with increasing levels of maternal education with the lowest percent of 4.3 attributed to women with the highest level education (SHS+). However, children whose mothers had education up to primary and those with up to JHS/Middle school had almost the same proportion of child death of 6.1 percent and 6.2 percent respectively. This needs further interrogation as it is expected that children of the former should have a better survival probability than the latter.

The bivariate results also revealed a significant association between under-five mortality and mothers' age at birth of child. The expected U-shape pattern also emerged from this association as children of younger and older mothers experienced higher under-five deaths compared to children of mothers in the middle age group. For instance, 9.6 percent of children whose mothers were aged 15-19 years died, while 8.3 percent of children of mothers who were 20-24 years died before reaching age five years. The lowest percentage (6.7%) of under-five deaths was associated with children whose mothers were 25-29 years. The proportions increased thereafter to almost 13 percent for children whose mothers were 44-49 years.

The place where a woman delivers a baby is an important determinant of child survival. The variable was found to be significantly associated with under-five mortality. As expected, mothers who delivered their children at health facilities had 5.6 percent of their children dying before attaining the age five years, while those who delivered their children at their own homes had 9.2 percent of their children dying before age five. Those women who delivered their children elsewhere rather than a health facility or their own homes had 14 percent of the children dying before celebrating their fifth birthday.

In terms of birth order of child, women whose children were first order births had about 8.5 percent of their children dying before age five. This reduced to 8.1 percent for children who were of birth order 2-4, and then increased again to 10.7 percent for those in the order of five or higher. This result exhibits the U-shape characteristics of the relationship between birth order and child death, a result which is consistent with findings from other studies (Antai, 2011; Titaley et al, 2008; Uddin and Hossain, 2008).

Studies have established survival disadvantage associated with multiple birth children. In this analysis, the bivariate results confirms this assertion, where 11.5 percent of the multiple birth children died before age five years, as compared to 8.8 percent of deaths associated with their singleton counterparts. Factors responsible for this relatively higher level of mortality associated with multiple births are not farfetched and have been discussed extensively (Dube et al, 2013; Health Canada, 2004).

According to the grandmother hypothesis, children tend to benefit from the presence of older women in the household. This is because grandmothers have experience in childcare and this experience is passed on to their daughters/daughters-in-law for the care of their children. The bivariate results as shown in Table 8.1 supports this assertion, as lower proportion of about 7 percent of child death occur in households where there is a

grandmother compared with 10.4 percent deaths associated with children in households without grandmothers.

8.3 Multivariate regression analysis of maternal migration and under-five mortality

The previous section examined the relationship between under-five mortality and some important covariates. Some differentials between and among these covariates were outlined. However, examination of mortality differentials using such single control classification does not provide adequate scientific bases for assigning a predictive ability to a particular factor or variable. This is because mortality in general, and that of under-five in particular, is affected by several factors jointly and compensatory in their effect. It is, therefore important to examine the effects of these factors on under-five mortality simultaneously using the multivariate regression technique.

Three separate models are run; the first model (Model 1) considered the gross effect of maternal migration on under-five mortality. The second model (Model 2) examined the above relationship but controlled for the moderating effects of household context variables that included household SES, place of delivery of child, mother's education and presence or absence of grandmother. Model 3 on the other hand examined the relationship but controlled for all the variables in this analysis. Table 8.2 displays the regression output of the results.

Table 8.2. Regression results of the association between child survival and predictor variables

Variable	Model 1-Uncontrolled		Model 2-controlled for HH contextual variables		Model 3-controlled for all variables.	
	Hazard Ratio	[95% CI]	Hazard Ratio	[95% CI]	Hazard Ratio	[95% CI]
Migration duration						
<i>Non-migrants (RC)</i>	-	-	-		-	-
<6 months	0.489***	0.422-0.565	0.621***	0.532-0.723	0.572***	0.488-0.671
6-11 months	0.515***	0.440-0.604	0.658***	0.557-0.776	0.598***	0.504-0.710
12+ months	0.457***	0.407-0.515	0.609***	0.534-0.694	0.545***	0.474-0.626
Household SES						
Poorest (RC)	-	-			-	-
Poorer	0.909	0.795-1.041			0.936	0.818-1.072
Poor	0.846*	0.749-0.956			0.919	0.813-1.038
Less poor	0.832*	0.706-0.981			0.941	0.798-1.110
Least poor	0.661***	0.566-0.772			0.846*	0.721-0.992
Mother education						
<i>No education (RC)</i>					-	-
Primary					0.605**	0.533-0.687
JHS/Middle					0.662**	0.557-0.787
SHS+					0.553**	0.413-0.741
Place of birth						
<i>Health facility (RC)</i>					-	-
Own Home					1.516**	1.338-1.717
Other					2.129**	1.869-2.426
Mothers Age						
<i>15-19 (RC)</i>					-	-
20-24					0.893	0.747-1.068
25-29					0.694**	0.564-0.855
30-34					0.675***	0.536-0.850
35-39					0.680***	0.530-0.872
40-44					0.624***	0.477-0.818
45+					0.614**	0.447-0.843
Birth order						
<i>1 (RC)</i>					-	-
2-4					0.741***	0.635-0.865
5+					0.687***	0.562-0.838
Multiple births						
<i>No (RC)</i>					-	-
Yes					1.719***	1.305-2.265
Grandmother presence						
<i>No (RC)</i>					-	-
Yes					0.876**	0.784-0.978

Generated from regression output.

* p -value ≤ 0.05 ; ** p -value ≤ 0.01 ; *** p -value ≤ 0.001 ; RC=Reference Category

8.3.1 Maternal migration and under-five mortality

From the results, maternal migration and their durations are significant predictors of under-five mortality in the study area. Specifically, children of return migrant mothers have a higher survival probability than children of non-migrant mothers. This supports earlier findings by other studies (Hildebrandt and McKenzie, 2005; Collinson, 2008). As shown in Table 8.2, children of mothers with the longest migration duration of 12 months or more had the highest survival probability of about 54 percent compared with children whose mothers never migrated. On the other hand, children of women with a migration duration of between six and 11 months were about 48 percent less likely to die before age five compared with children of non-migrant mothers. Similarly, children of mothers with a migration duration of less than six months were about 51 percent less likely to die before age five compared with children of non-migrant mothers.

After controlling for the moderating effects of the household context variables, the associated pattern still prevailed. However, the magnitude of the effects reduced. As shown in Model 2 (Table 8.2), the introduction of these confounders reduced the associated child survival benefit of mother's migration duration of 12 months and more to 39 percent compared with children whose mothers never migrated. Those children whose mothers had a migration duration of less than six months were about 38 percent (down from 51 percent) less likely to die compared with children of non-migrant mothers. The survival probability of children whose mothers had a migration duration of between six and 11 months reduced to 34 percent compared with children whose mothers never migrated before.

The third model (Model 3) examines the relationship between maternal migration and under-five mortality while controlling for the effects of all the socio-demographic variables outlined in this study. The results show that children of mothers with the longest

migration duration of 12 months or more still had a better survival advantage of 44 percent compared with children of non-migrant mothers. Those children whose mothers had migration duration of between six and 11 months were 40 percent less likely to die compared with children whose mothers never migrated before, while children whose mothers had a migration duration of less than six months were 43 percent less likely to die compared with children of non-migrant mothers.

The results so far have established the fact that maternal migration has beneficial impact on child survival. Specifically, the results have revealed that children of migrant mothers had a better survival probability than children of non-migrant mothers. However, it is important to recognise and examine other important factors that play key roles in child health and survival. Also, it has to be acknowledged that maternal migration generally affects child health and under-five mortality through some intermediate variables such as household SES, mothers' knowledge in childcare, adherence to proper lifestyles, among others. It is thus believed that these intermediate determinants depend on how long (duration) the migrant stays at place of destination, with the expectation that longer duration of stay will lead to better achievement of these best practices.

However, from the results, the duration effect has no regular pattern, so far as child survival is concerned. For instance, maternal migration duration of 12 months or more is associated with the best child survival probability. One would have expected that migration duration of between six and 11 months would have been associated with better child survival than the shorter duration of less than six months. However, it is observed that maternal migration duration of less than six months is associated with better under-five survival compared with migration duration of between six and 11 months. Meanwhile, when tested statistically, there was no statistical difference in terms of child survival between the migration duration types. However, the differences observed as

discussed above warrant some further explanations. In the KNDs, migration is seasonal and so people move and return at the beginning of the farming season. This period usually lasts for about five months. Those who come home during the onset of the rains are able to commence the farming activity at the right time and so it is believed that they are able to get the full benefits of the farming activities, all things being equal. These are those who fall within the three to five months migration duration. On the other hand, those who come home after the commencement of the farming season (i.e., staying for 6+ months) are likely to miss the initial phase of the farming season such as land preparation and sowing, among others. This could affect their agricultural yields negatively. This group could also be return migrants who are unable to get any decent jobs since their sojourn and so have to return home at that time. Under such circumstances, they are likely to be worse off economically than those who had been away for a shorter duration of between three to five months before coming home.

Another dimension of the migration duration dynamics is that some of the migrants stay much longer (over one year) if they are unable to achieve their set targets. While away, remittances in the form of cash or some materials are remitted or sent home to their households (Nabila, 1985; Awumbila et al, 2015). Even though they will miss farming activities at home, accumulation of these remittances and resources brought home sometimes outweigh what they would have earned from the farming activities. The resources acquired tend to improve household SES, which is found to improve child survival (Filmer and Pritchett, 2001; Doctor, 2004; Mustafa and Odimegwu, 2008; Nattey and Klipstein-Grobush, 2013). Specifically, improvement in household SES means that mothers will be able to feed their children well, provide them with needed health care and also clothe them well, which go a long way to improve child health and survival. In summary, longer stay allows for the accumulation of wealth that could compensate for the

farm income that the migrant missed at home. However, it has to be noted that, children who are left behind may also be affected in several ways, as discussed elsewhere. As a result, the survival benefit of children associated with longer migration duration of their mothers could diminish due to the long absence from home.

An important aspect of the migration-child survival relationship is the non-monetary benefit where migrants get the opportunity to learn new ideas at place of destination, including those of good health and childcare practices. These ideas are brought home and practiced, which go a long way to enhance child survival. For instance, at place of destination, migrants may be exposed to certain types of health information through several forms of media such as television, radio, information vans and public education. In a study in Morocco, Glewwe (1999) examined the mechanisms through which maternal knowledge raises child health and noted that maternal health knowledge in childcare rather than their level of schooling per se is the crucial factor for the improvement of child health. In a similar study in Mexico, Hildebrandt and McKenzie (2005) found that women in migrant households have more health knowledge than women in non-migrant households. This, by implication, means that migrant mothers apply the knowledge to improve the health and survival of their children.

In terms of duration, it is reasonable to assume that longer stay at place of destination leads to the acquisition of more knowledge compared with migrants who stay for a shorter period before returning. This means that children of mothers with longer migration duration will have a better care and survival than children of mothers with shorter migration duration or better still, non-migrant mothers.

Summarizing, this section has shown that there is a survival advantage for children of migrant mothers compared with children of non-migrant mothers. When

migration duration types are compared with non-migrants, children of mothers with any migration duration type has better survival than children of non-migrant mothers. However, no particular pattern emerges in respect of differences in survival advantage among the different duration types. What is, however, very clear is that children of migrant mothers have a better survival probability than children of non-migrant mothers, thereby sustaining the third hypothesis of this study. At this point, it is important to examine the other factors (variables) that affect under-five mortality, and have been used as confounders in this analysis.

8.3.2 Household socio-economic status (SES) and under-five mortality

Household socio-economic status (SES) is one of the variables of interest this study had set out to investigate in relation to under-five mortality. The results point to the fact that household SES is associated with under-five mortality, as established at the bivariate stage. For instance, the results show that even though there is survival advantage for children of mothers in the poorer household compared with children of women in the poorest household, the difference was not statistically significant. However, there was survival advantage of up to 15 percent in favour of children of women in poor households compared with those in the poorest households. Those children whose mothers were in less poor households had about 17 percent survival advantage compared with children of mothers in the poorest households. As expected, children of mothers in the least poor (richest) households were about 34 percent less likely to die compared with children in the poorest households. The finding is consistent with similar findings from studies conducted elsewhere (Houle et al, 2013; Doctor, 2004; Nattey et al, 2013).

Note that the above results and the associated differences in under-five mortality between the various household SES, as shown in Model 1 were unadjusted (not controlled for any confounders). However, when adjustment was made by introducing the other

socio-demographic variables as confounders to tease out the effect of these factors on the relationship between household SES and under-five mortality, the statistical differences disappeared except between children of mothers in the least poor (richest) households and those in the poorest households, as shown in Models 3. Specifically, the results revealed that children of mothers in the least poor households were 15 percent less likely to die compared with children of mothers in the poorest households.

Reasons for the differences in under-five mortality between the different groups of households, in terms of their SES, are not far-fetched. It has been noted that, the higher one's income is, the lower one's likelihood of disease and premature death (Cheryl et al, 2012). In the first place nutrition is an important factor that affects child health and survival. Households with higher SES are able to provide for themselves balance diet, for the proper growth of its members, particularly children. On the other hand, the poor is unable to provide such balanced diet for children. As a result, children of poor households are less resistant to infectious diseases and death due to malnourishment (Black et al, 2003). Pregnant women need proper diet for the unborn babies to develop well. However, most poor households are unable to afford such good and balance diet for pregnant women and so their children are born less healthy and are thus less resistant to diseases and deaths. In terms of health care, the poor are unable to afford better health care as well as unable to make appropriate use of health care services (Schellenberg, 2003). These, among other factors, explain the child survival advantage associated with the relatively rich households compared with children of poor households.

Meanwhile, the disappearance of significant difference in under-five mortality between the first four socio-economic groups, after controlling for the available confounders needs further explanation. It is important to recognize that factors affecting child survival are multifaceted. Apart from economic factors, others such as health system

factors, social factors as well as community level factors play a key role in determining child health and survival. In the KNDs, over the past one and a half decades, the health system has been such that geographical access to healthcare services has been made relatively easier following the implementation of the CHPS program, where health services are sent closer to the people by relocating nurses to the communities instead of staying at distant health facilities. For this reason most people, both rich and poor have easy access (geographical) to health facilities. In terms of economic access, the health insurance system, which also has some exemptions for children and pregnant women, has also enhanced access to healthcare services. All of these tend to improve child health and survival for both the poor and rich and may mask or significantly reduce any potential difference in child health outcomes between different socio-economic groups, as reported by other studies (USAID, 2015; Chen & Jin, 2012).

8.3.3 Maternal education and under-five mortality

The relationship between maternal education and under-five mortality has been a subject of many studies over the last three decades or more. From the results of this current study, maternal education has been found to have a significant effect on child survival. For instance, after controlling for some confounders to see the net effect of maternal education on under-five mortality, the results of the multivariate analysis show that children whose mothers had primary level of education were about 39 percent less likely to die compared with children whose mothers had no education. Similarly, children whose mothers had education up to the junior high (JHS) or middle school level had about 34 percent less likely to die before age five compared with children whose mothers had no education. As expected, the highest survival advantage was associated with children whose mothers had education up to secondary school and beyond, where those children were about 45 percent less likely to die before celebrating their fifth birthday

compared with their counterparts whose mothers had no education. These results are consistent with other studies in Ghana and elsewhere (Kanmiki et al, 2014; Nattey et al, 2013; Bicego and Boerma, 1993; Tawiah, 1979; Aslam & Kingdon, 2012; Frost et al, 2005; 2012, Buor 2003).

There are many ways through which maternal education impacts on child survival. Firstly, education broadens the individual's knowledge and increases the skill and ability of the woman to deal with issues pertaining to child health, leading to better child health outcomes (Caldwell, 1979; Murthi et al, 1995). Literate mothers are able to access information on their own to their benefits. Educated mothers are also more empowered than non-educated mothers, both economically and socially, to demand or seek better health services for their children. Feeding habits, use of preventive care, adherence to therapy and other conducts that enhance child survival are known to correlate with higher levels of education (Adler et al, 1994; Goldman and Smith, 2002). Apart from child survival benefits, the importance of maternal education transcends several sectors of the economy. That is why government efforts at empowering women through the girl-child education has been unrelenting in Ghana in the past few years.

Due to the low levels of female educational attainment, as shown in Table 4.1, the wide variation in respect of child survival probabilities as found in this study is not surprising. This also means that child survival benefits associated with maternal education will be minimal due to this low levels of maternal education in the study area.

8.3.4 Maternal age and under-five mortality

The relationship between under-five mortality and maternal age at birth of child has been found by several studies to exhibit a U-shaped characteristic, with the risk of child death being highest at both ends of the reproductive age spectrum of females

(Kayode et al, 2012; Doctor, 2011). However, the results of this study exhibits a more or less linear characteristics, where child survival gets better with increases in mothers' age. For example, as shown in Model 3 (Table 8.2), where the model has been controlled for the effects of some confounders, there was no statistical difference in under-five mortality between children whose mothers are 15-19 years and children born to mothers who were 20-24 years. However, when comparison was made between children whose mothers were 15-19 years and those whose mothers were 25-29 years, the latter were about 31 percent less likely to die compared with the former. Children whose mothers were in the age group 30-34 years and 35-39 years, each were 32 percent less likely to die compared with children whose mothers were 15-19 years. With respect to children whose mothers were 40-44 years, they were 38 percent less likely to die compared with children whose mothers were in the youngest age group. Children whose mothers were in the oldest age group were 39 percent less likely to die compared with children whose mothers were in the age group 15-19 years. This result is contrary to that observed at the bivariate level, where the pattern exhibited a U-shaped characteristic. This has probably been due to the adjustments (control) made to the model as the unadjusted result (not shown) exhibited the expected U-shaped pattern. This means that the moderating effects of some of the control variables such as education and household SES could play to the advantage of the older women.

Reasons attributed to the pattern observed are not far-fetched. Firstly, the high under-five mortality associated with young mothers is explained by the fact that young mothers are biologically immature for childbirth. At younger ages, fetuses of these women are unable to develop properly due to restrictions of blood supply to the cervix and uterus (Miller et al, 1996). The restriction predisposes the pregnant mother to infections, leading to preterm or low birth weight, which are major risk factors of child

death (Ventura et al, 1994: Paneth, 1995). Another factor is that young mothers are inexperienced in childcare and could make mistakes, such as inappropriate feeding regimes, wrong medication among others, that could affect child health and survival. Due to their young age, some of them conceal their pregnancies and so do not attend antenatal clinic on time for medical check-up, and this may lead to complications and affect the child's health and survival. Younger mothers may not have enough resources to take care of themselves and their children, who become malnourished and are at high risk of death.

8.3.5 Place of delivery of child and under-five mortality

One of the critical risk factors of child health and survival is the place where women deliver their babies, as well as the main person who assisted in the delivery. New born babies are vulnerable and susceptible to infections that can affect their health and sometimes lead to death. In this study, places where the study children were delivered are health facility, home of child and some other places other than the two. The results indicate that children who were delivered outside a health facility have a higher risk of under-five mortality compared with those born in health facilities (Table 8.2). For instance, children who were delivered at their respective homes were about 52 percent more likely to die compared with those who were born at a health facility. On the hand, those who were born elsewhere, other than their own homes were about 2.1 times more likely to die compare with those children who were born at a health facility.

The place of delivery and its associated risk of death is felt mostly at the neonatal stage. This is largely due to the type of environment in which the child is born into. Health facilities have clean environment and less prone to infections that could result in diseases and deaths. Health facility deliveries are also handled by health professionals who are able to deal with any birth complications that could lead to some health problems or the death of the child. The use of unsterilized instruments used in cutting the umbilical

cord of new born babies who are delivered at home, could introduce tetanus toxoid into the child which could result in complication and death of the child. Therefore, unavailability of the appropriate instruments and absence of health professionals to facilitate healthy delivery at homes leads to higher infant deaths compared with deliveries at health facilities.

It is believed that the difference in mortality among the different places of delivery could be larger but for the fact that in the KNDs, some of the deliveries that occur at home are attended to by health professionals who are called upon whenever it is not possible to transport the pregnant woman to the health facility for delivery.

8.3.6 Birth order and under-five mortality

Studies have revealed some association between birth order of a child and under-five mortality. However, results from these studies point to different findings, with some showing a high survival probability for first born children compared with children of higher birth order. This is based on the intra-household resource dilution hypothesis (Downey, 2001), for which older children are disadvantaged due to less available resources as more children are born. On the other hand, some studies have found that children of first order have a higher mortality compared with children of higher order birth. The findings of this present study does not conform to any of these findings. As shown in Model 3 of Table 8.2, where the model is controlled for the confounding effects of some socio-demographic variables, children of birth order 2-4 were about 26 percent less likely to die compared with children of first order births. On the other hand, children of birth order five and higher were about 31 percent less likely to die compared with children of first order birth. The net effect of birth order on under-five mortality, as noted above, indicates that mortality decreases with increasing birth order. The major reason for the survival disadvantage associated with first order children is the fact that most of these

children are born to young, and in some cases teenage mothers. And as already alluded to, children of these young mothers have been found to have higher probability of deaths compared with children of older mothers. It is also the case that first born children do not have sibling to protect them from danger, except where there is a house help or other family member to do so. When not attended to, these children have the tendency of touching and putting things in their mouths that can endanger their lives, thereby increasing their risk of dying compared with higher order children.

8.3.7 Multiple births and under-five mortality

Multiple births have been found to have high risks of death, and this seems to be a universal fact since almost all studies on multiple births attest to this fact (Health Canada, 2004; Hong and Hor, 2013). The results of this study confirm this assertion, where multiple birth children have about 72 percent higher probability of death compared with children born singleton. This finding is consistent with the results of the bivariate analysis.

Various factors account for the survival disadvantage associated with multiple birth children. The main one is biological, where during pregnancy of twins there is intrauterine growth restriction, which results in inadequate supply of oxygen leading to malnutrition of the fetuses (unborn babies). As a result, the children are likely to be born with low birth weight and birth complications, leading to poor growth, ill-health and death. Other factors such as behavioral, cultural, social and economic come into play to affect the health and survival of multiple birth children beyond the neonatal stage (Guo and Grummer-Strawn, 1993). The main factors here include nutritional inadequacies, poor clothing and inadequate attention from parents that could lead to high risk of injuries and deaths.

8.3.8. Presence of grandmother and under-five mortality

As noted earlier, grandmothers are important kinship members whose experience in childcare has been found to contribute positively to child wellbeing and survival. In this study, the effect of the presence of paternal grandmother in the household on under-five mortality was examined. The results, which show the net effect of grandmother presence on under-five mortality revealed that children with grandmother present in the household were 12 percent less likely to die compared with children whose households were without a grandmother. This finding is consistent with results from a number of studies (Beise, 2005; Sear et al, 2000), and the pathway through which grandmother's presence impacts positively on child survival have been explored.

In most rural settings, paternal grandmothers, unlike maternal grandmothers, are usually in the same household of the child's mother and so are able to guide and assist the wives of their sons during pregnancy through to delivery and beyond. They (grandmothers) guide their daughters-in-law in their daily routines, assist in household chores, remind them of clinic attendance and educate them on the general rubrics regarding best practices on how to handle a pregnancy (Gupta et al, 2015). They (grandmothers) also assist directly in feeding, bathing as well as performing other such functions that enhances child health. All these contribute to a higher survival of their grandchildren than children without grandmothers.

In summary, the results of this study have established that maternal migration improves household socio-economic status and enhances child survival, the main objective for which this study sought to investigate. Children whose mothers have ever migrated and returned have a lower probability of death compared with children of non-migrant mothers. Marginal survival benefits were found to be associated with different migration durations when compared with non-migrants. The results also revealed that

maternal migration is associated with household socio-economic status as households of migrant women have a higher SES compared with households of non-migrant women. Other variables were examined in relation to under-five mortality and were found to have significant effect on under-five mortality. These variables included, household socio-economic status, maternal education, maternal age at time of delivery of child, place of delivery of child, birth order of child, number of children delivered from a single pregnancy and the presence or absence of grandmother of the child in the household.



CHAPTER NINE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

9.1 Introduction

Death to children under the age of five years is one of the important health, economic and social problems faced by parents and governments the world over. This is because apart from the irreversible loss to society and country at large, it is a major indicator of socio-economic status of every country. This study was thus occasioned by the growing efforts at identifying factors that can help address the high levels of under-five mortality in the Kassena-Nankana East Municipality and Kassena-Nankana West district of northern Ghana. An important aspect of this study is the high levels of poverty that is pervasive in the study area, which is a rural farming community. Lack of or inadequate social and economic opportunities limits women's ability to take adequate care of their children that could lead to better child health and survival. As a result, one major alternative means of livelihood is seasonal out-migration from the area to other parts of the country in search of jobs.

Over the past few years, women have dominated the migration process. However, the contributions of these migrations to household SES and child health and survival have rarely been studied. The main objective of this study was, therefore, to investigate the impact of female migration on under-five mortality in the Kassene-Nankana Municipality and Kassene-Nankana West District (KNDs) of northern Ghana. Data from the Navrongo HDSS for the period 2000 to 2014 were used for this analysis. Mothers were categorised into migrants (return migrants) and non-migrants. The return migrants were further categorised into three groups according to their duration of stay outside the study area before returning. This is to allow for the investigation of the effect of maternal migration

duration on under-five mortality in the area. This chapter summarizes the findings of the study, draw some conclusions and offer some recommendations.

9.2 Summary of findings

In all, 20,990 women and their children with their characteristics were part of the analysis. Out of this number, 1,854 (8.8%) of the children of these women died before attaining their fifth birthday. In terms of the migration status of the mothers, only 10 percent of the women had never migrated out of the study area. For those who had ever migrated out and returned, about 19 percent of them had been away for less than six months. Those who returned after being away for between six and 11 months formed 14 percent, while those who sojourned for one year and over formed about 57 percent. The study established that about 22 percent of the women were residents of the poorest households, while only 17 percent were in the richest households. Those women who were residents of households in the middle quintile form the highest proportion of about 31 percent. In terms of age at birth of child, women who were in the age group 25-29 constituted the highest proportion of 23.8 percent. Women's educational attainment was very low, as about 57 percent of them had no formal education. Those with primary school education constituted 25.5 percent, while those with JHS/Middle school level education were just about 12 percent. Only 5.6 percent of the women had SHS level education and beyond.

The results showed that mortality in the study area had declined over the years. The decline has been attributed to the various interventions that took place in the area over the period. However, there was an increase in infant and neonatal mortalities between 2013 and 2014. This reversal in mortality trends of these indicators may be attributed to the slack in the intervention activities there were in place in the past. This could possibly be due to the fact that under some controlled systems of health

interventions, high impacts are always achieved. However, following the completion of these experimental and controlled systems of health delivery and interventions, the regular health systems are sometimes unable to provide similar healthcare delivery to the people. These can be attributed to lack of appropriate leadership, inadequate logistics, lack of the necessary motivation and commitment, among others.

As expected, the study revealed the dominance of women in the migration process in the study area and this is corroborated by literature (Adepoju, 2004; IOM, 2003). Factors responsible for this has been found to include declining job opportunities for males in most of the destination areas. On the other hand, females are more likely to find jobs which range from washing of dishes, carrying goods, serving as house helps as well as engaging in some street selling of items.

From the results, the main reason for migration was to look for job. As high as 43 percent of females moved for the purpose of seeking jobs. Also, about 31 percent of females moved by way of following relatives. Even though no specific reasons were given, it is believed that they also moved probably for economic reasons. This finding is also in consonance with much of the literature in respect of why people migrate, most of which is for economic purposes (Stark and bloom 1985; Lucas 1997; Quisumbing and McNiven, 2007; Black et al, 2004; Awumbila et al, 2011).

The study area is mainly rural with high levels of poverty, so migration has been adopted as one of the means to overcome extreme poverty and deprivation. Findings from this study have established that households of female return migrants have a higher socio-economic status than households of female non-migrants. This finding sustains one of the hypothesis of the study, which states that households of female return migrants have a higher SES than households of female non-migrants. The results show marginal

differences in household SES between households of female non-migrants and the different migration duration types.

While migration was found to contribute to higher household SES, the results established that higher levels of maternal education contribute more to household SES than migration. This finding is not surprising as educated women are highly placed to secure better and well paid jobs, either as migrants or non-migrants.

An important aspect of this study is the association between household SES and under-five mortality, which was one of the hypothesis of the study and states that children of households with higher SES is associated with lower under-five mortality. As expected, the finding showed that children of households with higher SES have a lower probability of under-five mortality, thus sustaining the stated hypothesis. Members of rich households are able to provide for themselves well balanced diets, afford better healthcare for their children, all of which promote good health and survival.

The main theme of this study is the examination of the relationship between maternal migration and under-five mortality in the study area. Having established the fact that female migration improves households SES, which in turn impact positively on child survival, the result of the direct relationship between maternal migration and under-five mortality showed that children of return migrant mothers have a higher survival probability than children of non-migrant mothers. This was evident at the bivariate, unadjusted and the adjusted levels of this analysis.

Another important variable that was shown to impact on under-five mortality was maternal education. From the results, maternal education contributed substantially to child survival. Higher levels of maternal education was found to be associated with lower under-five mortality, and this is consistent with findings from several studies. The reason

for this is not far-fetched as these have been discussed extensively in the literature. However, the study area has been found to have low female educational attainment and what that means is that the benefits associated with maternal education in respect of under-five mortality may be limited.

Delivery outside a health facility was found to be one of the major risk factors of child mortality. Children born at health facilities were found to have the lowest risk of under-five mortality compared with children who were born outside a health facility. Presence of health professional who can handle complications during labour and the clean environments associated with health facilities are some of the factors responsible for the higher child survival associated with children born at health facilities than those born outside health facilities. The study area is fortunate to have quite a number of health facilities, mostly clinics and CHPS compounds in most communities, thereby enhancing geographical access to these facilities. Even though the average proportion of health facility delivery for the analysis period (2000-2014) is about 46 percent, recent proportion of health facility delivery is over 70 percent.

Other variables that were found to have some influence on under-five mortality are age of mother at time of delivery of child. Children of younger mothers were found to have higher probability of death, even though most studies have reported a U-shaped relationship between under-five mortality and maternal age at time of birth of child. Birth order of child was also a predictor of under-five mortality, with first born children generally having higher risk of death compared with children of higher birth order. Multiple births children were found to have a lower survival probability than their counterparts who are born single. The results of the study have also revealed that the presence of the grandmother in the household contributes to higher child survival than households without a grandmother present.

Some variables were included in the analysis but did not have any significant effect on under-five mortality in the study area. These are the sex of child and marital status of mothers. Factors responsible for sex differentials in child mortality are mainly biological where male children have a higher mortality than female children. This differential effect is felt greatly at the infant stage of life and tends to reduce and disappear towards age five. In some settings where sex preference is prevalent in favour of one particular sex, the differentials tend to extend beyond age five. For instance, there is high male preference in India (Das Gupta et al, 2003) and as such there is high female mortality than males. However, in the KNDs where this study is conducted, there is no known preference for any particular sex, hence the absence of sex differential in mortality up to age five, as found in this study. It is believed that at the infant level, probably the differentials would have been observed as a result of purely biological factors.

9.3 Conclusion

This study set out to examine the effect of maternal migration on under-five mortality in the study area. Under-five mortality rate in the Kassena-Nankana Districts still remain high even though the rate has been declining over the last few decades. However, the study area recorded an increase in neonatal mortality and infant mortality between 2013 and 2014, which needs further interrogation.

The results also showed that households with female return migrants have higher socio-economic status than households without female migrant. This means that individuals in migrant households are in a better position to meet their basic needs than their counterparts in non-migrant households. In accordance with the main objective, this study examined the effect of maternal migration on under-five mortality and the finding revealed that children of return migrant mothers have a higher survival probability than children of non-migrant mothers.

With respect to the return migrants, duration of absence before returning to place of origin was also examined in relation to under-five mortality. Durations of less than six months, between six and 11 months, and 12 months and more were compared separately with non-migrants in relation to the survival status of their children. Even though no particular pattern emerged, it was, however, clear that children of migrant mothers, with any of the migration duration type, had a highest survival advantage than children of non-migrant mothers.

An interesting finding that emerged was the fact that women with a shorter migration duration of less than six months were better off in terms of both household SES and under-five mortality, compared with women with a longer migration duration of between six and 11 months.

Other variables that were examined in relation to under-five mortality were mothers' educational status and age at birth of child. The rest were household socio-economic status, place of birth, birth order, number of children born from one pregnancy and presence or absence of grandmother.

The result of the study revealed that higher levels of maternal education is associated with lower under-five mortality. With respect to household SES, the result showed that children of households with relatively higher SES had a lower chance of death compared with children of households with low SES. However, there was no statistically significant mortality difference between children of the poorest and poorer households. However, when the model is controlled for some confounding variables, the significant difference in mortality between the various poverty quintiles disappeared except between children in households of the highest quintile (richest) and those of the poorest households, where the former had a significantly lower mortality risk compared

with the latter. The possible reasons for the absence of statistical difference was discussed.

Children born at health facilities were reported to have a higher survival probability than those born outside health facilities. The results also showed that children born at their own homes survived better than children born in other homes such as in transit, traditional birth attendant's (TBA's) home and traditional healer's home. In terms of birth order, the findings revealed that generally, first order births had statistically significant higher probability of death compared with higher order births. The number of children born from a single pregnancy was examined in relation to under-five mortality and the results showed that multiple birth children had a higher risk of dying compared with their counterparts who were born single. The presence of a grandmother was found to impact positively on child survival in the KNDs, as postulated by the grandmother hypothesis.

9.4 Recommendations

The results of this study have revealed increases in infant and neonatal mortalities in recent times, following earlier declines. It is recommended that the Ghana Health Service (GHS), represented by the health directorates of the Kassena-Nankana Municipality and Kassena-Nankana West District should identify the causes of the recent increases in the mortality levels. This will allow for the review and strengthening of the health system to bring back those gains that prevailed in the past. It is realized that the mortality increases in recent times occurred at the neonatal stage. This points to the fact that endogenous factors are the major causes of these deaths. This, therefore calls for close monitoring of pregnancies at the early stages. This will make it possible for any risk associated with the pregnancy to be identified and dealt with on time. This in turn means that women should

be intensively and extensively educated on the need to seek antenatal care very early during pregnancy. The need to also deliver at health facility and by health professionals should also be taken seriously. This requires intensive and continuous education of pregnant women in particular as well as women with little children on good health practices. All these require that more health professionals (Doctors, Midwives) are trained to reach out to all pregnant women in good time, particularly those in rural areas.

The Navrongo Health Research Centre (NHRC) runs a Health and Demographic Surveillance system (HDSS) that has data on some key determinants of health and mortality. It is recommended that the NHRC should liaise with the two health directorates in the study area to do some detail analyses to identify the key factors that are responsible for the recent increases in the neonatal and infant mortality rates. The NHRC has causes of death information of all resident members (including infants) who die. The causes of death data can be reviewed to identify the particular causes and circumstances of deaths during the period of increases in the mortality rates. This way, the GHS can implement appropriate interventions to enhance child health and survival in the study area.

Women play several roles in contributing to household upkeep and this task becomes more challenging in poor rural areas where opportunities are limited. Results of this study have shed some light on the important contribution of female migration to household SES and under-five mortality in the KNDs. Therefore, with migration as an important means by which women can overcome rural hardships, it behooves on government to implement policies that will address challenges that migrants in general, and female migrants in particular face. Often times women who migrate from rural areas to urban destinations experience marginalization and sometimes exploitation. This has compelled some policy think tanks to advocate the curtailment of female migration from rural to urban areas. This perception is being contested as being misguided (Owusu, 2008;

Awumbila et al, 2014, all cited in Awumbila et al, 2015). An important point to recognize is that so long as rural poverty persists, migration becomes an important alternative livelihood strategy for rural dwellers. The benefits of migration in terms of financial resource accumulation and exposure to modern best practices should be recognized and promoted.

It has to be realized that migration presents mutual benefits to the migrant and those who utilize their services at destination areas. In their quest to earn some income, migrants' services are also important in shaping economic activities of destination areas. What is important is for some regulatory mechanisms to be put in place to address challenges associated with rural-urban migration. These problems include poor sanitation, lack of decent accommodation, abuse and marginalization of migrants. For instance, in the run up to the 2016 general elections in Ghana, one of the presidential candidates, now the current president, realizing the plight and the positive contributions female head porters (mostly migrants from the north of the country) make to the national economy, promised to provide some affordable places of abode to solve the accommodation challenges faced by vulnerable people, particularly female migrants.

The National Migration Policy (NMP) was launched at the latter part of 2016. The NMP is aimed at providing a comprehensive framework to manage migration for Ghana's sustainable development. The policy also seeks to maximize the gains and minimize the costs associated with migration. However, the Ghana National Commission on Migration (GNCM), a body that is crucial for the implementation of the policy has not been established. It is recommended that efforts should be put in place to get the GNCM constituted to draw and implement the migration policies, especially where migration had benefits for individuals and households and for the country to reap the full benefits of migration. Specifically, the commission and other agencies could regulate migration both

internal and international by providing information to potential migrants regarding possible places of destination with readily available jobs.

Maternal education was found to have a substantial impact on under-five mortality in the study area. Higher educational status of the mother is associated with lower mortality. However, it was realized that educational levels of females in the KNDs are very low, particularly beyond the junior high school (JHS) level. Quite a number of the females are unable to continue beyond this level for several reasons. It is, therefore, important that factors that militate against female education should be identified and the appropriate interventions put in place to improve female enrolment and retention at all levels of education. Poverty has been identified as a major factor of school dropout, particularly for girls (Abu, 2015; A., Imoro, 2009) and to curb this phenomena, it behooves on the Government, the assemblies and other relevant stakeholders to implement pro-poor interventions to improve on the income levels of families. Parents also have important roles play in the education of their children. Being a rural area where most parents themselves are uneducated, District Assemblies, the GES, as well as relevant stakeholders should take it upon themselves to educate parents on the importance of education and the need for parents to take their wards' education serious.

Grandmothers' positive contribution to child survival has been revealed by the findings of this study and many other studies. As result, their contribution should not be overlooked when drawing up programmes targeting improvements in child health and survival. Even though some of their ideas have been viewed as conservative, some lessons can be learnt from their experiences for the improvement of child health and survival. The Ghana Health Service (GHS) could offer some rudimentary training to these grandmothers on several aspects of maternal and child health, particularly in remote areas where access to health facility is difficult. For instance, the GHS could provide some

basic training to elderly women on the identification of danger signs pertaining to pregnancy and the appropriate action required, while efforts are made to take the patient to the nearest health facility. The women could also be educated to avoid “primitive” and harmful health practices that could endanger the life of the patient.

In the long term, governments should adopt strategies to close the developmental gap between northern and southern Ghana so that individuals who do not migrate can also have some economic engagement at rural place of origin in order to earn income for a better socio-economic status and eventually higher child survival. This can be achieved by creating opportunities for dry season farming. In this regard, the District and the Municipal Assemblies should provide the necessary inputs to facilitate and motivate people to go into dry season farming. Among the key inputs are provision of dams and dug-outs, fertilizers and insecticides. However, to make the best out of the farming activities, there is the need for ready market for their farm produce, particularly tomatoes since the commodity is cultivated on commercial quantities and are also easily perishable. The situation where tomato traders from southern Ghana refuse to buy tomatoes in Navrongo but rather pass to Burkina Faso to buy tomatoes there is making the tomatoes business in Navrongo unattractive. It is thus recommended that the Government, through the Ministries of agriculture, trade and industry, should put in measures in place to get ready market for tomatoes produced in Navrongo and elsewhere in Ghana. An important consideration is to revamp the Pwalugu Tomatoes Factory in the Upper East Region to provide ready market for tomatoes produced in Navrongo and other places such as Veve, also in the Upper East Region. As a perishable commodity, readily available market will prevent the heavy losses farmers encounter annually and the associated economic hardships thereof, which sometimes push some of the farmers to commit suicide (Adimabuno, 2010).

9.5 Study's contribution

According to King (2012), return migration became a topic for detailed study only in the 1970s and 80s and still remains an understudied component of migration. Similarly, one of Ravenstein's law of migration (law 6), which focuses on feminization of migration, has been ignored and is likely to be so for the next hundred years (King, 2012). This current study makes very useful contribution to our understanding of female return migration and how it impacts on household socio-economic status and child survival.

The focus of most migration studies tend to examine the consequences of migration on either the migrant, unemployment and poor sanitation, among others at the urban places of destination. These studies tend to emphasize on the negative aspects of migration. Several studies have also examined the effect of maternal migration on children left behind, with most of them being interested in the negative outcomes of such migrations. This current study contributes to our understanding of the effects of maternal migration at place of origin after migrant has returned to place of origin. This then provides us with the opportunity to appreciate the benefits associated with such migration.

Maternal migration durations and their benefit to the households in terms of their SES and child survival has rarely been studied. This study thus makes very important contribution to knowledge by investigating the relationship between maternal migration duration and under-five mortality in a rural setting.

As mentioned elsewhere in this thesis, several studies have examined child mortality differentials among countries, regions and population subgroups. While some of these studies have found similar results, others have found contrasting results. This is so because some, if not most, of these studies use cross-sectional data with small study

population for their analysis or they have few variables or both. However, the use of longitudinal data spanning a period of 15 years, with a study population of almost 21, 000 and with several socio-demographic variables as confounders has the advantage of overcoming the problem of producing any biased or spurious results that might not represent the true situation of the population under study.



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